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

**Electronic, 17th – 26th April, 2023**

**Agenda Item:**  **7.14.4**

**Source: China Unicom (email rapporteur)**

**Title:** [**AT121bis-e][220][QoE] SRB5 configuration and usage (China Unicom)**

**Document for: Discussion and Decision**

# 1 Introduction

This is the email report of [AT121bis-e][220]:

* **[AT121bis-e][220][QoE] SRB5 configuration and usage (China Unicom)**

Scope: Discuss how the SRB5 is configured by MN/SN, e.g. how switching the reporting leg and QoE pause work. Attempt to provide proposal on agreeable details as well as details requiring further discussion.

Intended outcome: Discussion report in R2-2304395

Deadline: Deadline 2 (Comment deadline: Friday W1, 0900 UTC, Rapporteur proposed outcome: Monday W2)

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

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# 2 Discussion

## 2.1 SRB5 Configuration and procedures

To decide whether to use explicit indication for QoE reporting in NR-DC, two cases are mentioned in the contributions:

Case 1: whether to indicate the reporting leg by implicit indication (MN or SN)?

Case 2: whether to indicate the changed leg by implicit indication (MN -> SN or SN->MN)?

For case 1, [6] supports both SRB4 and SRB5 are configured simultaneously, and [6][10] propose that UE can be explicitly indicated the reporting leg in the case of both SRB4 and SRB5 are configured, then QoE reports can be reported to the corresponding leg. However, [7] supports to use implicit indication when only one SRB (SRB4 or SRB5 are configured). The case that both SRB4 and SRB5 are configured simultaneously are not considered in [7]. [11] also supports only one bearer, i.e. either SRB4 or SRB5 is configured at a given time.

From Rapp perspective, it's common to report QoE reports to the corresponding leg when only one of SRB4 or SRB5 is configured at a given time. In addition, as QoE supports more and more metrics and service types for measurement, the use of SRB4 and SRB5 can help reduce the AS buffer pressure under RAN overload and reduce the probability of QoE reports being discarded due to the buffer is full. Before deciding whether to use implicit indication for QoE reporting, RAN2 needs to discuss the SRB4 and SRB5 configuring. [7] also propose that the case that both SRB4 and SRB5 are not configured need to be considered.

**Q1a: Do you agree with that RAN2 should consider both SRB4 and SRB5 are configured simultaneously?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Huawei, HiSilicon | Yes | We think it is natural that both of them can be configured simultaneously, since both MN and SN can have their own QoE configurations, e.g. for RAN visible QoE and it is usually beneficial that the results are reported directly to the node which configured the measurements. Also, in case the reporting leg is indicated per QoE configuration (as proposed in Proposal 4) it is possible to share the reporting load between MN and SN flexibly.  In summary, we see no technical obstacles with allowing such flexibility. For UE capability aspect, we can address it later. |
| Ericsson | Yes | Both the MN and the SN can configure the UE with QoE configurations. The SRBs are valid for all QoE configurations, they are not configured per QoE configuration. So the MN may have configured the UE with one QoE configuration and the SN the UE with another QoE configuration and then both SRB4 and SRB5 may be configured. |
| NEC | Yes | It would be up to network configuration, no need to restrict it in the spec. |
| Nokia | Yes | Our understanding is that, both SRB4 and SRB5 can be configured simultaneously to UE. Simultaneous SRB4/SRB5 configuration is up to NW configuration and dependent on RAN3 decision. i.e. if there is a need to coordinate RRC Ids between MN and SN, we assume that simultaneous configuration from MN and SN can happen. Given that default reporting (SRB4 to MN and SRB5 to SN) could be also made possible. But maybe check with RAN3 is required. |
| LGE | Yes | Basically, it is reasonable to use SRB4/SRB5 to directly transmit the MN/SN related QoE report to MN/SN respectively, when the UE is configured with the QoE measurements by both MN and SN. |
| Qualcomm | No | But can following majority view. |
| CMCC | Yes | We also agree that SRB4 and SRB5 can be configured for MN and SN for QoE report separately. And we think MN and SN can have different QMC configurations therefore they can be configured simultaneously. |
| ZTE | Yes | No need to restrict NW’s implementation. |
| Apple | Yes | However, we think both of them are optional. |
| China Unicom | Yes | More and more metrics and service types for QoE measurement will be supported in the future, the use of both SRB4 and SRB5 can help to reduce the AS buffer pressure under RAN overload and reduce the probability of QoE reports being discarded due to the buffer is full. |

