**3GPP TSG-RAN WG3 #111-e R3-211014**

**25 January – 4 February 2021**

**Online**

Agenda Item: 15.2

Source: ZTE (moderator)

Title: Summary of Offline Discussion on NRQoE4-Slice

Document for: Approval

# Introduction

**CB: # NRQoE4-Slice**

**- Scenarios priority?**

**- Suggest OAM to include the Slice Scope outside of the QoE configuration container, and send an LS to SA5 to implement this? Or slice identities should be inside and outside of the QoE configuration container defined by SA4, further confirmation is needed with SA4? Liaise other groups, based on the outcome?**

**- How to define the slice scope information for QoE configuration?**

**- The activation or deactivation of per slice QoE measurement collection can be included in PDU session related messages accordingly?**

**- Slice scope (e.g. list of S-NSSAIs) should be transmitted to the target gNB during mobility?**

**- QoE report mapping solution: RAN based or UE based?**

**- TP cleanup in 6.9.1**

**- Capture agreements as TP for TR**

(ZTE - moderator)

Summary of offline disc [R3-211014](https://ericsson-my.sharepoint.com/personal/filip_barac_ericsson_com/Documents/WORK/3GPP.exe/Meetings/RAN3%23111-e.exe/2%20QoE/QOE%20CBs/CB%20%23%20NRQoE4-Slice/Inbox/R3-211014.zip)

Note:

The first round email discussion plan to be end at end of Friday of the first week.(Friday 17:00 UTC 2021-1-29)

The second round email discussion plan to be end 2 hours before the on-line session (Thursday 11:00 UTC).

# For the Chairman’s Notes

Propose the following:

Propose to capture the following:

# Discussion

## Scenarios priority?

In [1], the company thinks the following three scenarios need to be taken into account:

* **Scenario 1 Different service types uses different slices**
* **Scenario 2 Different service types uses the same slice**

**- Scenario 3 Same service type using different slices**

In [2], the company thinks that from RAN point of view, all the scenarios listed are possible.

In [4], the company thinks scenario 5 and 7 could be with low priority as they are not practical scenarios.

In [5], the company thinks the scenarios of same type services of one APP served by different slices has low priority, which means scenario 3 and scenario 7.

In [6], the company proposes not to consider the solution for the scenario 3&7 in this stage.

Three companies think scenario 7 need to be low priority or no need to be considered in Rel-17. Two companies think scenario 3 need to be low priority or no need to be considered in Rel-17. Two companies think all scenarios listed are possible. One company thinks scenario 5 has low priority.

**Q1: Which scenario(s) has low priority in Rel-17?**

|  |  |
| --- | --- |
| **Company** | **Comment** |
| ZTE | **Scenario 3,5,7 have low priority and need not to be considered in Rel-17 .** |
| Samsung | In our analysis in [1], APP vendor information seems redundant in the scenarios, as it has already been covered by SA4 defined metrics (e.g. StreamingSourceFilter, Ext), besides, the App vendor is transparent to 3GPP network, we should remove the APP information in the scenarios. From 3GPP perspective, we should only consider service types and slices. So [1] proposed to only consider three different scenarios.  To align with the previous discussed scenarios, we think only **scenario 1,2,3 without APP information** should be considered. |
| Huawei | Scenario 3,5,6,7 have low priority. |
| Qualcomm | We think Samsung’s simplified scenario description in [1] seems much clearer and can be captured in TR instead of the existing scenarios.  Also considering there is a still lot of coordination among WGs to study per-slice QoE and limited TU constraints, we propose to deprioritize per-slice QoE in Rel-17. |
| CATT | I don’t know whether the scenario should be discussed in per slice QoE support. What is the difference in the solution for different scenarios |
| China Unicom | One APP will select one single slice according to NSSP in URSP. Therefore, scenarios of one APP served by different slices can be low priority, i.e., scenario 5 and 7.  Based on above understanding, agree with Samsung to converge the scenarios description. |
| Nokia | Same understanding as CATT, I think the solution will be valid for all scenarios. |
| CMCC | Prefer to discuss based on Samsung’s down-scope. |
| **Ericsson** | We support the downprio proposal by Samsung. Moreover, it would be good to have one common solution for all cases.  Finally, we are also ok with QC proposal that the per-slice QoE could be deprioritized in Rel17. |

