**3GPP TSG-RAN WG2 Meeting #113 electronic R2-2101975**

**Online, Jan 25th – Feb 5th, 2021**

**Agenda Item:**  **8.8.3** **Slice based RACH configuration**

**Source: CMCC**

**Title:** **Report of [AT113-e][252][Slicing] Conclusions on slice-based RACH configuration**

**Document for: Discussion and Decision**

## 1 Introduction

At RAN2#113-e meeting, the following email discussion is allocated after the 1st week web conference and to be reported to the 2nd week web conference.

* **[AT113-e][252][Slicing] Conclusions on slice-based RACH configuration (CMCC)**

Scope:

* + - Determine agreeable additional conclusions on slice-based RACH configuration for the SI, including technical justification of each and open issues not handled during the SI.

 Intended outcome:

* + - Discussion summary in [R2-2101975](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_113-e/Docs/R2-2101975.zip) (by email rapporteur).

 Deadline for providing comments, for rapporteur inputs, conclusions and CR finalization:

* + - Initial deadline (for companies' feedback): 2nd week Mon, UTC 1200
		- Initial deadline (for rapporteur's summary): 2nd week Tue, UTC 1200

## 2 Slice based RACH configuration

### 2.1 Previous agreements

Here are the relevant agreements made at RAN2#112-e meeting [2]:

Agreements

* 10: The intentions and use cases for slice-based RACH configuration are as follows:
Intention 1: RA resource isolation. From marketing point of view, some of the industrial customers have the requirement for access resource isolation, in order to provide guaranteed RA resources for their sensitive slices.
Intention 2: Slice access prioritization. In R15/16, all slices are sharing the same RA resources and cannot be differentiated by network side. But some slices may need to be prioritized during the RA procedure.
* 11: The following solutions will be studied and captured in the TR 38.832:
Solution 1: Slice-specific separate RACH resources pool can be configured per slice or per slice group, in addition to the existing common RACH resources.
Solution 2: Slice-specific RACH parameters prioritization can be configured per slice or per slice group.
Neither solution may not be applicable to all possible slices.

Agreements made at RAN2#113-e during 1st week web conference:

**Agreements**

3 Slice based RACH configuration can be applied to idle/inactive UE.

4 The association between slices and slice-specific RACH resources can be configured and provided to UE in SIB and dedicated signalling.

### 2.2 Discussions on open issues

Here are some open issues and the corresponding proposals from companies’ contributions [3~16].

#### Q1: RACH resource isolation

Proposal 8 in [5]: Separated PRACH transmission occasions of time-frequency domain and preambles can be configured for slice or slice group. [5]

**Question 1: Do you agree with the above proposal? Please provide comments if any.**

|  |  |  |
| --- | --- | --- |
| **Company** | **Agree or not (Yes/No)** | **Comments** |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

#### Q2: RACH Prioritization

Proposal 10 in [5]: Existing RACH parameters prioritization (i.e. *scalingFactorBI* and *powerRampingStepHighPriority* ) can be supported as baseline for slices.

**Question 2: Do you agree with the above proposal? Please provide comments if any.**

|  |  |  |
| --- | --- | --- |
| **Company** | **Agree or not (Yes/No)** | **Comments** |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

#### Q3: Slicing Grouping

Proposal 2 in [3]: RAN2 is kindly suggested to discuss how to configure slice group(s).

Proposal 2 in [6]: For slice-based RACH isolation and prioritisation, the gNB provides RACH configuration for one or more Access Categories from the set of Operator-defined Access Categories.

From rapporteur point of view, access category is to allocate 1 or several slices into 1 group i.e. 1 Access Category.

