**Source: Lenovo, Motorola Mobility – Prateek (pmallick@lenovo.com)**

**Title:****Details of Solution Direction Option 4**

**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:

|  |
| --- |
| * 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 combinationb) Option 5): Maximize slice supportc) 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 reselectiond) 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 5b) 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 mobilityd) 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:

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.

# **Phase 1**

## How does Solution Direction (Option 4) 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 belongs to the UE’s RA then camp on the cell and exit this sequence of operation

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

Step 7: If the slice list is not empty 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)

You may now share your understanding and comments in below table:

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| --- | --- |
| Company Name | Comment |
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## What is the content of “Slice Info” when provided using Broadcast and dedicated signaling?

Without attempting to define stage-2 ASN.1 coding (and rather just for understanding purposes), Slice-Info could look like:

*SliceInfoList ::= SEQUENCE (SIZE (1..maxNrofS-groups) OF* [*SliceInfo*](file:///C%3A%5CUsers%5Cpmallick%5CDesktop%5CDraft_38331-g10.docx_ASN1.html#115)

*SliceInfo ::= SEQUENCE {*

 *SliceGroupId INTEGER(0..maxNrofS-groups),*

 *SliceFreqPriorities* [*CellReselectionPriorities*](file:///C%3A%5CUsers%5Cpmallick%5CDesktop%5CDraft_38331-g10.docx_ASN1.html#111)

*}*

Here SliceGroupId can be conditionally present only for broadcast signaling. In dedicated signaling (RRCRelease) the appearance of the slice/ slice-group can be in the same order as from their appearance in the allowed slice list (e.g. as in the Registration Accept message).

## If used, who provides the “Slice priority” (NAS/ AS, UE/ Network)

Network (e.g. NAS signaling because of registration (update) procedure).

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

Seems “Yes”.

# **Annex**

*Somewhat* in line with the TR 38.832 following geographies are depicted – only as a checkpoint to see how your solution works here. Only “slice” is mentioned but it can also mean “slice group”. A general term of “desired slice” is used to intentionally avoid using the term “intended slice”. A “desired slice” for one solution may mean higher priority slice (if a slice priority exists) or, for another solution may just point to the slice corresponding to the highest absolute priority for a supporting frequency.



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.



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.



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



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)
2. Only TA1
3. Only TA2



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
2. Only TA2

# **Annex-2**

List of companies contributing to this option

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| Company Name | Delegate Name | Email Address |
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