**3GPP TSG RAN2 #121 R2-23xxxxx**

**Athens, Greece, 27th Feb – 3rd Mar, 2023**

**Agenda Item:**  **8.14.5 Other topics**

**Source: Huawei (email rapporteur)**

**Title:** **Report of [AT121][201][QoE] Continuity of QoE measurements during intra-5GC inter-RAT HO (Huawei)**

**Document for: Discussion and Decision**

# 1 Introduction

This is the email report of [AT121][201]:

* [AT121][201][QoE] Continuity of QoE measurements during intra-5GC inter-RAT HO (Huawei)

 Scope: Discuss the possible options and identify their impacts to specifications and WGs. Should identify which options have LTE impact (and therefore are not in the current scope of the WI). If possible try to downselect which options could be feasible for this WI.

 Intended outcome: Report in [R2-2302005](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_121/Docs/R2-2302005.zip).

 Deadline: Friday morning (before morning coffee break)

Companies providing input to this email discussion are requested to leave contact information below.

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| --- | --- | --- |
| **Company** | **Name** | **Email Address** |
| Samsung | Seungbeom Jeong | s90.jeong@samsung.com |
| Qualcomm | Jianhua Liu | jianhua@qti.qualcomm.com |
| Huawei, HiSilicon | Jun Chen | jun.chen@huawei.com |
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# 2 Discussion

## 2.1 List of options

Based on the relevant contributions and online discussions, at least the following options are provided. Companies can add other options if possible.

**Option 1:** (NR -> LTE/5GC -> NR) Source NR node sends RRC message to UE to pause the NR QoE. Later, when the UE goes back to NR, the NR can indicate the UE to continue the previous NR QoE reporting.

**Option 2:** (LTE/5GC -> NR -> LTE/5GC) Source LTE/5GC node sends RRC message to UE to pause the LTE QoE, which has some impacts to TS 36.331. Later, when the UE goes back to LTE/5GC, the LTE/5GC can indicate the UE to continue the previous LTE QoE reporting.

**Option 3:** (NR -> LTE/5GC) When the UE goes to LTE/5GC from NR, one previous QoE measurement can be activated in LTE/5GC (while others can be paused or released), and the QoE measurement and reporting will continue in LTE/5GC.

**Option 4:** (LTE/5GC -> NR) When the UE goes to NR from LTE/5GC, the previous QoE measurement can be continued in NR. During the inter-RAT HO, the target RAT can also configure other QoE measurements to the UE.

**Option 5:** The network can release the QoE configuration before moving UE to LTE/5GC and then reconfigure once UE moves back to NR.

[Other options…]

## 2.2 Discussion on Option 1

For option 1, the technical analysis in [2] are used here.

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| --- | --- | --- | --- |
| **Principle** | **LTE impacts** | **Other RAN2 impacts** | **RAN3 impacts** |
| Source NR node sends RRC message to UE to pause the NR QoE. Later, when the UE goes back to NR, the NR can indicate the UE to continue the previous NR QoE reporting. | TS 36.331: no impacts | TS 38.331: impacts to inter-RAT HO command and QoE configurations storingTS 38.300: stage-2 description | TS 38.423: check whether existing QoE config in HANDOVER REQUEST procedure can cover LTE QoE config or not |

**Q1: For option 1, do companies agree on analysis on principle and specification impacts (including LTE impacts)? Please provide your comments in the comment column if any.**

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| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Samsung | Yes, but | Please see our response in Q2.  |
| Qualcomm |  | - There is risk that when the UE moves into LTE, and never come back into NR. Then the QoE measurement efforts will be wasted.- For the new QoE behavior introduced in NR, e.g. per-slice based QoE, it will not be applicable when the UE moves to LTE. |
| Huawei, HiSilicon | Yes |  |
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For the scope of this email discussion, it mentions “If possible try to downselect which options could be feasible for this WI.”, so it is suggested to collect companies’ preferences.

**Q2: Do companies support to select Option 1 for this WI? Please provide your comments in the comment column if any.**

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| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Samsung | No | We would like to note the objective of WID:* Support the continuity of legacy QoE measurement job for streaming and MTSI service during intra-5GC inter-RAT handover process [RAN2, RAN3].