## Suggest OAM to include the Slice Scope outside the QoE configuration container, and send an LS to SA5 to implement this? Or slice identities should be inside and outside of the QoE configuration container defined by SA4, further confirmation is needed with SA4? Liaise other groups, based on the outcome?

In [1], the company thinks slice identities should be inside and outside of the QoE configuration container defined by SA4, further confirmation is needed with SA4.

In [2], the company thinks RAN can support a filtering condition indicating a slice identity to be sent to a UE together with QoE measurement configuration.--Which means outside the QoE configuration defined by SA4.

In [3], the company thinks :

For M-based QoE, OAM to include the Slice Scope outside the QoE configuration container.

For S-based QoE, the received slice scope information, within the QMC configuration information, is transparently forwarded by the gNB to the UE.

In [4], the company thinks Slice Identification shall be placed outside the QoE Report container.

In [5], the company thinks the slice scope information could be placed into the area scope information and outside the QMC application configuration containers.

In [6], the company thinks RAN decides whether to configure the QoE measurement for the UE based on the slices of the UE to be setup and the slice scope and service type in the QoE configuration.--Which means outside the QoE configuration defined by SA4.

In [7], the company suggests OAM to include the Slice Scope outside of the QoE configuration container, and send an LS to SA5 to implement this.

It seems the majority agree to support Slice Scope outside the QoE configuration container which is defined by SA4. NG-RAN node enable to be aware of the slice scope.

It is also observed that two companies support Slice Scope inside the QoE configuration container which is defined by SA4. Concern raised for this is how could application layer be aware of NW slicing.

**Q2: Slice Scope is outside the QoE configuration container which defined by SA4? NG-RAN node needs to be aware of the slice scope. Send LS to SA5 for confirmation?**

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| --- | --- | --- |
| **Company** | **Agree/disagree** | **Comment** |
| ZTE | Yes | Agree that slice Scope is outside of the QoE configuration container which defined by SA4, and an LS to SA5 for confirmation is helpful. |
| Samsung | Yes with comments | Slice scope should be outside the container, thus gNB can check the slice scope to choose the qualified UEs and send the configuration to the UE.  And slice scope should also be inside the container, thus the application layer in UE can check whether to start the QoE recording, as the application layer knows whether the corresponding service is using the given slice.  So the LS should be sent to both SA4 and SA5. |
| Huawei | Yes | Of course there is no need for SA4 to understand slice related info, then we need to liaison with SA5 about including slice related info in QoE measurement request. |
| Qualcomm | Yes | Slice scope outside QoE configuration container is used by NG-RAN to make sure it sends QoE configuration only to PDU sessions which belong to the slice scope  Regarding the need to include slice scope within QoE configuration container, we are trying to understand the use case. Here is an example:  Say OAM/CN configures *slice* *scope* = [eMBB] to an NG-RAN node supporting only eMBB slice. NG-RAN node checks that PDU session 1 is mapped to an eMBB slice and sends QoE configuration to UE on PDU session 1. Say UE APP is now running *serviceType* = [Video] and URSP at UE APP is set as [Video-> URLLC]. In this case UE APP might start collecting QoE measurements on URLLC slice even though the serviceType is not mapped within the slice scope.  Is the proposal to add slice scope within QoE configuration for the above scenario? |
| CATT |  | We need to check with SA5, whether the slice scope information is available for the QoE configuration. The QMC/OAM may not know which application/service type belong to which slice. Like as QC example, the mismatch may be happened.  We may just treat slice scope as one type of *Area Scope of QMC* |
| China Unicom | Yes | Agree. |
| Nokia | Yes with comments | The LS should be sent to both SA5 and SA4. In order to cover all scenarios, it seems preferable that the slice scope is transferred both within and outside the container. For post-processing we believe it is useful that both subscribed slice and slice of the PDU session is included in the QoE report container, and we should request SA4 to confirm this. And if SA4 doesn't consider slice information useful within the QoE report, who would be the end-consumer of the slice information? |
| CMCC | Yes | Agree to introduce slice scope outside of the QoE configuration container. |
| **Ericsson** | Yes | Outside. Liaise both SA4 and SA5. |

