**3GPP TSG-RAN WG2 Meeting #127 R2-2407735**

**Maastricht, Netherlands, Aug 19 – 23, 2024**

**Agenda item:** 7.14.2

**Source:** ZTE Corporation

**Title:** Draft Report of [AT127][504][QoE] Release of QoE configurations (ZTE)

**Document for:**  Discussion and decision

# Introduction

This is to discuss the following offline discussion:

* [AT127][504][QoE] Release of QoE configurations (ZTE)

      Scope: Discuss whether/what changes are needed for release of QoE configurations as per R2-2406998 and/or R2-2407090

      Intended outcome: Report in R2-2407735 with the agreeable TPs

      Deadline: Report available for CB session on Thursday

# Discussion

## 2.1 Scenario 1: Mobility from NR to EUTRA

It is noted in [1] that UE could improperly maintained idle/inactive QoE configuration for below cases, and UE behavior in such scenario is unclear:

* Case 1 mentioned in [1]: UE reselects to EUTRA after during RRC connection reestablishment and establish connections to EUTRA
* Case 2 raised by Huawei online: UE is in NR RRC IDLE state and then the UE moves to LTE cell for connection establishment.

**Q1: Do you agree that UE shall release its stored NR QoE configuration for case 1 and case 2? If not, what’s the intended UE behavior in such cases?**

|  |  |
| --- | --- |
| Company | comments |
| ZTE | Agree |
| CATT | Agree |
| Samsung | Agree |
| Huawei, HiSilicon | Agree. Case 1 and Case 2 are for different reasons but finally the UE will connect to a LTE cell, so it is good to have a unified UE behaviour for both cases. It should be a simple option to let UE just release all of the stored NR QoE configurations.  Just one small comment on the wording:  **UE shall release its stored NR QoE configuration and possible QoE reports for case 1 and case 2** |
| Ericsson | Agree. |
| Nokia | Agree |

If agrees on Q1, then the following question would be how to address this behavior in specifications. Below gives some preliminary analysis from rapporteur on the possible options to capture the UE behavior.

* Option 1: Capture in subclause 5.3.3.4 in **LTE RRC specs** that UE release stored NR QoE configuration/reports, if any upon successful RRC connection establishment in EUTRA, and inform upper layers to release the corresponding QoE configuration
* Option 2: Capture in subclause 5.3.7.3 in NR RRC specs that if UE reselects EUTRA cell during cell reselection UE release all stored QoE configuration/reports, if any, and inform upper layers to release the corresponding QoE configuration
* Option x: Please provide other solutions if any.

|  |  |  |
| --- | --- | --- |
| Solutions | Advantages | Disadvantages |
| Solution 1 | Cover all cases. Avoid loss of QoE configuration. It is possible that UE fails to establish RRC connection in LTE, UE might returns to NR, and the maintained LTE configuration can still be used. | Asking LTE AS/APP layer to release NR configurations, CT1/SA4 might be impacted |
| Solution 2 | Only impact NR specs, no impact on CT1/SA4. | NR idle/inactive configuration/reports will be lost when UE fails to establish RRC connection in LTE, and returns back to NR. |

**Q2: Please provide your preference on proposed solutions, and comments if any.**

|  |  |  |
| --- | --- | --- |
| Company | Supported options | comments |
| ZTE | Solution 1 | It would be cleaner. But we may also clarify the case when UE moves from NR IDLE to LTE IDLE. |
| CATT | Solution 2 | Prefer to solve this issue in NR spec. Not sure whether there is need to contact with other group. |
| Samsung | Solution 2 | Technically solution 1 is right, but do not want to make things complicated… We can accept solution 2. |
| Huawei, HiSilicon | Solution 1 | Solution 1 is straightforward. As we commented for Q1, the UE finally connects to a LTE cell, so it’s reasonable to clarify UE behaviours in TS 36.331. |
| Ericsson |  | We see possible issues with both solutions and would like to check a bit more first. The case raised by HW came up during the meeting and there hasn’t been enough time for thorough checking. |
| Nokia |  | For solution 1, we wonder whether the LTE AS layer can release the NR QoE configuration. E.g., after UE reselects to LTE cell, how the LTE AS can know there is an existing NR configuration in App layer and then release it accordingly. Furthermore, we may need further check whether the current LTE AT command can support to release NR QoE configurations. Solution 2 seems simple. We prefer to further check the possible solutions. |