**Question 3: Do you agree to using slice group? Whether to define a new grouping mechanism or reusing UAC access category is left to WI phase.**

|  |  |  |
| --- | --- | --- |
| **Company** | **Agree or not (Yes/No)** | **Comments** |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

#### Q4: RA type selection for slicing

2-step RACH was introduced in NR Rel-16, which can send both msg1 and msg3 in msgA to reduce latency of RACH procedure. According to TS 38.321 [3], whether to select 2-step RACH or 4-step RACH only depends on RSRP measurement against configured threshold. However, for slice-specific RACH, some companies think it makes sense to introduce new approach to select 2-step RACH, e.g. 2 step RACH is preferred for URLLC related slice(s) to reduce RACH access latency.[3][10][12] proposed to discuss how to select RACH type.

Proposal 3 in [3]: RAN2 is kindly suggested to discuss how to select RACH type (i.e. 4-step slice-based RACH or 2-step slice-based RACH) in slice-based RACH.

**Question 4.1: Do you agree RACH type selection (between 4-step slice-based RACH and 2-step slice-based RACH) should be considered for slice-based RACH? Details left to WI phase.**

|  |  |  |
| --- | --- | --- |
| **Company** | **Agree or not (Yes/No)** | **Comments** |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

If you agree to discuss 2-step slice-based RACH, there is another issue on fallback mechanism. Fallback mechanism to 4-step RACH was specified for 2-step RACH in NR Rel-16: when the number of msgA transmission failure is beyond the configured threshold, the UE will use 4-step RACH instead. If you agree to discuss 2-step slice-based RACH, [3] proposed that there may have below 4 type of RACH:

1. 2-step slice-based RACH
2. 4-step slice-based RACH
3. 2-step common RACH
4. 4-step common RACH

**Question 4.2: If you agree Question 4.1, do you agree fallback mechanism (e.g. 2 step slice-based RACH fallback to 4-step slice-based/common RACH) should be considered for slice-based RACH? Details left to WI phase.**

|  |  |  |
| --- | --- | --- |
| **Company** | **Agree or not (Yes/No)** | **Comments** |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

Tdoc [10] also discussed that, in legacy, RA prioritization for several scenarios, i.e. HO, beamFailureRecovery and special UE (i.e. MPS and MCS UE) is already supported. If multiple sets of RA parameters are configured, i.e. slice-specific RA prioritization is configured together with legacy RA prioritization, one left issue is which set of RACH parameters to be chosen. For example, in case that UE is in idle/inactive mode and both slice-specific RA prioritization and access identity-specific RA prioritization are configured, UE behaviour should be specified on which set of RACH parameters to be prioritized.

Proposal 4 in [10]: RAN2 considers to solve the collision in case that slice-specific RA prioritization is configured with legacy RA prioritization, i.e. it should be specified that which set of RA parameters to be prioritized.

Email rapporteur tend to think this is kind of issue to be solved in WI phase, and would like to check with companies’ views.

**Question 4.3: Do you agree that the collision in case that slice-specific RA prioritization is configured together with legacy RA prioritization (e.g. MPS & MCS UEs) need to be solved in WI phase, i.e. to specify which set of RA parameters to be prioritized?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Agree or not (Yes/No)** | **Comments** |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

#### Q5: Slice info for MT

Proposal 6 in [5]: To support slice-specific RACH configuration, for MT traffic, the intended slice (e.g. implicitly indicated by access category) should be indicated in paging message.

Proposal 3 in [6]: For mobile terminated calls, RAN2 recommends a general mechanism for RA priority indication that can also be used to isolate or prioritize RA for certain slices or group slices.

**Question 5: Do you support to indicate slice info in paging message for MT traffic? Details left to WI phase.**

|  |  |  |
| --- | --- | --- |
| **Company** | **Agree or not (Yes/No)** | **Comments** |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

#### Q6: Co-existence for solution 1 & 2

It seems solution 1 & 2 are not conflict with each other and both can be specified. Companies are invited to confirm with this understanding.

**Q6: Do you agree the solution 1 & 2 can work together?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Agree or not (Yes/No)** | **Comments** |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

#### Q7: Conclusion for slice-based RACH configuration

Proposal 1 in [16]: Both solution 1 and solution 2 for slice-based RACH configuration are recommended for normative work. (And the details are depending on the summary of the above questions.)

