**3GPP TSG-RAN3 Meeting #111-e R3-210539**

**E-meeting, 25 Jan – 5 Feb 2021**

**Title:** Evaluation of slicing solutions

**Source:** Huawei

**Agenda item:** 17.2

**Document Type:** Discussion and Decision

# 1. TP for TR 38.832

# 6.3 Solution evaluation

The evaluation criteria are as follows:

* **RAN impact**

The point here is to analyze RAN impact of the solution (standardization and node behaviour), for example what signalling procedures may be affected and at what extent.

* **Core impact**

The point here is to analyze Core impact of the solution (standardization and node behaviour), for example what signalling procedures may be affected and at what extent. Such analysis needs to be carried out together with SA2 and CT groups.

* **OAM impact**

The point here is to analyze operator and maintenance effort, for example how many network elements (e,g. gNB, NF) should be configured and managed by OAM. Such analysis may need to involve SA5.

* **UE Impact**

This is to analyse the impact at NAS and AS level on the UE. Such analysis needs to be carried out together with RAN2, SA2 and CT groups.

* **Effectiveness of solution**

The point here is to analyse the effectiveness after applying the solution, for example the UE’s service experience after applying the solution.

* **Applicable scenarios**

The point here is to list the applicable scenarios which the corresponding solution targets.