TPs for each solutions are provided in below for review and discussion

* **TP1 for option 1:**

**5.3.3.4 Reception of the *RRCConnectionSetup* by the UE**

NOTE 1: Prior to this, lower layer signalling is used to allocate a C-RNTI. For further details see TS 36.321 [6];

The UE shall:

[...]

1> If the UE has any stored NR application layer measurement configuration:

2> release all NR application layer measurement configurations;

2> inform upper layers to clear all stored NR application layer measurement configurations;

2> discard the stored NR application layer measurement reports if any;

2> consider itself not to be configured to send NR application layer measurement reports;

* **TP2 for option 1:**

5.3.7.3 Actions following cell selection while T311 is running

Upon selecting a suitable NR cell, the UE shall:

[....]

Upon selecting an inter-RAT cell, the UE shall:

1> perform the actions upon going to RRC\_IDLE as specified in 5.3.11, with release cause 'RRC connection failure';

1> if the UE is configured with any application layer measurement configuration:

2> inform upper layers about the release of all application layer measurement configurations;

2> release all application layer measurement configurations including their fields in UE variables *VarAppLayerIdleConfig* and *VarAppLayerPLMN-ListConfig*;

2> discard any application layer measurement reports which were not yet fully submitted to lower layers for transmission;

2> consider itself not to be configured to send application layer measurement reports;

**Q3: Please provide comments on the TPs for the solutions supported, if any. If you suggest different solutions, please provide the corresponding TPs in below table.**

|  |  |  |
| --- | --- | --- |
| Company | Supported solutions | Comments to the corresponding TPs |
| ZTE | Option 1 | It at least covers the cell reselection for case 1. |
| CATT | Maybe TP2 | Maybe not completed to cover all case, e.g. case2. Prefer to postpone this issue to next meeting. |
| Samsung | Option 2 | But have the same concern with CATT |
| Huawei, HiSilicon | Option 1 | It can cover both case 1 and case 2. |
| Ericsson |  | We would like to postpone this to the next meeting. |
| Nokia |  | Prefer to postpone it to next meeting. |

**Q4a .If agree on option 1, do you agree that LS is needed to inform SA4/CT1? If yes, do you agree the LS in the annex 2 of R2-2406998?**

|  |  |  |
| --- | --- | --- |
| Company | Agree/Disagree | Comments |
| ZTE | Agree | SA4/CT1 needs to be informed to see if there are any impacts. |
| CATT | disagree | Not for now. |
| Samsung | Disagree |  |
| Huawei, HiSilicon | Disagree | This issue is purely a RAN2 issue, and it seems no need to involve SA4/CT1. |
| Ericsson | Disagree | It is too early with an LS now, we first need to think about which solution could be the best. We can check with our CT1 colleagues while checking. |
| Nokia | Disagree |  |

Summary on scenario 1:

It is full consensus that UE shall release its stored NR QoE configuration and possible QoE reports for below cases:

* Case 1: UE reselects to EUTRA after during RRC connection reestablishment and establish connections to EUTRA
* Case 2: UE is in NR RRC IDLE state and then the UE moves to LTE cell for connection establishment.

While there are no consensus on which specs to address and how to address the issue. There are some companies consider there could be potential issue even with exiting options, and would like to have a more careful check. Based on current circumstance, it is suggested to agree on below proposal on UE behavior and postpone the CR.