**Q1b: If the answer of Q1a is “Yes”, do you agree to explicitly indicate the QoE reporting leg (to MN or SN)?**

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| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Huawei, HiSilicon | Yes | We support to have explicit indication due to two reasons:   * It is not complex * It is clear between UE and network   Some companies also proposed some implicit rules for the UE to decide the reporting leg. However, we are not sure what the benefits are (is it to save 1 or 2 bits in the RRC configuration?). We think this would mean RAN2 has to discuss rules one by one. We are not sure whether it is a good way, because for now we have seen couple of rules, and it will become more and more. Perhaps in the end, we will have quite a lot of rules.  In general, we observe that the benefit of implicit indication is not so attractive and the costs are considerable. |
| Ericsson | Yes | An explicit indication is not needed when it is obvious which leg to report to. If a cell group has configured QoE, the reports are by default sent to that cell group and by the same method (direct signalling or encapsulated). If the reports should be sent in a different way, an explicit indication is needed. |
| NEC | No | When a UE in MR-DC is configured with both SRB4 and SRB5, then SRB4 is used for QoE report to MN for QoE configurations configured by MN whereas SRB5 is used for QoE report to SN for QoE configurations configured by SN. It is obviously that the QoE report leg can be indicated by whether the corresponding SRB is added/released or not. |
| Nokia | No | We think more straightforward selection would be to allow the indication is implicitly handled by appropriate SRBs configuration. For example, the reporting leg selection can be implicitly indicated by SRB4/5 configuration. For example, if SRB5 is configured (no matter SRB4 is configured or not), the UE reports QoE reports to SN. If SRB5 is not configured but SRB4 is configured, it reports QoE reports to MN. |
| LGE | No | When MN leg and SN leg are not congested, no indication is needed. I.e. UE can use SRB4 to transmit the QoE report configured by MN to MN and use SRB5 to transmit the QoE report configured by SN to SN.  When MN leg is congested, all QoE reports need to be transmitted via SRB5. We already have ‘pauseReporting’ to indicate the congestion, and the ‘pauseReporting’ can be configured MN and SN separately. So no additional indication is needed to indicate the QoE reporting leg. |
| Qualcomm | No | As commented by above companies, UE can report MN configured QoE to MN and SN configured QoE to SN. If MN is overloaded, then the QoE configuration should be modified to SN |
| CMCC | Yes | An explicit indicator can be beneficial for RAN overload. |
| ZTE | Yes | As in Q1, it is possible NW can configure both SRB4/5, implicit indication based on SRB type is not feasible. Even when SRB5 is configured, NW may consider to use MN to transmits the QoE report to achieve load balance between two legs. |
| Apple | No | We think the UE can select SRB based on whether QoE reporting is configured by MN or SN. |
| China Unicom | Yes | We support to explicitly indicate the QoE reporting leg, but not for the reporting leg changing.  If both SRB4 and SRB5 are configured to the UE, the UE may receive different QoE configurations from different nodes, the UE AS and UE APP layer can't figure out which configurations shall be reported via SRB4 or via SRB5, due to all the configurations are measured and stored together.  Besides, in the case of both SRB5 are configured, it’s not agreed that SRB5 has a high priority than SRB4, and the SN leg may be unstable when considering UE power saving or bad coverage of SCG, so it’s not reasonable to prioritize QoE reporting via SRB5. |

**Q1c: Do you agree with that QoE reports can be reported to the MN (only SRB4 is configured) and QoE reports can be reported to the SN (only SRB5 is configured)?**

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| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Huawei, HiSilicon | Yes, details up to RAN3 | In our view, for m-based QoE, if only one SRB (either SRB4 or SRB5), the QoE reports can be forwarded to another entity, e.g. from MN to SN, or from SN to MN. The forwarding itself is RAN3 related, and RAN2 can focus on Uu part. |
| Ericsson |  | Not sure of the question. Does it relate to the UE sending the reports or to forwarding of reports between nodes on the network side |
| NEC | Yes |  |
| Nokia | See comment | We wonder what the “forwarded” mean in the question. Does it mean "reported to MN/reported to SN"? If this understanding is correct, we agree the proposal. |
| LGE |  | Same view as Nokia |
| Qualcomm |  | Same view as Nokia |
| CMCC | Yes | If “forwarded” means “reported”. |
| ZTE |  | Needs clarification? Based on the agreements so far, UE can allow NW indication to report the QoE measurements to either SN or MN, which is also per RAN3’s request. Regarding the detailed forward procedure, it can be left to RAN3 to discuss. |
| Apple |  | Same view as Nokia |
| China Unicom | Yes |  |

