**3GPP TSG-RAN WG2 Meeting #115 e R2-21xxxxx**

**E-Meeting, August 09th - 27th  2021**

**Source: Lenovo, Motorola Mobility**

**Title:****Comparison of Solution Options**

**Document for:** **Discussion and Decision**

# **Introduction**

RAN2 has initiated the following long email discussion.

* [Post114-e][251][Slicing] Solution direction details for slice priorities in cell reselection (Lenovo)

      Scope: Discuss technical details for solution directions identified as part of [AT114-e][250] and identify their pros and cons. Can ask questions on how the solutions work, can discuss combined solutions etc.

      Intended outcome: Discussion report (may include also draft CRs if there is enough convergence)

      Deadline:  Long

Following are the agreements from the RAN2#114e:

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| --- |
| * 1: Frequency priority mapping for each slice (slice -> frequency(ies) -> absolute priority of each of the frequency) is provided to a UE.   Note: Signaling optimizations are not excluded.  Note: "slice may also mean "slice group"   * 1b: Frequency priority mapping for each of the slice (slice -> frequency(ies) -> absolute priority of each of the frequency) is part of the “slice info” agreed to be provided to the UE using both broadcast and dedicated signaling. * 2: RAN2 kindly allow one more meeting cycle for understanding the necessity of Slice priority along with the following shortlisted solution directions for Idle mode mobility:   a) Option 4): Slice priority first looping over slice-frequency combination  b) Option 5): Maximize slice support  c) Option 6): Frequency priority of highest priority slice with adjustment based on actually supported slice(s) in best ranked cell, without multiple iterations of cell reselection  d) Option 7): Perform legacy cell reselection mechanism based on slice specific frequency priority   * 3: RAN2 consider a scenario in its work for slice specific cell (re)selection where it is possible that (Suitable) cells on the same frequency belonging to different TAs support different Slice(s). * 4: Working assumption: The Best cell principle according to absolute priority reselection criteria specified in clause 5.2.4.5 of TS38.304 needs to be met also for slice specific cell (re)selection. * 6: In addition to proposal 2, following aspects are FFS:   a) Content of “Slice Info” – to what extent the information needs to be and should be provided to support the Principle in proposal 5  b) If used, who provides the “Slice priority” (NAS/ AS, UE/ Network)  c) Can RAN2 continue to use “intended” slice for initial registration and idle-mode mobility  d) How UE in each of the solutions from proposal 2 uses slice info for cell reselection if both slice info and existing cell reselection priority is signaled (in the SIB and/ or dedicated signaling) |

This email discussion will be carried in 3 phases; currently we are in the second phase:

Phase 1: Development of Solution directions to one well defined solution

Phase 2: Comparison among solutions out of Phase 1 and selecting the most reasonable one

Phase 3: Coming up with an acceptable draft CR for the selected solution if time and situation permits – depending on the outcome of Phase 2.

# **Solution Options**

# **Option 4**

## How does it work?

The UE Idle mode behavior for slice priorities can be described in following sequence of operation:

**Step 1**: List Slices in the priority order starting with highest priority slice.

**Step 2**: Select the first (or next if from Step 7) slice in the list

**Step 3**: Assign the priorities to frequencies according to the priorities provided to the selected slice

**Step 4**: Perform cell search according to the legacy procedure using the priorities assigned in step 3

**Step 5**: If the highest ranked cell is suitable (as defined in 38.304) and supports the selected slice in step 2 then camp on the cell and exit this sequence of operation; FFS: How the UE determines whether the highest ranked cell supports the selected slice.

**Step 6**: If there are remaining cell frequencies then go back to step 3

**Step 7** (Optional): If the end of the slice list has not been reached go back to step 2

**Step 8**: Perform legacy cell reselection (using non-slice-based priorities i.e. for frequencies not corresponding to any slice support)

## What is the content of “Slice Info” when provided using Broadcast and dedicated signaling?

In a tabular form the Slice Info looks like:

|  |  |  |
| --- | --- | --- |
| SliceInfo-List | | |
| Slice Id-1/ Slice-Group Id-1 | Supported-on-Freq-x | Freq-x-priority |
| Supported-on-Freq-y | Freq-y-priority |
| Slice Id-2/ Slice-Group Id-2 | Supported-on-Freq-x | Freq-x-priority |
|  | Supported-on-Freq-z | Freq-z-priority |
| … | … | … |

## Who provides the “Slice priority” (NAS/ AS, UE/ Network)

AS receives the Slice Priority from NAS and how NAS receives it is left for SA2/ CT1 to solve.

## Can “intended” slice as defined in TR38.832 be used “as is” for in this Solution?

Yes. The content of “intended slice” i.e. which slice is signalled by NAS as part of “intended slice” is left to NAS. For mobility related reselections, the AS uses the “intended slice(s)” last received from NAS.