## How to define the slice scope information for QoE configuration?

If Slice Scope outside the QoE configuration container which defined by SA4 is yes,In [5], the company provides two options, one is the slice scope is applied for all configured area scope, the other option is that different Slice Scope is applied for different PLMN, or different TAC, or different Cell.

**Option1: Slice Scope is applied for all configured Area scope.**

**Option2: Different Slice Scope is applied for different PLMN, or different TAC, or different Cell.**

**Q3: Which solution is preferred and captured in TR?**

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| --- | --- | --- |
| **Company** | **Agree/Modify/disagree the update** | **Comment** |
| ZTE | Both are feasible, Option1 is preferred. | Although some slices may be available only in part of the network, so It makes sense that the slice scope is different in different area. However, it is more easier to implement if the slice scope is applied to the entire area scope and is sufficient in most cases. So ,we prefer option1. |
| Samsung | Option 1 |  |
| Huawei | Option 1 | We think the RAN itself can combine the slice scope and area scope. Therefore option1 is simpler. |
| Qualcomm | Option 1 |  |
| CATT | Option 1 |  |
| China Unicom | Option 1 |  |
| Nokia | Option 1 |  |
| CMCC | Option 1 |  |
| **Ericsson** | Option 1 |  |

## The activation or deactivation of per slice QoE measurement collection can be included in PDU session related messages accordingly?

In [1], the company suggests the activation or deactivation of per slice QoE measurement collection can be included in PDU session related messages accordingly.



**Q4: Can we agree the proposal?**

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| --- | --- | --- |
| **Company** | **Agree/disagree/other view** | **Comment** |
| ZTE | It depends. | The figure above seems fine, and Per slice activation /deactivation needs to be in line with general cases. |
| Samsung | Yes | It is possible that this per slice QoE configuration is activated before/during/after the corresponding PDU session setup.  In case of during PDU session setup, the activation configuration can be included in PDU session related procedures.  And in case of before/after PDU session setup, the general procedures of QoE management can be used. |
| Huawei | Maybe not needed | Maybe we could just take LTE as base line, i.e. RAN node can decide to activate the QoE measurement for the services that to be setup and decide to deactivate the QoE measurement for the services that to be released, and just include the QoE measurement configuration in the Initial Context Setup Request message, the Handover Request message, the Trace Start message. |
| Qualcomm | No | Same view as Huawei. |
| CATT | No |  |
| Nokia | No | same view as Huawei |
| CMCC | Maybe not needed |  |
| **Ericsson** | No |  |

## Slice scope (e.g. list of S-NSSAIs) should be transmitted to the target gNB during mobility?

In [1], the company suggests slice scope (e.g. list of S-NSSAIs) should be transmitted to the target gNB during mobility.

**Q5: Can we agree the update?**

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| --- | --- | --- |
| **Company** | **Agree/disagree/other view** | **Comment** |
| ZTE | It depends. | For S-based QoE, yes  For M-based QoE, depends on progress of QoE mobility CB. |
| Samsung | Yes for S-based | Same view as ZTE |
| Huawei | Partially yes | Similar view as above |
| Qualcomm | Yes for S-based | Same view as above |
| CATT | Yes for S-based |  |
| China Unicom | Depends on final mobility solution | Same view as above |
| Nokia | Not sure | For s-based QoE I believe that the slice scope relates to the subscribed slice, and I'm not sure this information is needed for PDU sessions that are already set up.  For m-based QoE let's see progress of QoE mobility CB. |
| CMCC | Yes at least for s-based |  |
| **Ericsson** | For both s- and m-based, but we should **capture “may”, and not “should”.** |  |