**Q1d: Do you think RAN2 needs to discuss the case that both SRB4 and SRB5 are not configured? If the answer is yes, how to handle the measured QoE reports?**

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| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Huawei, HiSilicon | No | If both SRB4 and SRB5 are not configured, QoE features are not enabled, like we did for Rel-17 QoE. So we wonder what issue we are going to discuss. |
| Ericsson | No | If the network has configured QoE, at least SRB4 should be configured, otherwise it is an erroneous configuration. |
| NEC | No | It is not a valid configuration for QoE report. |
| Nokia | Yes | It seems a feasible situation, which may need discussion until when the UE could buffer data. |
| LGE | No | Same view as Huawei. |
| Qualcomm | No | Same view as Huawei |
| CMCC | No | Same view as Huawei. |
| ZTE | No | Same view as Huawei |
| Apple | No | We are not sure why a UE should even measure QoE if no appropriate SRB for QoE reporting is configured. |
| China Unicom | No | Share the same view with Huawei and Ericsson. |

For case 2, [1][7][10][11] support to use the implicit indication, while [2][4][6] support to use explicit indication. In detail, [7] propose that if SRB5 is configured, the UE reports QoE reports to SN, if SRB5 is not configured but SRB4 is configured, it reports QoE reports to MN. [10] propose that if pause indication is set to true, the MN leg can be changed to SN to mitigate MN’s overload status. Or it can be changed from SN to MN if the SN is released. [11] propose that QoE reporting leg changing can be achieved by existing bearer type change. For explicit indication, [4] also propose to use 1-bit indication per QoE configuration (i.e., per measConfigAppLayerId) to indicate the switching leg for QoE reporting (MN or SN). [8] propose that if the reporting leg is changed for a QoE/RVQoE configuration, the change takes effect immediately, i.e., also for an ongoing application layer measurement session.

To summarize, some companies support to use implicit indication thinks that leg changing can be implicitly indicate by bearer type changing, pause indication, SRB added/released action, the others support to use explicit indications. And one company also propose the ongoing APP layer measurement session can be changed. From Rapp perspective, different companies have different opinions, but the signalling overhead can be reduced with implicit indication for leg changing. As for can we change the ongoing QoE session, it can be discussed further.

**Q2a: Do you agree to indicate the changed leg by implicit indication (MN -> SN or SN->MN)? If the answer is yes, please provide the detailed procedures how can implicit indication be used?**

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| **Company** | **Yes/No** | **Comments** |
| Huawei, HiSilicon | No | As indicated in our reply to Q1a, we do not think we need to spend time on specifying complex rules for leg selection. |
| Ericsson | No | Not sure how implicit indication could work. |
| NEC | Yes | See comments for Q1b. |
| Nokia | Yes | Implicitly indicated by appropriate SRBs configuration, as explained in Q1b. |
| LGE | Yes | For QoE configured by MN, UE basically would use SRB4 to transmit directly the QoE report to MN. When MN is congested, SRB5 can be used. The pauseReporting per CG seems sufficient to indicate the MN/SN congestion. |
| Qualcomm | Yes | Same as Q1b, UE can report MN configured QoE to MN and SN configured QoE to SN. If MN is overloaded, then the QoE configuration can be switched to SN (e.g. SN provides QoE configuration ID to the UE) |
| CMCC | Yes | Similar views as LGE. |
| ZTE | No | The switch leg indication is required by RAN3 to deal with overload situation, to rely on implicit indication(e.g. by default to report to configured node ) is not feasible and cannot fulfil RAN3 requirement. Implicit SRB type is also not feasible per our explanation in previous question. |
| Apple | Yes | We think the UE can select SRB based on whether QoE reporting is configured by MN or SN. |
| China Unicom | Yes | As we proposed in the discussion paper, leg changing for reporting may happen in the following scenarios:  1) When only MN (or SN) is RAN overload, the leg changing will happen.  e.g. if Rel-17 paused indication is sent to the UE, QoE reports that needed to be reported to MN (or SN) shall be changed to SN leg for reporting.  2) When the SN is released due to some reasons, the leg changing will happen. QoE reports shall be automatically select MN for reporting.  So we believe that implicit indication is enough for leg changing. |