In Option 1/2/5, QoE reporting is paused or released (i.e., no continuity) anyhow. It does not comply with the objective in WID. For example, with Option 1, what if UE does not come back to NR? UE continues QoE measurement in LTE cell but its reports cannot be sent. Then, QoE measurement within LTE cell is meaningless, but UE never stops measuring. There is no way LTE node releases NR QoE measurement without 36.331 impact. Therefore, we only support Option3/4. |
| Huawei, HiSilicon | Yes | Firstly, we think the meaning of “continuity” can be discussed in RAN2, and the WID does not explicitly say that the “continuity” is equal to “continuity of collection, continuity of reporting, or both”.Secondly, Option 1 has no impacts on LTE specs, so it is preferred.For RAN3 impacts, the above analysis may not be concrete. We observe that at least for Option 1/2/3/4, it will be helpful for RAN3 to check potential impacts once RAN2 makes some progress. |
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## 2.3 Discussion on Option 2

For option 2, the technical analysis in [2] are used here.

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| **Principle** | **LTE impacts** | **Other RAN2 impacts** | **RAN3 impacts** |
| Source LTE/5GC node sends RRC message to UE to pause the LTE QoE, which has some impacts to TS 36.331. Later, when the UE goes back to LTE/5GC, the LTE/5GC can indicate the UE to continue the previous LTE QoE reporting. | TS 36.331: impacts due to the introduction of pause/resume mechanism | TS 38.331: no impactsTS 38.300: stage-2 description | TS 38.423: check whether existing QoE config in HANDOVER REQUEST procedure can cover LTE QoE config or not |

**Q3: For option 2, do companies agree on analysis on principle and specification impacts (including LTE impacts)? Please provide your comments in the comment column if any.**

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| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Samsung | Yes, but | Please see our response in Q2.  |
| Qualcomm | Yes |  |
| Huawei, HiSilicon | Yes |  |
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**Q4: Do companies support to select Option 2 for this WI? Please provide your comments in the comment column if any.**

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| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Samsung | No | Please see our response in Q2. |
| Qualcomm | No | Impact on LTE specification |
| Huawei, HiSilicon | No | Firstly, there may be impacts to TS 36.331.Secondly, the direction “LTE/5GC -> NR -> LTE/5GC” is not as popular as Option 1. |
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## 2.4 Discussion on Option 3

For option 3, the technical analysis in [2] are used here.

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| **Principle** | **LTE impacts** | **Other RAN2 impacts** | **RAN3 impacts** |
| When the UE goes to LTE/5GC from NR, one previous QoE measurement can be activated in LTE/5GC (while others can be paused or released), and the QoE measurement and reporting will continue in LTE/5GC. | TS 36.331: impacts related to configuration of the QoE measurements from NR | TS 38.331: impacts to inter-RAT HO commandTS 38.300: stage-2 description | TS 38.423: NR or LTE/5GC can decide which of QoE measurements can be continued and inform NR, which has impacts to Xn. In addition, whether existing QoE config in HANDOVER REQUEST procedure can cover LTE QoE config or not can be checked. |

**Q5: For option 3, do companies agree on analysis on principle and specification impacts (including LTE impacts)? Please provide your comments in the comment column if any.**

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| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Samsung | No | To avoid 36.331 impact, we can update MobilityFromNRCommand with corresponding TP update in 38.331. |
| Qualcomm |  | Besides the analysis in the table, the application layer will also be impacted. When the UE moves into LTE, the application layer will deliver service type instead of RRC ID to AS layer, not sure whether this will impact the QoE session. |
| Huawei, HiSilicon | Yes | We observe that some companies also prefer to keep one QoE session when it goes to LTE/5GC, which is simple from our point of view. |
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**Q6: Do companies support to select Option 3 for this WI? Please provide your comments in the comment column if any.**

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| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Samsung | Yes | Please see our response in Q2. |
| Qualcomm | No | Impact on LTE, and also impact on application layer |
| Huawei, HiSilicon | Open | If only one NR QoE measurement is considered, we observe some LTE impacts as well as other impacts. But we are open and we can be ok to select it if the majority companies are fine with it. |
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## 2.5 Discussion on Option 4

For option 1, the technical analysis in [2] are used here.

