3GPP TSG RAN WG2 Meeting #121bis-e R2-230xxxx

**Electronic, 17 – 26 April, 2023**

**Agenda item:** 7.14.1

**Source:** Huawei, HiSilicon

**Title:** Report of [AT121bis-e][221][QoE] LS replies to QoE

**Document for:**  Discussion and decision

# Introduction

This document aims and gathering and summarizing the companies views for the following offline discussion:

* [AT121bis-e][221][QoE] LS replies to QoE (Huawei)

Scope: Determine whether to send replies to LSs received from other groups (e.g. RAN3, SA4 and SA5) and attempt to provide RAN2 reply. If LS reply is agreeable, discussion should also determine what to reply and what the target groups are (for To and Cc).

Intended outcome: LS out to SA4/SA5 in [R2-2304396](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_121bis-e/Docs/R2-2304396.zip) (if agreed).

Deadline: Deadline 4

# Discussion

## LS to SA4 and SA5 on MBS broadcast

RAN2 sent an LS to SA4 and SA5 containing several questions related to QOE measurements in RRC IDLE/INACTIVE state in [1]. SA4 and SA5 provided their replies in [2] and [3] respectively. Following these replies it was suggested to send further replies to SA4 in [4] and to SA5 in [5]. These draft reply LS(es) assumed that RAN2 would discuss and make agreements for some specific issues. Hence, before the need to send the LS(es) is discussed, the rapporteur suggests to check whether RAN2 can reach agreements on the related issues.

First issue is related to the SA4 reply LS provided in [2] where the following is indicated:

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| --- |
| ***Question 1:*** *Can information about the applicable area scope of a QoE configuration be provided to the application layer in the UE as part of the QoE configuration container? If it can, how is this information defined at the application layer, e.g. does it indicate applicable tracking area, applicable cells etc.?*  **SA4 reply**: For QMC of 3GP-DASH Streaming, VR Streaming and MTSI, the area scope of a QoE configuration can be provided within the QoE configuration container and it can be indicated via the *Location Filter*, which can be a list of cell IDs and/or a geographic area expressed with one or more instances of *polygonList* and/or *circularAreaList*. Tracking area is not supported.  ***Question 2:*** *Can the application layer know the UE location on the proper level (e.g. tracking area, cell) and use this information to decide whether to start QoE measurements when triggering conditions are met?*  **SA4 reply**: The application layer can know the UE’s location on a proper level (e.g. cell ID, geographical coordinates). The QoE configuration is then evaluated by the client at the start of a QoE measurement and reporting session (“QoE session”) associated with a streaming session. This includes evaluation of any filtering criteria such as by geographical area or cell ID. When the trigger conditions are met, e.g. the UE is in the target area at the start of the session, the QoE session is started for QoE measurement and reporting.  As a reminder, SA4 specifications assume that *LocationFilter* can only be included in the QoE configuration container, if geographical filtering is not handled on the network side, i.e. to avoid otherwise redundant location filtering at network and UE sides, as mentioned in TS 26.247 and TS 26.114. As for AS layer filtering, SA4 assumes that the area scope filtering will not be based on GNSS locations and polygon/circular shapes, but rather on radio network parameters like Cell Id or Tracking Area. |

Based on this, the draft reply LS in [4] suggests to provide the following two pieces of information:

1. Clarify that for MBS broadcast services, the network will not perform area scope checking as this is infeasible to do so on behalf of the UEs which are in RRC IDLE/INACTIVE state.
2. Indicate that considering SA4 feedback, RAN2 decided that area scope verification for QoE measurements applicable to RRC IDLE/INACTIVE states should be performed by the application layer.

Hence the rapporteur suggests to check whether this is agreeable to RAN2.