**Q2b: Do you think that an ongoing application layer measurement session is also changed for reporting when the reporting leg is changing?**

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| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Huawei, HiSilicon | No | There should be no impact on ongoing application layer session from leg switching. |
| Ericsson |  | Our proposal was not related to the session in the application layer, it was only related to the reporting. We wanted to confirm the understanding that the change in reporting leg takes effect immediately in order to know if any changes to the pause mechanism would be needed, but maybe that is already obvious and the proposal was confusing. If the reporting leg can be changed for an ongoing session, we don’t think that any changes to the pause mechanism is not needed as the network can change the reporting leg instead. |
| NEC | No strong veiw | Follow majority |
| Nokia | See comments | The question is ambiguous. The “ongoing application layer measurement session” is from App layer point of view? Or RRC ?  If the QoE reporting leg is changed in RRC layer, is it transparent for App layer? |
| LGE | No | The reporting leg change is just an AS behaviour. It doesn’t affect APP layer. |
| Qualcomm | No | To avoid confusion, propose to change to “reporting leg change is not visible to application layer QoE sessions”. |
| CMCC | No | Application layer is not aware of leg switching. |
| ZTE |  | My understanding is that the proposal is not to change the on-going measurements. But to emphasize that UE shall always follow the indication received to report the measurements, which is fine for us. |
| Apple | No | RAN3 has agreed that leg switching is possible during an application session |
| China Unicom | No | The APP layer shall not be affected. |

After leg changing, [8] propose the session start and stop indications are sent to the node which configured the UE with QoE, even if the QoE/RVQoE reports are sent to the other node.

**Q2c: Do you agree with that the session start and stop indications are sent to the node which configured the UE with QoE, even if the QoE/RVQoE reports are sent to the other node?**

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| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Huawei, HiSilicon | No | We wonder about the benefits.  It seems easy to let UE send all reports for a RRC ID to one node and the nodes can forward the reported information to each other, if needed (details up to RAN3). |
| Ericsson | Yes | It is the node that configured QoE that is responsible for the configuration and handles the area scope. |
| NEC | No strong veiw | Follow majority |
| Nokia | Need more discussion | The alignment of MDT and QoE measurements was not fully discussed. FFS. |
| LGE | No | No need to support such a complicate UE behaviour. MN/SN can forward it to another node. |
| Qualcomm |  | Postpone the discussion, MDT and QoE alignment has no progress in RAN3. |
| CMCC | Yes, not a strong view | Can wait for RAN3’s conclusions. |
| ZTE | Postponed | Wondering about the use case,further discussion is needed. |
| Apple |  | We think this can be discussed further when motivations/benefits are more clear to RAN2 |
| China Unicom | Need more discussion | Share the same view with Nokia, it can be discussed further. |

For SRB5 handling, [1][6] propose that SRB5 handling (setup, modification, release) is configured via SN RRC Reconfiguration message. [6][8] propose that when SCG is released, SRB5 should be released as well. And in TS 37.340, SRB3 definition needs to be updated due to SRB5 introduction [6].

In Rapp’s view, SRB5 is defined for QoE reporting to SN, which is similar with SRB3 defined for SN. So it’s common to handle SRB5 via SN RRC message and SRB5 should be released when the SCG is released. Then the SRB5 should be updated to the TS 37.340.

**Q3a: Do you agree with that SRB5 handling (setup, modification, release) is configured via SN RRC Reconfiguration message, and SRB5 should be released when the SCG is released?**

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| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Huawei, HiSilicon | Yes | Proponent |
| Ericsson | Yes |  |
| NEC | Yes |  |
| Nokia | Yes |  |
| LGE | Yes | As SRB3 is released when SCG is released. |
| Qualcomm | Yes |  |
| CMCC | Yes |  |
| ZTE | Yes |  |
| Apple | Yes |  |
| China Unicom | Yes |  |