# **Option 5**

## How does it work?

## What is the content of “Slice Info” when provided using Broadcast and dedicated signaling?

## Who provides the “Slice priority” (NAS/ AS, UE/ Network)

## Can “intended” slice as defined in TR38.832 be used “as is” for in this Solution?

# **Option 6**

## How does it work?

## What is the content of “Slice Info” when provided using Broadcast and dedicated signaling?

## Who provides the “Slice priority” (NAS/ AS, UE/ Network)

## Can “intended” slice as defined in TR38.832 be used “as is” for in this Solution?

# **Option 7**

## How does it work?

## What is the content of “Slice Info” when provided using Broadcast and dedicated signaling?

## Who provides the “Slice priority” (NAS/ AS, UE/ Network)

## Can “intended” slice as defined in TR38.832 be used “as is” for in this Solution?

# **Behaviours in different scenarios**



Q1: Best Cell (Cell 1) on a high priority frequency (F1) does not support the-most-desired Slice (Slice 2). Where should the UE camp (or reselect)? Only one of TA1 or TA2 is part of UE’s RA.

Option 4: The UE camps on Cell 1, based on the best cell principle.

Option 5:

Option 6:

Option 7:



Q2: Best Cell (Cell 4) on a high priority frequency (F1) does not support UE’s only desired Slice (Slice 1). Where should the UE camp (or reselect)? Only TA1 is part of UE’s RA.

Option 4: UE behavior from option 4: On Cell 5 to be able to use Slice 1.

Option 5:

Option 6:

Option 7:



Q3: Only TA1 is part of UEs Registration area. All Slices (1, 2, 3 and 4) are part of UEs Slice list. From radio quality Cell 6 is the best cell on F1. Where should the UE camp (or reselect) if

1. Slice 1 is most desired
2. Slice 4 is most desired

Option 4: UE behavior from option 4: In both cases the UE selects cell 6, the best radio cell.

Option 5:

Option 6:

Option 7:



Q4: F1 has the highest absolute frequency priority according to the *cellReselectionPriorities* provided to the UE but none of the UE desired slices prefer F1 (as configured in the Slice-Info) and cell 8 does not broadcast any Slice support indication. Slice 1 is the only desired slice for the UE and UE’s RA consist of:

1. Both TA1 and TA2 (assuming this is not violating “homogeneous principle in the UE’s RA since cell 11 - TA1 does not prohibit use of any particular slice)

Option 4: UE selects cell 9 on F2 since F1 does not explicitly support Slice 1.

Option 5:

Option 6:

Option 7:

1. Only TA1

Option 4: Same behavior as above and UE needs to perform a RAU procedure.

Option 5:

Option 6:

Option 7:

1. Only TA2

Option 4: UE selects cell 9.

Option 5:

Option 6:

Option 7:



Q5: F1 has the highest absolute frequency priority according to the *cellReselectionPriorities* provided to the UE but none of the UE desired slices prefer F1 (as configured in the Slice-Info). Cell 10 supports only Slice 2 but Slice 1 is the only desired slice for the UE. UE’s RA consist of:

1. Only TA1

Option 4: UE camps on Cell 11 since Slice 1 can be used – UE will need to perform a RAU/ TAU.

Option 5:

Option 6:

Option 7:

1. Only TA2

Option 4: Same procedure as above but without a RAU/ TAU.

Option 5:

Option 6:

Option 7:

# **Comparison of options**

**Q1: Is the solution proposed out of Phase 1 clear enough and covering relevant details?**

|  |  |
| --- | --- |
| **Solution 4** | |
| Company Name | Comments |
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| --- | --- |
| **Solution 5** | |
| Company Name | Comments |
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| **Solution 6** | |
| Company Name | Comments |
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| --- | --- |
| **Solution 7** | |
| Company Name | Comments |
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**Q2: How well the given solution fulfils relevant Objective set out in the WID [RP:210912] and is in accordance with the intention of the study [TR 38.832]?**

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| **Solution 4** | |
| Company Name | Comments |
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| **Solution 5** | |
| Company Name | Comments |
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| **Solution 6** | |
| Company Name | Comments |
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| **Solution 7** | |
| Company Name | Comments |
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**Q3: How easy/difficult is to implement/ specify the solution?**

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| **Solution 4** | |
| Company Name | Comments |
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| **Solution 5** | |
| Company Name | Comments |
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| **Solution 6** | |
| Company Name | Comments |
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| **Solution 7** | |
| Company Name | Comments |
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# **Conclusion**

# **Contact list**

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| Company Name | Delegate Name | Email Address |
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