**Q7: Do you agree the above conclusion? If not, please also provide the suggested conclusion.**

|  |  |  |
| --- | --- | --- |
| **Company** | **Agree or not (Yes/No)** | **Comments** |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

## 3 Conclusion

Here are the summarized proposals for this email discussion.

## 4 Reference

Session Chairman notes:

1. RAN2-112e LTE DCCA Mobility RAN slicing and Multi-SIM (Tero)\_2020-11-13-eom UTC
2. RAN2-113e LTE DCCA Mobility RAN slicing and Multi-SIM (Tero)\_2021\_01\_26\_1900

Contributions for slice based RACH configuration

1. R2-2100129 Discussion on candidate solutions of slice-based RACH Qualcomm Incorporated
2. R2-2100363 Consideration of slice based RACH Intel Corporation
3. R2-2100424 Considerations on the solutions of slice based RACH configuration Beijing Xiaomi Software Tech
4. R2-2100599 RACH prioritisation for slices Nokia, Nokia Shanghai Bell
5. R2-2100662 Consideration on slice based RACH configuration Spreadtrum Communications
6. R2-2100705 Remaining issues on RACH configuration vivo
7. R2-2100878 Discussion on slice based RACH and cell barring Apple
8. R2-2100895 Consideration on slice-specific RACH OPPO
9. R2-2100929 Consideration on slice-specific separate RACH resources pool Samsung Electronics
10. R2-2101062 Considerations on solutions for slice-specific RACH configuration Lenovo, Motorola Mobility
11. R2-2101195 Consideration on the slice specific RACH configuration ZTE corporation, Sanechips
12. R2-2101405 RSRP Thresholds for RACH separation and prioritisation for numerous slice configurations NEC Telecom MODUS Ltd.
13. R2-2101701 Slice based RACH configuration Huawei, HiSilicon
14. R2-2101805 Solutions analysis and draft TP for slice-based RACH configuration CMCC

## 5 Contact

Since upload announcement is not mandatory required, indicating contact person is helpful in case companies would like to offline. The same list as last email discussion is copied here, please correct the list if contact person is changed.

|  |  |  |
| --- | --- | --- |
| **Company** | **Name** | **Email** |
| Qualcomm | Peng Cheng | chengp@qti.qualcomm.com |
| Huawei | Jun Chen | jun.chen@huawei.com |
| OPPO | Zhe Fu | fuzhe@oppo.com |
| Vodafone  | Manook Soghomonian  | Manook.soghomonian@vodafone.com  |
| Intel | Seau Sian Lim | seau.s.lim@intel.com |
| Nokia | Gyorgy Wolfner | gyorgy.wolfner@nokia.com |
| CMCC | Ningyu Chen | chenningyu@chinamobile.com |
| Xiaomi | Xiaofei Liu | liuxiaofei@xiaomi.com |
| Fujitsu | Ohta, Yoshiaki | ohta.yoshiaki@fujitsu.com |
| Apple | Yuqin Chen | yuqin\_chen@apple.com |
| ZTE | Yuan Gao | gao.yuan66@zte.com.cn |
| SoftBank | Katsunari Uemura | katsunari.uemura@g.softbank.co.jp |
| KDDI | Hiroki Suezaki | hi-suezaki@kddi.com |
| Samsung | Hyunjeong Kang | hyunjeong.kang@samsung.com |
| Ericsson | Håkan Palm | Hakan.l.palm@ericsson.com |
| LGE | HyunJung Choe | stella.choe@leg.com |
| Futurewei | Hao Bi | Hao.bi@futurewei.com |
| Sharp | Art Ishii | ishiia@sharplabs.com |
| Spreadtrum | Xiaoyu Chen | xiaoyu.chen@unisoc.com |
| Turkcell | İzzet Sağlam | Izzet.saglam@turkcell.com.tr  |
| CATT | Chunlin Ni | nichunlin@catt.cn  |