**Proposal 1: UE shall release its stored NR QoE configuration and possible QoE reports for below cases:**

* **Case 1: UE reselects to EUTRA after during RRC connection reestablishment and establish connections to EUTRA**
* **Case 2: UE is in NR RRC IDLE state and then the UE moves to LTE cell for connection establishment.**

**FFS where (LTE or NR specs) and how to address this in specs.**

## Scenario 2: Mobility from EUTRA to NR

|  |
| --- |
| **Agreements RAN2#124**  For HO from LTE/5GC to NR, UE should release all LTE QoE configurations and apply NR QoE configuration if received. How UE releases old QoE configurations can be handled in CR phase. |

Corrections provided in [2] [R2-2407090](file:///D:\\3GPP\\Extracts\\R2-2407090%20-%20Correction%20CR%20for%20LTE%20QoE%20measurements.docx" \o "D:3GPPExtractsR2-2407090 - Correction CR for LTE QoE measurements.docx) intends to address above agreements.

---------------------------------------------- corrections from [R2-2407090](file:///D:\\3GPP\\Extracts\\R2-2407090%20-%20Correction%20CR%20for%20LTE%20QoE%20measurements.docx" \o "D:3GPPExtractsR2-2407090 - Correction CR for LTE QoE measurements.docx)-------------------------------------------------------

1> else if the UE was connected to 5GC prior to the reception of the *MobilityFromEUTRACommand* and the *targetRAT-Type* in the received *MobilityFromEUTRACommand* is set to *nr*:

2> reset MAC;

2> stop all timers that are running except T325, T330;

2> release *ran-NotificationAreaInfo*, if stored;

2> release the AS security context including the KRRCenc key, the KRRCint, the KUPint key and the KUPenc key, if stored;

2> release all radio resources, including release of the RLC entity, the MAC configuration and the associated PDCP entity and SDAP entity for all established RBs;

NOTE 1: PDCP and SDAP configured by the source configurations RAT prior to the handover that are reconfigured and re-used by target RAT when delta signalling (i.e., during inter-RAT intra-system handover when *fullConfig* is not present) is used, are not released as part of this procedure.

2> if a *serviceType* is stored in the current UE configuration:

3> release the stored *serviceType*:

3> inform upper layers to clear the stored application layer measurement configuration;

3> discard received application layer measurement report information from upper layers;

3> consider itself not to be configured to send application layer measurement report;

---------------------------------------------- corrections from [R2-2407090](file:///D:\\3GPP\\Extracts\\R2-2407090%20-%20Correction%20CR%20for%20LTE%20QoE%20measurements.docx" \o "D:3GPPExtractsR2-2407090 - Correction CR for LTE QoE measurements.docx)-------------------------------------------------------

During online discussion, companies commented that this requirement has already fulfilled with existing specs. Shown below is current mobility from EUTRA description in 36.331:

---------------------------------------------------------- From TS 36.331 ----------------------------------------------------------

### 5.3.12 UE actions upon leaving RRC\_CONNECTED or RRC\_INACTIVE

Upon leaving RRC\_CONNECTED or RRC\_INACTIVE, the UE shall:

[....]

1> release the stored *serviceType*, if any;

1> inform upper layers to clear the stored application layer measurement configuration;

1> discard received application layer measurement report information from upper layers, if any;

1> consider itself not to be configured to send application layer measurement report;

[...]

#### 5.4.3.4 Successful completion of the mobility from E-UTRA

Upon successfully completing the handover, the cell change order or enhanced 1xRTT CS fallback, the UE shall:

1> if the *targetRAT-Type* in the received *MobilityFromEUTRACommand* is set to *eutra* (intra-E-UTRA inter-system HO):

2> indicate to the upper layers associated to the source system the release of the RRC connection together with the release cause 'other';

2> the procedure ends;

1> else if the UE was connected to 5GC prior to the reception of the *MobilityFromEUTRACommand* and the *targetRAT-Type* in the received *MobilityFromEUTRACommand* is set to *nr*:

2> reset MAC;

2> stop all timers that are running except T325, T330;

2> release *ran-NotificationAreaInfo*, if stored;

2> release the AS security context including the KRRCenc key, the KRRCint, the KUPint key and the KUPenc key, if stored;

2> release all radio resources, including release of the RLC entity, the MAC configuration and the associated PDCP entity and SDAP entity for all established RBs;

NOTE 1: PDCP and SDAP configured by the source configurations RAT prior to the handover that are reconfigured and re-used by target RAT when delta signalling (i.e., during inter-RAT intra-system handover when *fullConfig* is not present) is used, are not released as part of this procedure.