**Question 1: Do companies agree that the network will not perform area scope checking for MBS broadcast services as this is infeasible to do so on behalf of UEs which are in RRC IDLE/INACTIVE state?**

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| **Company** | **Yes/No** | **Justification / comments** |
| Lenovo | Yes |  |
| Ericsson | Yes |  |
| CMCC | Yes |  |
| China Unicom | No | The first piece of information and question seems to clarify that the network will not perform area scope checking for MBS broadcast services in all RRC states, which is not correct. In RRC\_CONNECTED state, the gNB can perform area scope checking for MBS broadcast services if Rel-17 NW-trigged area scope is reused. So we suggest to modify the question as below:  **Question 1: Do companies agree that area scope checking for MBS broadcast services can be performed in RRC\_CONNECTED state, but not in RRC\_IDLE/INACTIVE state as it’s infeasible to do so when the UE is in non-connected state?** |
| ZTE | Yes for idle/inactive | Per RAN3’s decision, only when UE is in idle/ianctive that UE is required to do the area checking. |
| Huawei, HiSilicon | Yes | To China Unicom: It is true indeed it is feasible for NW to do that in RRC CONNECTED state. However, if the area scope is handled by the UE in RRC IDLE/INACTIVE, then why couldn’t it be handled by the UE in the RRC Connected state? If the UE can handle it in all RRC states, then the network will not have to release and reconfigure QoE configuration depending on the area scope and the QOE configuration can be simply kept at the UE all the time (as long as network finds it suitable). |
| Qualcomm | Yes |  |
| CATT | Yes for idle/inactive | When UE is in IDLE/INACTIVE states, only UE can do area checking as the gNB cannot to do so. But when UE is in CONNECTED state, we think we can follow the R17 mechanism. The area checking can be done by gNB. For the area scope handling during mobility in RRC\_CONNECTED state, the network can keep track of whether UE is inside or outside the area and configures/release configuration accordingly. |
| Apple | Yes |  |
| Ericsson2 | No | Agree with China Unicom’s comment, we only agree to the UE doing it in Idle/Inactive. Regarding Huawei’s reply, the proposed behavior is not inline with previous agreements. Such a big change in the behaviour requires more thinking and needs to be analyzed first. |
| Nokia | Yes for idle/inactive |  |

**Question 2: Do companies agree that the area scope verification for QoE measurements for MBS broadcast services can be performed by the application layer?**