**Table 6.3-1: Evaluation of the solutions**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Criteria****Solution** | **RAN impact** | **Core impact** | **OAM impact** | **UE impact** | **Effectiveness** | **Applicable scenarios** |
| **6.2.1: Re-mapping Policy in target NG-RAN node** | **Configuration in target NG-RAN node** | RAN is configured with re-mapping policy from the OAM. RAN may possibly signal the slice remapping decision to CN. | CN is configured with re-mapping policy from the OAM. CN may possibly be notified in case of any slice-remapping, e.g. for charging purpose. CN reconfigures UE with NAS signalling to associate an ongoing PDU Session to a new S-NSSAI. Pending SA2 decisions**(Q: need to clarify what the CN does with this information? What does remapping mean in this context?)****E///: The slices the RAN can remap need to be served in CN by the same network functions, e.g. by the same UPF and SMF. The CN needs to signal an update of the S.NSSAI to the UE via NAS.****Assuming that the CN checks whether the remapping from RAN is feasible, CN needs a configuration from OAM to validate RAN’s decision**HW: updated, based on the above comments. Slice remapping means the one S-NSSAI to another S-NSSAI mapping, observed from the TR.  | OAM configures slice re-mapping policy to the NG-RAN, CN.E///: OAM needs to also configure the CN, see CN impactHW: updated | UE needs to be reconfigured at NAS level to associate an ongoing PDU Session to a new S-NSSAI. Pending SA2 decisions **(Q: can a PDU session be remapped without UE involvement?)****E///: share the same view as Q.**  **UE needs to be reconfigured at NAS level to associate an ongoing PDU Session to a new S-NSSAI. Pending SA2 decisions**HW: updated | Complicated at the cost of CN, OAM, RAN and UE impactThe effeteness depends SA2 assessmentE///: this solution has impacts at CN, RAN, OAM and UE level. It is not possible to state whether the solution allows for a remapping without service interruptions as this depends on SA2 assessment of how long it may take for a PDU Session to be remapped to a new slice.HW: updated | 1, 3, 5, 6 |
| **Signalled from 5GC/source RAN node** | RAN is signalled with the remapping policy from CN/the source RAN node. RAN may possibly signal the remapping decision to CN. | CN is configured with remapping policy from the OAM, and signals the re-mapping policy to the NG-RAN.CN needs to support new NAS signalling to the UE to associate a PDU Session to a remapped slice. Details are depending on SA2. | OAM configures slice re-mapping policy to the CN.**E/// RAN needs to also be configured with remapping**HW: RAN can acquire the information from the CN. So no update is made | CN needs to support new NAS signalling to the UE to associate a PDU Session to a remapped slice. Details are depending on SA2.  | Complicated at the cost of CN, OAM, RAN and UE impactThe effeteness depends SA2 assessmentE///: Same impact as  **Configuration in target NG-RAN node**HW: updated | 2, 4 |
| **6.2.3: Configuration based Solution** | RAN is configured with re-mapping policy from the OAM. RAN may possibly signal the RAN-internal slice resource change to CN.**E///: why does the RAN need to signal remapping to the CN if this happens only at UP?**HW: updated, change to “RAN-internal slice resource change”  | CN may possibly be notified in case of any RAN-internal slice resource change e.g., for charging purpose**(Comment: it should be clarified that “remapping” seems to be a RAN-internal operation in this case)****E///: agree with Q. There is no CN involvement in this solution**HW: updated, change remapping to “RAN internal slice resource change” | OAM configures slice resource policy to the NG-RAN.  | No impact | Simple and effective at the main cost of the OAM impact. whether it can be applied to non-supported slice scenarios, depending on SA5 feedbackE///: the solution description in “ *Scenario 2: Non-supported slice in case of Inter-RA mobility*” is incomplete and does not indicate what the solution is, but only a problem. HW: not updated, since this FFS depending on SA5 | 1, 3, 5, 6.E///: our understanding is that the solution described in this section is only for scenarios 1, 3, 5, 6. For scenarios 2, 4 there is a problem description. Modify to scenario 1, 3, 5, 6.HW: updated, remove 2,4 |
| **6.2.4: Candidate solutions with/without CN involvement** | **Solution with CN involvement** | Same as 6.2.1: Signalled from 5GC/source RAN nodeBut 6.2.1 has two quite different solutions. It is not clear which one this refers to.HW: updated, to be applicable to Signalled from 5GC/source RAN node.  | Same as 6.2.1: Signalled from 5GC/source RAN node | Same as 6.2.1: : Signalled from 5GC/source RAN node | Same as 6.2.1: Signalled from 5GC/source RAN node | Same as 6.2.1: Signalled from 5GC/source RAN node | Same as 6.2.1: Signalled from 5GC/source RAN node |
| **Solution without CN involvement** | RAN is configured with re-mapping policy from the OAM. New functionality to support semi-handover case.New behaviour in new gNB (allow usage by non-supported slice).Requires Xn support from inside old RA to any node inside new RA (unless continuity is broken later)  | New functionality to support the new handover case, where the UE is connected to target but source maintains UE signalling connection with CN. E///: New functionality where source does not support the slice but uses resources to support serign the slice at the target HW: seems E/// is not fully correct? It should be that the target does not support slice while the source does. Will be updated later till clear.  | OAM configures slice re-mapping policy to the NG-RAN. | New functionality to support the new handover case, where the UE is connected to target but source maintains UE signalling connection with CN..Details are depending on SA2. | Complicated and effective solution. Uses resources in new gNB that are not meant to be available for the slice.Only seems to work at immediate RA boundaries. | 2, 4E///: The solution scenarios are always based on EU moving to a targe tcell. At least the resource shortage scenario without mobility seems not in scopeHW: updated, applicable only to the not-support scenarios |
| **6.2.5: Slice resource re-partitioning** | RAN is configured with re-mapping policy from the OAM. (NB: there is no remapping as such)E///: there is no CN involvement in this solution, no signalling to CNHW: updated, this is removed.  | No impact(NB: there is no remapping as such)E///: there is no CN involvement in this solution, no signalling to CNHW: updated, this is removed. | OAM configures slice re-mapping policy to the NG-RAN.  | No impact | Simple and effective at the main cost of the OAM impact | 1, 3, 5, 6 |
| **6.2.6: Multi-carrier radio resource sharing** | No impact.  | No impact | No impact | No impact | Simple and effective solution. It requires the same slice coverage across different frequencies. E///: consider reformulating to “It requires coverage of supporting carrier at UE location”HW: not clear about the “UE location”. Will be updated if clear | 1, 3, 5, 6 |
| **6.2.7: 5GC Solution based on SSC-mode 3** | RAN is signalled with the remapping policy from CN/the source RAN node.New procedure is needed to support the “SSC-mode 3”, e.g., the target node needs to temporarily accept the PDU session even if slice is not supported in the cell. E///: the target node needs to temporary accept PDU session even if slice is not supported in the cell.HW: updated, add “e.g., ” | CN is configured with remapping policy from the OAM, and signals the re-mapping policy to the NG-RAN.New procedure is needed to support the “SSC-mode 3”. Details are depending on SA2.E///: Pending SA2 decisionHW: updated. | OAM configures slice re-mapping policy to the CN.  | The new procedures to support this “SSC-mode 3”. Details are depending on SA2.  | Complicated and effective solution, at the cost of OAM, CN, RAN and UE impact | 2 |
| **6.2.8: Slice Remapping decision in 5GC** | No impact | CN is configured with remapping policy from the OAM.New intra-CN procedure is needed to change the slice for an ongoing PDU session.  | OAM configures slice re-mapping policy to the CN. | UE needs to be reconfigured at NAS level to associate an ongoing PDU Session to a new S-NSSAI. Details are depending on SA2.  | Less complicated and effective solution, at the cost of OAM, CN and UE impact | 2, 4 |