## QoE report mapping solution: RAN based or UE based?

In [1] , the company thinks as follows:

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| It is assumed that the one QoE configuration file (QoE metrics defined by SA4) is associated with one specific service type and one specific QoE reference in QoE configuration, which is defined in SA4/5. If the slice scope is configured in the QoE configuration, it should also be associated with the service type and QoE reference |

In [2], the company thinks The NG-RAN can map a QoE report to the slice which the QoE report refers to, by means of the slice identity that NG-RAN receives together with the QoE report. -- UE based solution

In [3], the company supports UE based solution:

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| 6.9.2.2 Mapping  Mapping of slice scope information received for QMC configuration takes place in the UE. If the received slice scope information corresponds to slices to which the UE is subscribed, the UE maps the slice scope onto the corresponding allowed slice(s).  6.9.2.3 Reporting  The slice identification should be included in the QoE report. The UE includes in the QoE report:   * the allowed slice id, which is the slice id of the PDU session on which the reported QoE measurement(s) are performed, and   the corresponding subscribed slice id |

In [4], the company provides two options: Network based solution and UE based solution.

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| The procedure of mapping QoE report and slice performed by NG-RAN node is as follows:  1. OAM/CN transmit the QoE measurement configuration to NG-RAN node, including Slice Scope.  2. NG-RAN node can map the Slice Scope to the ongoing PDU session list and send the QoE measurement configuration with the PDU session list to UE.  3. UE receives the QoE measurement configuration and sends it to the corresponding application layer according to the PDU session list.  4. UE sends the QoE report with PDU session ID to NG-RAN node.  5. NG-RAN node can remap the PDU session ID back to slice ID and attach it in the QoE report.  6. NG-RAN node forwards the QoE report with slice ID to the MCE.  The procedure of mapping QoE report and slice performed by UE is as follows:  1. OAM/CN transmits the QoE measurement configuration to NG-RAN node, including Slice Scope.  2. NG-RAN node checks the Slice Scope with all of the ongoing PDU sessions, and sends QoE measurement configuration to UE with qualified PDU sessions, including Slice Scope.  3. UE receives the QoE measurement configuration and sends it to the corresponding application layer according to the Slice Scope.  4. UE sends the QoE report(s) including S-NSSAI to NG-RAN node.  5. NG-RAN node forwards the QoE report including S-NSSAI to the MCE. |

In [5], the company provides two types of solutions for mapping:

- Solution 1: Mapping performed by NG-RAN node--Network based solution

- Solution 2: Mapping performed by UE--UE based solution

For reporting :  **UE can either report the S-NSSAI associated with the QOE report, or report the PDU session ID, or DRB ID or QoS Flow ID associated with the QoE report.**

In [6], the company prefers Network based solution .

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| 6.9.2.2 Mapping  The NG-RAN configures the QoE measurement for the UE only when the services of one service type have the same slice ID and the slice ID is included in the slice scope. The NG-RAN does not send the slice ID or PDU session ID to the UE.  6.9.2.3 Reporting  When the NG-RAN receives the QoE report from the UE, the NG-RAN deduces the slice ID based on the services type and sends the QoE report and slice ID to the final destination configured (e.g. TCE/MCE). |

In [7], the company prefers to include slice identification within the QoE report container.--UE based solution.

Based on above, it seems both network based solution and UE based solution have almost equal support.