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| **Company** | **Yes/No** | **Justification / comments** |
| Lenovo | Yes |  |
| Ericsson | No | We have listed a number of issues with the application layer handling the area in our contribution. The biggest problem is that the application doesn’t know the RRC state of the UE and therefore doesn’t know when it should handle the area (the UE should only handle it when the UE is in Idle or Inactive). We need to have a solution for this first in such case. Another issue is that each and every application needs to implement the area handling if this is agreed, instead of just doing it in one place in the UE AS. That increases the implementation cost and will probably lead to different handling by different applications, i.e. unpredicted behavior.  Normally 3GPP chooses the simplest solution. Is there any reason to choose a more complex solution and put the area handling in the application layer? Is there any benefit with it that could motivate the extra complexity? |
| CMCC | Yes |  |
| China Unicom | No | We support the NW can send the NW-trigged area scope information to the UE AS for checking.  Using app layer area scope information is not a good idea, because it will make conflicts when both LocationFilter information and Network-trigged area scope exist in the network. You can image that when the UE transfer from idle to connected state or vice versa, two types of area scope exists, the network cannot decide which information will be used as baseline for QoE measurements. RAN2 is not clear how to resolve this conflict issue, obviously, coordinating both LocationFilter and NW-trigged area scope will cost lots of time and will cause more specs impacts than only NW-triggered is used for all RRC states. |
| ZTE | Yes with clarification | First this is only for idle/inactive per RAN3 decision. And based At command (e.g., Signalling connection status) it is possible for application layer to know about UE status. Since it is application layer that performs the measurement, it is straightforward to let application layer do the area checking. |
| Huawei, HiSilicon | Yes | SA4 reply is very clear and we are not sure about the issues mentioned by Ericsson and China Unicom.  To Ericsson:   * The very simple solution is that UE handles area scope verification in all RRC states. For AS layer solution, is your intention to always release the are scope configuration when UE goes to RRC Connected state and then add it back when the UE moves to RRC IDLE/INACTIVE? * Also, as per SA4 reply, all applications for which QOE is specified already support LocationFilter. * Normally 3GPP does not specify multiple solutions for the same issue and we see no reason for replicating the existing mechanism in another layer.   To China Unicom:   * There are no conflicts as the UE can simply perform area scope checking for MBS broadcast in all RRC states, there is no need and no benefit in switching between NW controlled and UE controlled mechanism.   Hence no coordination is required and there is almost zero specifications impact if we choose application layer area scope checking (only some stage-2 description is needed). |
| Qualcomm | Yes | Tend to agree with Huawei that SA4 already said it is possible to perform area scope in application layer which is existing application layer behavior.  For RRC state issue commented by Ericsson, as with Huawei area scope can be checked by application layer even UE is in Connected state, which is aligned with the principle for existing broadcast service configuration and reception. If companies don’t like the unified behavior for IDLE/Inactive/CONNECTED state, it is also possible gNB check area scope as rel-17, the area scope in gNB side and in application layer should be same. |
| CATT | No | For clarification, in R17 QoE measurement, the area checking can be done by network or UE App layer. But actually the area checking is only done by network. Because in TS 26.247, it is specified that “*Note that if geographical filtering is handled on the network side (i.e. QoE reporting is turned on/off by the network depending on the UE location), no LocationFilter should be specified in the QoE Configuration, as this would mean two consecutive filterings*.”. In TS 28.413, in QoE measurement configuration, the area scope of QMC (not the LocationFilter in container) is mandatory presence. Network always do area check based on this information. So actually the LocationFilter will not be specified in QoE configuration in RRC\_CONNECTED state.  When UE enter RRC\_IDLE/RRC\_INACTIVE state, if the area checking is done by UE App layer, the LocationFilter needs to be included in QoE configuration container. But it cannot be realized as it was agreed not to use RRCRelease to configure QoE measurement.  So we think it is better to let UE AS layer to do area checking when UE enters RRC\_IDLE/RRC\_INACTIVE state. |
| Apple | Yes | We think it is much simpler to let the application to handle area scope verification always, regardless of the RRC state of the UE. |
| Ericsson2 | No | Some comments on the replies from Huawei:   * The very simple solution is that UE handles area scope verification in all RRC states. For AS layer solution, is your intention to always release the are scope configuration when UE goes to RRC Connected state and then add it back when the UE moves to RRC IDLE/INACTIVE? *Ericsson: There is no need to release the area configuration, the UE can keep it and the UE AS knows that it only needs to handle it when in Idle/Inactive.* * Also, as per SA4 reply, all applications for which QOE is specified already support LocationFilter. *Ericsson:* *We don’t see this in the SA4 reply. Could you please copy the text from the LS? We understand that it has been specified, but that is not the same thing as all applications already supporting it.* * Normally 3GPP does not specify multiple solutions for the same issue and we see no reason for replicating the existing mechanism in another layer. *Ericsson: Exactly. Why should we then introduce the use of LocationFilter when that hasn’t been used before?* |
| Nokia | Maybe | RAN3 only agreed that “*UE handles area scope checking for QoE measurements in RRC INACTIVE/IDLE mode.”* while not explicitly indicated the area scope checking for UE in RRC Connected state. We wonder if this is RAN3 intention that it is NW to check the area scope for MBS QoE when UE is in RRC Connected state. If this is true, we think there is no need to change Rel-17 behavior for MBS QoE.  Furthermore, when UE is in RRC\_IDLE/Inactive, based on SA4 LS, we understand the area scope can be indicated in App layer. We think the information provided in App layer should be used by UE for area scope checking. This is beneficial to avoid any duplicate area scope information sent from gNB to UE via RRC.  Maybe RAN2 can first agree some basic aspects as above before determining whether App or AS layer should perform the area scope checking for RRC idle/inactive. |