**Q3b: Do you agree to update TS 37.340 based on the introduction of SRB5?**

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| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Huawei, HiSilicon | Yes | Some changes may be needed. |
| Ericsson | Yes |  |
| NEC | Yes |  |
| Nokia | Yes |  |
| LGE | Yes |  |
| Qualcomm | Yes |  |
| CMCC | Yes |  |
| ZTE | Yes |  |
| Apple | Yes |  |
| China Unicom | Yes |  |

## 2.2 RRC spec impacts with SRB5 introduced

As for the detailed RRC aspects related with SRB4 and SRB5, [3][5][8][10] propose that if SRB5 is not configured or the SCG is deactivated, UE transmits the QoE reports related to SCG in MeasurementReportAppLayer message embedded in ULInformationTransferMRDC via SRB4 to the MN, [8] also propose in this case the MN can forward the embedded SN-related QoE reports to SN. [3] [7] agree with that if SRB5 is configured and the SCG is not deactivated, UE transmits the QoE report related to SCG in MeasurementReportAppLayer message via SRB5.

In Rapp’s view, all the QoE reports (include both MN-related and SN-related QoE reports) are required to be uploaded to MN if SRB5 is not configured, and SN-related QoE reports can be transfer to SN via SRB5 if SCG is not deactivated and SRB5 is configured. How can MN handle the SN-related QoE reports involves with Xn or NG interface, which is out of RAN2 scope.

**Q4a: Do you agree that if SRB5 is not configured or the SCG is deactivated, UE transmits the QoE reports related to SCG in *MeasurementReportAppLayer* message embedded in *ULInformationTransferMRDC* via SRB4 to the MN?**

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| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Huawei, HiSilicon | No | Reasons are provided in our paper [6]:  Also, according to the agreements of RAN3, both nodes may be interested in knowing the RAN visible QoE results. In such case, if the SN *MeasurementReportAppLayer* is included in the MN *ULInformationTransferMRDC* message, MN needs to send the SN *MeasurementReportAppLayer* to SN and only then SN sends the RAN visible QoE results back to MN. It will increase the delay of RAN visible QoE results and increase signaling over Xn interface.  Our preference is:  **If SRB5 is not configured, UE sends the SN QoE results in MeasurementReportAppLayer message via SRB4 and MN forwards them to SN.** |
| Ericsson | Yes to not configured, No to deactivated SCG | If SRB5 is not configured, the UE transmits the QoE reports in *MeasurementReportAppLayer* message embedded in *ULInformationTransferMRDC* via SRB4. The assumption is that the network has made the configuration in an *RRCReconfiguration* encapsulated in *mrdc-SecondaryCellGroupConfig* in such case. The network should not make any configuration using SRB3 without configuring SRB5 at the same time, that would be an erroneous configuration.  If the SCG is deactivated and the UE needs to transmit a QoE report to the SN, the UE should indicate that it has a preference to get the SCG activated according to legacy procedures. When the SCG has been activated, the UE can transmit the report to the SN.  The UE shouldn’t send reports to any other node than the node which provided the QoE configuration, unless explicitly indicated by the network. |
| NEC | Yes |  |
| Nokia | No | It seems simple to reuse legacy MeasurementReportAppLayer message via SRB4. |
| LGE | Yes, | so that MN can forward the QoE report to SN. |
| Qualcomm |  | It seems we need to distinguish different cases:  - For s-based QoE, this is not needed, MN can forward the QoE report to MCE  - For SN triggered m-based QoE, this may need to be discussed in RAN3, whether MN can forward to the right MCE.  - For RVQoE, MN needs to decodes the reporting message and obtain PDU Session ID and QoS Flow ID, then MeasurementReportAppLayer message via SRB4. |
| CMCC | No | *MeasurementReportAppLayer* can be reused. |
| ZTE | No | It is possible to use SRB4, no need for new message |
| Apple | Yes but | We are also fine with Huawei’s preference indicated above. The key point is that MN should be able to forward the QoE report to SN. |
| China Unicom | Yes | Generally, the SCG is deactivated for UE power saving or other reasons, the QoE reports can be reported to MCG, it’s not needed to re-activate the SCG just for QoE reporting. |

**Q4b: If the answer of Q3a is yes, do you agree with that RAN2 should wait for RAN3’s decision on how to handle the SN-related QoE reports received in MN?**