1> else:

2> perform the actions upon leaving RRC\_CONNECTED as specified in 5.3.12, with release cause 'other';

NOTE 2: If the UE performs enhanced 1xRTT CS fallback along with concurrent mobility to CDMA2000 HRPD and the connection to either CDMA2000 1xRTT or CDMA2000 HRPD succeeds, then the mobility from E-UTRA is considered successful.

--------------------------------------------------------- From TS 36.331 -----------------------------------------------------------

According to above highlighted description in yellow, UE will perform leaving RRC\_CONNECTED for inter-system mobility from EUTRA to NR, while for intra-system mobility from EUTRA to NR there is no such requirement. And when performing leaving RRC\_CONNECTED UE will release stored LTE QoE configuration.

It can be concluded that when UE leaves from LTE-EPC to NR, current LTE specs already allows UE to release LTE QoE configuration, no specs update is needed. While for LTE-5GC to NR there is no such requirement specified. It is rapporteur’s understanding that the corrections proposed in [2] intends to address the missing scenarios from LTE-5GC to NR, which seems needed.

**Q5 .Do companies agree with above analysis that the corrections in [R2-2407090](file:///D:\\3GPP\\Extracts\\R2-2407090%20-%20Correction%20CR%20for%20LTE%20QoE%20measurements.docx" \o "D:3GPPExtractsR2-2407090 - Correction CR for LTE QoE measurements.docx) is needed.**

|  |  |  |
| --- | --- | --- |
| Company | Agree/Disagree | Comments |
| ZTE | Agree | It covers mobility from 5GC to NR case. |
| CATT | Disagree | 5.4.2.3 Reception of the *RRCReconfiguration* by the UE The UE shall:  1> apply the default L1 parameter values as specified in corresponding physical layer specifications except for the parameters for which values are provided in *SIB1*;  1> apply the default MAC Cell Group configuration as specified in 9.2.2;  1> perform RRC reconfiguration procedure as specified in 5.3.5;  NOTE: If the UE is connected to 5GC of the source E-UTRA cell, the delta configuration for PDCP and SDAP can be used for intra-system inter-RAT handover. For other cases, source RAT configuration is not considered when the UE applies the reconfiguration message of target RAT.  In current spec as hightlighted, UE only can use the delta configuration for PDCP and SDAP for intra-system inter-RAT handover. In other case, UE will not consider the source RAT configuration. So we think it also includes that UE will also not consider the QoE configuration in source RAT. The smart UE will naturally discard these configurations. So it seems no need to capture in LTE spec. |
| Samsung |  | We can follow the majority view |
| Huawei, HiSilicon | Disagree | Firstly, we do think that 5.3.12 is a general section, and it means if the UE meets the condition (i.e. leaving connected or inactive), the UE shall go into this section as well.  Companies can check whether our above understanding is ok or not.  Secondly, if the understanding is ok, then the UE behaviours are clear, i.e. the UE should perform actions according to both 5.4.3.4 and 5.3.12. if the understanding is not ok, we could check what is missing, but QoE is just one of cases. Let’s give an example,  The following text have been captured in 5.3.12, but not in 5.4.3.4. If we are not ok with the above understanding, it means at least the following UE behaviours are not performed by the UE due to 5.4.3.4. Then we have a concern as UE behaviours upon these IEs are unclear and we need to discuss the issues. It is noted that if it happens, it may be about a very early release. If companies want, we are also open to go with this direction.  1> discard any segments of segmented RRC messages received;  1> release the LWA configuration, if configured, as described in 5.6.14.3;  1> release the LWIP configuration, if configured, as described in 5.6.17.3;  From Huawei and HiSilicon perspective, we confirm our above understanding, so the CR [R2-2407090](file:///D:\\3GPP\\Extracts\\R2-2407090%20-%20Correction%20CR%20for%20LTE%20QoE%20measurements.docx" \o "D:3GPPExtractsR2-2407090 - Correction CR for LTE QoE measurements.docx) is not needed. |
| Ericsson | Agree | The release is currently missing in the specification and should be added. The highlighted text by CATT only relates to the AS layer configuration, not the application layer configuration. That is the way we have understood that kind of statement for other cases and that is also why the actions at release include informing the application layer about the release, because it is not covered by AS layer release.  Regarding 5.3.12 we agree with the analysis from ZTE that 5.3.12 is currently not triggered at IRAT HO with 5GC and it needs to be corrected. We can add the magic sentence on the cover page to cover earlier releases. |
| Nokia | Agree | Agree with ZTE and Ericsson. |