**Question 3: Do companies agree to send the LS to SA4 capturing RAN2 conclusion on the above?**

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| **Company** | **Yes/No** | **Justification / comments** |
| Lenovo | Yes |  |
| Ericsson | No |  |
| CMCC | Yes |  |
| China Unicom | No | SA4 don’t ask for RAN2 to reply a new LS, why we need to send the new LS to tell the conclusion? If RAN2 has made some agreements online that affect SA4, then a LS is needed. |
| ZTE | Depends | In case the conclusion will affect SA4. |
| Huawei, HiSilicon | Yes | If we agree to use application layer area scope verification, it would be useful to inform SA4 about this so that they can verify whether there is impact on their specifications. |
| Qualcomm |  | Seems not necessary, area scope checking is existing behavior, once is configured to the application layer, application layer should check as today. |
| CATT | No for now |  |
| Apple | No strong view |  |
| Nokia | No for now | Depends on outcome of Q2. |

With respect to the reply to SA5, in [5] it was proposed to indicate that:

1. As a default behavior, when the UE’s buffer for storing QoE reports is full and a new report arrives, the UE should discard older report(s) to make room for the new one.
2. Providing selection policies from consumers to the UE would be beneficial, e.g. for the UE to decide which reports to discard in case the UE’s QoE buffer becomes full.

Again, before deciding whether/what to reply, the rapporteur would like to understand whether RAN2 can reach agreements on the above issues.

**Question 4: Do companies agree that, as a default behavior, when the UE’s buffer for storing QoE reports is full and a new report arrives, the UE should discard older report(s) to make room for the new one.**

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| **Company** | **Yes/No** | **Justification / comments** |
| Lenovo | No | This default behaviour may make sense in case of limited storage space for QoE reports at the UE. However, we haven’t reached consensus yet wrt i) the minimum AS layer buffer size requirement; ii) in which layer to store QoE reports (AS layer and/or application layer). Depending on the minimum AS layer buffer size requirement RAN2 may decide on a hybrid solution (i.e. storing QoE reports in both AS and application layer) or on the solution in which application layer stores the QoE reports. In both cases a default behaviour wouldn’t then be needed. |
| Ericsson | Yes |  |
| CMCC | Yes | We agree to introduce time-based discard. But since RAN2 has not decided whether APP layer can store QoE report, the behavior can be different with regarding to the preferred layer to store QoE reports. |
| China Unicom | Yes |  |
| ZTE | Yes, and | Per SA5’s reply LS, new data apparently has higher priories regardless the buffer level. In case very limited buffer level, filter based on assisting information as proposed in second bullet may be considered on top of this default behavior. |
| Huawei, HiSilicon | Yes | To Lenovo: We have made the following agreement:  **8: If the AS layer buffer is full, RAN2 thinks AS layer should discard the QoE data. Can revisit this if SA5 LS reply indicates something that would create issues with this.**  There is nothing in SA5 reply that would require revisiting this agreement, so hybrid solution should not be considered any more. Hence, since AS storage space will be limited, even if we agree to extend it, specifying some discarding behavior will be needed.  [Lenovo2] I recall the below agreement from RAN2#119-e meeting. I don’t recall that we made an explicit agreement that only the AS layer stores the QoE reports. And from the contributions submitted to this meeting, one company proposed as alternative a hybrid solution in which the UE application layer stores the buffered QoE reports when UE AS memory becomes full. So I assumed that storing QoE reports in application layer is not precluded yet.   * 4: For buffering of QoE reports generated in RRC IDLE/INACTIVE state, RAN2 should discuss at least the minimal memory size requirement. FFS if AS layer is responsible for storing the QoE reports (as in Rel-17). |
| Qualcomm | Yes | Per SA5 reply.  For Lenovo’s comment, even thought we also think it makes sense to buffer in application layer if AS layer is full, but actually, it was excluded in last RAN2 meeting (RAN2#121)  *Proposal 8: If the AS layer buffer (64KB) is full, RAN2 discusses the following alternatives:*  *Alt 1: The AS layer should discard the QoE data.*  *Alt 2: The QoE data should be buffered in application layer.*   * 8: If the AS layer buffer is full, RAN2 thinks AS layer should discard the QoE data. Can revisit this if SA5 LS reply indicates something that would create issues with this.   [Lenovo3] Thanks for the clarification. We were missing a clear agreement saying that “QoE reports are only stored in AS layer”. However, if companies think that application layer has been implicitly excluded by above agreement then that’s fine with us. |
| CATT | Yes | Agree with QC |
| Apple | Yes | We should honor the agreement cited by HW/QC. |
| Nokia | Yes | Agree with Huawei and QC. If AS layer buffer is full, AS layer should discard the QoE data as agreed by RAN2. |