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| **Principle** | **LTE impacts** | **Other RAN2 impacts** | **RAN3 impacts** |
| When the UE goes to NR from LTE/5GC, the previous QoE measurement can be continued in NR. During the inter-RAT HO, the target RAT can also configure other QoE measurements to the UE. | TS 36.331: impacts to inter-RAT HO command | TS 38.331: some impacts related to ensuring continuation of QoE measurement from LTE when the UE moves to NRTS 38.300: stage-2 description | TS 38.423: check whether existing QoE config in HANDOVER REQUEST procedure can cover LTE QoE config or not |

**Q7: For option 4, do companies agree on analysis on principle and specification impacts (including LTE impacts)? Please provide your comments in the comment column if any.**

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| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Samsung | No | To avoid 36.331 impact, we can update RRCReconfiguration which can be contained within MobilityFromEUTRACommand. In 38.331, RRCReconfiguation can be updated and TP when receiving RRCReconfiguration can be also updated. |
| Qualcomm |  | Besides the analysis in the table, the application layer will also be impacted. When the UE moves into NR, the application layer will deliver RRC ID instead of service type to AS layer, not sure whether this will impact the QoE session. |
| Huawei, HiSilicon | Yes | It seems straightforward to keep the LTE QoE measurement (one measurement) in the NR. |
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**Q8: Do companies support to select Option 4 for this WI? Please provide your comments in the comment column if any.**

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| **Company** | **Yes/No** | **Comments** |
| Samsung | Yes | Please see our response in Q2. |
| Qualcomm | No | Impact on LTE, and also impact on application layer |
| Huawei, HiSilicon | Open | We are open and we can be ok to select it if the majority companies are fine with it. |
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## 2.6 Discussion on Option 5

For option 1, the technical analysis in [2] are used here.

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| **Principle** | **LTE impacts** | **Other RAN2 impacts** | **RAN3 impacts** |
| The network can release the QoE configuration before moving UE to LTE/5GC and then reconfigure once UE moves back to NR. | TS 36.331: no impacts | TS 38.331: no impactsTS 38.300: may be no impacts | May be no impacts |

**Q9: For option 5, do companies agree on analysis on principle and specification impacts (including LTE impacts)? Please provide your comments in the comment column if any.**

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| **Company** | **Yes/No** | **Comments** |
| Samsung | Yes, but | Please see our response in Q2. |
| Qualcomm |  | Clarify question: all the QoE configurations should be released, even it can be supported by LTE? Then this option is not for service continuity? |
| Huawei, HiSilicon | Yes | It is implementation related option.For more details, maybe interested companies can provide more details, e.g. responses to Qualcomm. |
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**Q10: Do companies support to select Option 5 for this WI? Please provide your comments in the comment column if any.**

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| **Company** | **Yes/No** | **Comments** |
| Samsung | No | Please see our response in Q2. |
| Qualcomm |  | Based on the clarification to the question. |
| Huawei, HiSilicon | No | Obviously, this Option 5 can not enable “Continuity of QoE measurements during intra-5GC inter-RAT HO”. |
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## 2.7 Discussion on Option XX

[to be added if necessary]

# 3 Conclusion

[To be added]

# 4 References

[1] RAN2-121 LTE MUSIM QoE XR (Tero)\_2023-02-28-1845

[2] R2-2300356 Discussion on Rel-18 other QoE enhancement ZTE Corporation, Sanechips

[3] R2-2300603 QoE continuity between LTE-5GC and NR Huawei, HiSilicon

[4] R2-2300631 Discussion on QoE measurement during intra-5GC inter-RAT handover Lenovo

[5] R2-2300722 QoE Continuity During Intra-5GC Inter-RAT Handover Apple

[6] R2-2301339 QoE measurements at IRAT handover Ericsson

[7] R2-2301641 Discussion on QoE measurement continuity during inter-RAT handover Samsung

[8] R2-2301665 On QoE continuity during inter-RAT handover Nokia, Nokia Shanghai Bell

[9] R2-2301756 Discussion on the QoE continuity during intra-5GC inter-RAT HO China Unicom

[10] R2-2301803 Discussion on the continuity of QoE measurement CATT