**Q6: please provide your preference on which solution (network based or UE based) can be captured in TP?**

|  |  |
| --- | --- |
| Company | Comment |
| ZTE | Regarding mapping in 6.9.2.2 and reporting in 6.9.2.3, to capture Network based and UE based solution into TP. |
| Samsung | From above proposals, we found we may have different understandings on mapping, more discussions are needed.  In general, the mapping can be simply realized by slice identity, and the mapping means “check the slice scope”.  In more details, gNB only knows the service types that the UE supports (i.e. capability) and the slices that the UE is using, but gNB does not know which slice is used by which service type, and only the application layer knows that. So the UE application layer should do the final mapping anyway, and gNB should also be aware of the slice identity to choose the qualified UE and send the configuration.  So we think both of the gNB and UE application layer should be aware of this slice identity, we don’t need to choose one of them (network or UE based), both of them are needed.  We suggest update the mapping part in TR according to our discussion result.  In [1], we have below analysis which can be used as a baseline, if our understanding is correct.   |  |  | | --- | --- | | Mapping | Description | | gNB | The gNB checks the PDU sessions of the UE that match the criteria for slice information in the QoE measurement configuration, if qualified PDU session(s) are found, and UE capability is also matched, gNB will send the QoE configuration to the UE for the service type. | | UE | When each application session starts, the UE application layer checks the slice information in the configuration, if the service type is using the corresponding slice, the QoE measurement collection starts. |   Regarding reporting, we agree including slice identity in QoE report from UE side, whether its inside or outside the QoE report container may need further check with RAN2 and SA4. |
| Huawei | We prefer network based solution. In our understanding, only the NAS knows the mapping between applications and the S-NSSAIs, while the application layer does not know the PDU session ID/slice ID. The UE based solution requires the NAS to inform the application layer of the association between APP and slice ID, actually application layer doesn’t need to be involved. Therefore we suggest the scenario 3&7 should be low priority. For other scenarios, we think the UE does not need to know the slice ID of the QoE measurement and the network based solution can satisfy the requirement of these scenarios. |
| Samsung2 | Reply to HW: actually the application knows the slice ID to route the traffic.  It is very clear in TS23.503 that there are URSP rules for routing traffic in application, below is an example in annex:  Table A-1: Example of URSP rules   |  |  |  | | --- | --- | --- | | Example URSP rules | | Comments | | Rule Precedence =1  Traffic Descriptor: Application Identifiers=App1 | Route Selection Descriptor Precedence=1  Network Slice Selection: S-NSSAI-a  SSC Mode Selection: SSC Mode 3  DNN Selection: internet  Access Type preference: 3GPP access | This URSP rule associates the traffic of application "App1" with S-NSSAI-a, SSC Mode 3, 3GPP access and the "internet" DNN.  It enforces the following routing policy:  The traffic of App1 should be transferred on a PDU session supporting S-NSSAI-a, SSC Mode 3 and DNN=internet over 3GPP access. If this PDU session is not established, the UE shall attempt to establish a PDU session with S-NSSAI-a, SSC Mode 3 and the "internet" DNN over 3GPP access. | |
|  | In [6], the sentence “The NG-RAN configures the QoE measurement for the UE only when the services of one service type have the same slice ID” may not be correct, as the gNB is not aware of service types of UE (gNB only knows the capability), how does gNB know which service type have the same slice ID?  In our view, gNB configures the QoE measurement for the UE only when UE has the capability of the given service type and the PDU sessions associated with the given slice. And the application layer needs to do the final check with the service type and slice ID when each session starts, so we think this will have SA4 impact. |
| Qualcomm | We agree with the reasoning from Samsung. To summarize our understanding:  “*gNB does not know which slice is used by which service type, and only the application layer knows that”*. And therefore, mapping needs to be done at **both** **gNB** (to make sure gNB sends QoE configuration to only PDU sessions within the slice scope) and **UE** (to make sure UE APP can map the service type with the slice ID in its QoE report)  We are also okay to capture the mapping table description in [1] mentioned in Samsung’s comments. |
| CATT | Looks both are workable. We should open for the solutions and further study in WI. |
| Nokia | Agree with Samsung and Qualcomm |
| CMCC | Both network based and UE based solutions can be captured in TP. |
| **Ericsson** | Only network-based solution should be captured. |