**Question 5: Do companies agree that providing selection policies from consumers to the UE would be beneficial, e.g. for the UE to decide which reports to discard in case the UE’s QoE buffer becomes full.**

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| **Company** | **Yes/No** | **Justification / comments** |
| Lenovo | No | See comments to Q4 above. |
| Ericsson | Yes |  |
| CMCC | Yes | Generally, we think FIFO discard policy is sufficient for MBS broad cast, but for other service type, different policy can be applied. |
| China Unicom | Yes | RAN3 has agreed to use assistant information, e.g. priority, we think it can also be used as selection policy for MBS broadcast service. |
| ZTE | Yes |  |
| Huawei, HiSilicon | Yes | Since this information will be anyway available at the gNB as per RAN3 agreement, it is a low-hanging fruit to forward it to the UE to ensure high priority reports are kept. |
| Qualcomm |  | It seems RAN3 agreed in LS R2-2302425,  *From RAN3 perspective, there is no need to send assistance information to UE* |
| CATT | Yes | Although R3 has agreed there is no need to send assistance information to UE, R2 can give the feedback if we want the gNB to send the assistant information to UE. We think the assistance information is beneficial to UE. |
| Apple | Yes | In the past we do not think the priority level per QoE configuration is useful. But now for RRC-IDLE/INACTIVE cases, indeed it is beneficial if the UE can have some guidelines (i.e. priority level) to decide which buffered QoE measurement should be discarded when the buffer is full. |
| Nokia | Yes |  |

**Question 6: Do companies agree to send the LS to SA5 capturing RAN2 conclusion on the above?**

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| **Company** | **Yes/No** | **Justification / comments** |
| Lenovo | No | This can be deferred to next meeting when the issue on AS layer buffer size will be discussed and consensus can be reached wrt i) the minimum AS layer buffer size requirement; ii) in which layer to store the QoE reports (AS layer and/or application layer). |
| Ericsson | No |  |
| CMCC | No |  |
| China Unicom | No |  |
| ZTE | No for now |  |
| Huawei, HiSilicon | Yes | If we can reach an agreement, we can inform this to SA5 and RAN3. |
| Qualcomm | No |  |
| CATT | No for now |  |
| Apple | No Strong view |  |
| Nokia | No for now |  |

## LS to SA5 on SA5 eQoE CRs for NR

SA5 sent an LS to RAN2 in [6] informing about the agreement to include NR QoE in their specifications. SA5 also attached one of the CRs that has been agreed in SA5 (see [7]) and asked “to take the above information in account and if needed update relevant specification”. Based on this LS, the draft reply was proposed in [8] were several issues were identified. The rapporteur proposes to discuss two things:

1. Whether the issues indicated in [8] are valid.
2. Whether RAN2 needs to update any RAN2 specification based on SA5 LS.

**Question 7: Do companies agree with the following issues raised in [8] with respect to the CR in S5-232115 (see [7]):**

1. **Figure 4.6.1.1-1:**
   1. **Step 5: the parameters “transmissionOfSessionStartStop” and “ran-VisibleParameters” are missing in the RRCReconfiguration message.**
   2. **Step 6: the codepoint “report\_initial\_playout\_delay“ is not correct since it is not defined in the AT command +CAPPLEVMCNR and should be replaced by “report\_playout\_delay\_for\_media\_startup“.**
   3. **Step 6: the codepoint “ran\_visible\_release\_only“ can be removed since Figure 4.6.1.1-1 describes the activation of (encapsulated) QoE and RAN-visible QoE measurements.**
   4. **Step 11: the codepoint „report\_initial\_playout\_delay“ can be removed since it is not defined in the AT command +CAPPLEVMRNR.**
   5. **Step 12: the parameter „ran-VisibleMeasurements“ is missing in the MeasurementReportAppLayer message.**
2. **Figure 4.6.1.2-1: The same issues as in Figure 4.6.1.1-1 should be corrected.**