Summary on scenario 2:

3 companies supports the CR while 2 companies think current specs are fine and no CRs are needed, one can go with the majorities’ views. There is slightly preference leaning on to have this CR (4/6), since this issue has been discussed several times, it is suggested to try one last time to see if the CR is agreeable or not. If not, capturing in chairman’s note that RAN2 understands based on existing specs, UE will release all LTE QoE configurations when HO from LTE/5GC to NR.

**Proposal 2: RAN2 agrees on the corrections provided in [R2-2407090](file:///D:\\3GPP\\Extracts\\R2-2407090%20-%20Correction%20CR%20for%20LTE%20QoE%20measurements.docx" \o "D:3GPPExtractsR2-2407090 - Correction CR for LTE QoE measurements.docx). If not agreeable, RAN2 captures in chairman’s note that RAN2 understands based on existing specs, UE will release all LTE QoE configurations when HO from LTE/5GC to NR.**

# Summary

Based on the input from companies, we have the following proposals:

**Proposal 1: UE shall release its stored NR QoE configuration and possible QoE reports for below cases:**

* **Case 1: UE reselects to EUTRA after during RRC connection reestablishment and establish connections to EUTRA**
* **Case 2: UE is in NR RRC IDLE state and then the UE moves to LTE cell for connection establishment.**

**FFS where (LTE or NR specs) and how to address this in specs.**

**Proposal 2: RAN2 agrees on the corrections provided in [R2-2407090](file:///D:\\3GPP\\Extracts\\R2-2407090%20-%20Correction%20CR%20for%20LTE%20QoE%20measurements.docx" \o "D:3GPPExtractsR2-2407090 - Correction CR for LTE QoE measurements.docx). If not agreeable, RAN2 captures in chairman’s note that RAN2 understands based on existing specs, UE will release all LTE QoE configurations when HO from LTE/5GC to NR.**

# Reference

[1] [R2-2406998](file:///D:\\3GPP\\Extracts\\R2-2406998%20Consideration%20on%20QoE%20configuration%20release%20during%20inter-RAT%20mobility.docx" \o "D:3GPPExtractsR2-2406998 Consideration on QoE configuration release during inter-RAT mobility.docx) Consideration on QoE configuration release during inter-RAT mobility ZTE Corporation, Sanechips discussion Rel-18 NR\_QoE\_enh-Core

[2] [R2-2407090](file:///D:\\3GPP\\Extracts\\R2-2407090%20-%20Correction%20CR%20for%20LTE%20QoE%20measurements.docx" \o "D:3GPPExtractsR2-2407090 - Correction CR for LTE QoE measurements.docx) Release of QoE measurements at successful handover from LTE Ericsson, Nokia, Nokia Shanghai Bell CR Rel-18 36.331 18.2.0 5048 - F NR\_QoE\_enh-Core