## Any other stuff?

**Please provide your view on the Proposal**.

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| --- | --- | --- |
| **Company** | **Yes/no/other view** | **Comment** |
| **Ericsson** |  | The moderator has left out the following two proposals from E/// paper 0530:  **Proposal 1: Reformulate the example in 6.9.1 of TR 38.890, replacing “should” with “may”, and add a note to clarify that multiple services (PDU sessions) can be mapped to the same network slice (S-NSSAI).**  **Proposal 2: Remove the requirements of slice QoE measurements in 5G reported in TR 38.890, clause 6.9.1.**  **Please include them in the second phase.** |
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## TP cleanup in 6.9.1

**For the phase II, based on views received from companies.**

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| Company | Agree/Modify/disagree the update | Comment |
| ZTE |  |  |
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# Conclusion, Recommendations [if needed]

If needed

# References

1. [R3-210508](https://ericsson-my.sharepoint.com/personal/filip_barac_ericsson_com/Documents/WORK/3GPP.exe/Meetings/RAN3%23111-e.exe/2%20QoE/QOE%20CBs/CB%20%23%20NRQoE4-Slice/Docs/R3-210508.zip) Discussion on per slice QoE measurement (Samsung)
2. [R3-210530](https://ericsson-my.sharepoint.com/personal/filip_barac_ericsson_com/Documents/WORK/3GPP.exe/Meetings/RAN3%23111-e.exe/2%20QoE/QOE%20CBs/CB%20%23%20NRQoE4-Slice/Docs/R3-210530.zip) pCR for TR 38.890: QoE Support for Network Slicing (Ericsson)
3. [R3-210661](https://ericsson-my.sharepoint.com/personal/filip_barac_ericsson_com/Documents/WORK/3GPP.exe/Meetings/RAN3%23111-e.exe/2%20QoE/QOE%20CBs/CB%20%23%20NRQoE4-Slice/Docs/R3-210661.zip) (TP for TR 38.890) Slice scope in QoE measurement activation and reports (Nokia, Nokia Shanghai Bell)
4. [R3-210842](https://ericsson-my.sharepoint.com/personal/filip_barac_ericsson_com/Documents/WORK/3GPP.exe/Meetings/RAN3%23111-e.exe/2%20QoE/QOE%20CBs/CB%20%23%20NRQoE4-Slice/Docs/R3-210842.zip) Further discussion on scenarios and mechanisms for per slice QoE measurement (China Unicom)
5. [R3-210846](https://ericsson-my.sharepoint.com/personal/filip_barac_ericsson_com/Documents/WORK/3GPP.exe/Meetings/RAN3%23111-e.exe/2%20QoE/QOE%20CBs/CB%20%23%20NRQoE4-Slice/Docs/R3-210846.zip) Consideration on slice QoE measurement (ZTE)
6. [R3-210864](https://ericsson-my.sharepoint.com/personal/filip_barac_ericsson_com/Documents/WORK/3GPP.exe/Meetings/RAN3%23111-e.exe/2%20QoE/QOE%20CBs/CB%20%23%20NRQoE4-Slice/Docs/R3-210864.zip) Further discussions on the remaining open issues of support slice for QoE Huawei
7. [R3-210900](https://ericsson-my.sharepoint.com/personal/filip_barac_ericsson_com/Documents/WORK/3GPP.exe/Meetings/RAN3%23111-e.exe/2%20QoE/QOE%20CBs/CB%20%23%20NRQoE4-Slice/Docs/R3-210900.zip) Remaining issues on NR QoE management (CMCC)
8. [R3-210901](https://ericsson-my.sharepoint.com/personal/filip_barac_ericsson_com/Documents/WORK/3GPP.exe/Meetings/RAN3%23111-e.exe/2%20QoE/QOE%20CBs/CB%20%23%20NRQoE4-Slice/Docs/R3-210901.zip) TP to 38.890 for NR QoE management (CMCC)