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| **Company** | **Which issues do you agree with?** | **Justification / comments** |
| Lenovo | All | Proponent. We assumed that the Figures in the SA5 CR describe the activation of both (encapsulated) QoE and RAN-visible QoE measurements. |
| Ericsson | 1.1, 1.2, 1.4 and 1.5 | 1.3 The release of only RVQoE is done in the activation command in 27.007, so we think the current text is correct.  [Lenovo2] Isn’t it that both Figures show the **initial** activation of (encapsulated) QoE and RAN-visible QoE measurements? Acc. to TS 27.007 the parameter “ran\_visible\_release\_only” is optional and has only the value “0”. Are you assuming that the RRCReconfiguration message in Step 5 contains the ran-VisibleParameters-r17 set to “release” although there has been no ran-VisibleParameters-r17 setup before?  ran-VisibleParameters-r17 SetupRelease {RAN-VisibleParameters-r17}    TS 27.007, clause 8.84:  <ran\_visible\_release\_only>: integer type. Indicates the RAN visible application level measurements to be released.  0 Release the RAN visible application level measurements for this <meas\_config\_app\_layer\_id> |
| CMCC | All |  |
| ZTE | ALL | Indeed, release of RVQoE is done by the same AT command, but since the figure is example for measurement activation, it is ok to not include this. |
| Huawei, HiSilicon | 1.1, 1.2, 1.4 and 1.5 | 1.3 – Seems Ericsson is correct. CAPPLEVMCNR is used for providing/modifying the QoE configuration which may include releasing of RVQoE.  [Lenovo2] see comment to Ericsson above. |
| CATT | 1.1,1.2,1.3,1.5 | 1.4 - In RV QoE report, UE app layer should send the playout delay result to AS layer. If this is removed, how to indicate the result of initial play out delay. So we think whether the change fo step 11 should be same as the change for step 6 as in 1.2?  [Lenovo3] Beside buffer level we support only “Playout Delay for Media Startup” for RVQoE (and not “initial playout delay”). And for the latter the parameter below is specified in the AT command +CAPPLEVMRNR for sending the playout result to AS layer.  <playout\_delay\_for\_media\_startup>: integer type. Indicates the application layer playout delay for media startup in ms. |

**Question 8: Do companies think any RAN2 specifications need to be updated based on SA5 LS?**

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| **Company** | **Yes/No** | **Justification / comments** |
| Lenovo | No |  |
| Ericsson | No |  |
| CMCC | No |  |
| China Unicom | No |  |
| ZTE | No |  |
| Huawei, HiSilicon | No |  |
| Qualcomm | No |  |
| CATT | No |  |
| Apple | No |  |
| Nokia | No |  |

The rapporteur thinks it is natural that in case any issues need to be corrected in SA5 specifications, RAN2 will have to inform SA5 about this, hence there is no separate question on the need for such LS.

# Summary

TBD

# References

1. R2-2213054, LS on QoE measurements in RRC IDLE/INACTIVE states, RAN2
2. S4-230369, Reply LS on QoE measurements in RRC IDLE/INACTIVE states, SA4
3. S5-232760, Reply LS on QoE measurements in RRC IDLE/INACTIVE states, SA5
4. R2-2303597, [DRAFT] Further reply LS to SA4 on QoE measurements in RRC IDLE/INACTIVE , Huawei, HiSilicon
5. R2-2303599, [DRAFT] Further reply LS to SA5 on QoE measurements in RRC IDLEINACTIVE states, Huawei, HiSilicon
6. R2-2302463, LS on Approval of eQoE CRs for NR, SA5
7. S5-232115, Add MDT Alignment Information and RAN visible QoE Metrics to Signalling Based Activation, Ericsson
8. R2-2304019, Draft reply LS on eQoE CRs for NR, Lenovo