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| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Ericsson |  | There is already an existing mechanism for it for *MeasurementReport*. The same way should be used for *MeasurementReportAppLayer*. |
| LGE |  | Same view as Eircsson |
| Apple |  | Agree with Ericsson |
| China Unicom |  | MN can forward the QoE report to SN. |
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**Q4c: Do you agree that if SRB5 is configured and the SCG is not deactivated, UE transmits the QoE report related to SCG in *MeasurementReportAppLayer* message via SRB5?**

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| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Huawei, HiSilicon | Not sure | We think explicit leg indication should be provided per QoE configuration and the UE just follows the configuration. We are not sure what “related to SCG” means. |
| Ericsson | Yes | The assumption is that the network made the configuration via SRB3 in such case. |
| NEC | Yes |  |
| Nokia | Yes | Reusing legacy message via SRB5 is fine. |
| LGE | Yes |  |
| Qualcomm | Yes |  |
| CMCC | Yes |  |
| ZTE | Yes |  |
| Apple | Yes |  |
| China Unicom | Yes |  |

[6] also propose some detailed RRC spec impacts with SRB5 introduced.

1) SRB5 is for RRC messages which include application layer measurement report information (i.e. MeasurementReportAppLayer), all using DCCH logical channel.

2) SRB5 has a lower priority than SRB3 and can only be configured by the network after AS security activation.

3) Once AS security is activated, all RRC messages on SRB5 are integrity protected and ciphered by PDCP.

4) Split SRB is not supported for SRB5.

5) The integrity protection algorithm is common for SRB1, SRB2, SRB3 (if configured), SRB4 (if configured), SRB5 (if configured) and DRBs configured with integrity protection, with the same keyToUse value. The ciphering algorithm is common for SRB1, SRB2, SRB3 (if configured), SRB4 (if configured), SRB5 (if configured) and DRBs configured with the same keyToUse value.

6) SRB5 release is supported, e.g. via srb5-ToRelease IE

7) During RRC connection resume, the UE resumes SRB5 (if configured)

**Q4d: Do you agree all the 1)-7) proposals related with RRC RRC spec impacts when introducing SRB5?**

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| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Huawei, HiSilicon | Yes | Proponent |
| Ericsson | Yes to 1-6 | The UE should apply the configuration indicated by the network at resume. |
| NEC | Yes |  |
| Nokia | Yes |  |
| LGE | Yes |  |
| Qualcomm | Yes to 1-6 | For 7, same as Ericsson, whether SRB5 can be resumed depend on whether SCG can be resumed. |
| CMCC | Yes |  |
| ZTE | Yes 1-6 | Same view as QC |
| Apple | Yes to 1-6 | Same view as Ericsson and QC |
| China Unicom | Yes |  |

## 2.3 Reuse Rel-17 QoE mechanism

When considering whether and how to reuse Rel-17 mechanism, QoE reports meassage segmentation, the capability of maximum number of simultaneous QoE configurations, and pause and restart mechanism are discussed.

[2][6] discuss the segmentation for SRB5, [6] propose the SRB5 can be used for transferring of segments of ULDedicatedMessageSegment.

[6][7] discuss the maximum number of simultaneous QoE configurations information exchanging between MN and SN. [7] also propose that RAN2 discuss whether the UE’s maximum number of application layer measurement configurations (i.e., 16) needs extension for DC.

[3][6][7] propose to support pause mechanism in NR-DC, but there are different opinions on how to introduce this mechanism (if MN sends Pause to suspend reporting to both: MN and SN, or to suspend reporting to MN only). In [3], some scenarios are proposed to discuss the RAN overload state for MCG and SCG with considering whether SRB5 is available. However, [6] only propose to reuse Rel-17 principle in NR-DC, e.g. pause all the QoE reports and not pausing RVQoE reports.

In Rapp’s view, reusing Rel-17 segmentation for SRB5 can help to transmit large QoE reports (e.g. XR QoE reports) successfully. For the maximum number of simultaneous QoE configurations information exchanging between MN and SN, it depends on how MN and SN split the QoE configurations by RAN3. If MN is responsible to split all the QoE configurations to MN-trigged or SN-trigged, the maximum number of simultaneous QoE configurations information exchanging seems not needed. For pause mechanism, there are a lot of issues need to be discussed: pause which node, if not paused how to handle the QoE reports?

**Q5a: Do you agree SRB5 can be used for transfer of segments of *ULDedicatedMessageSegment*?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Huawei, HiSilicon | Yes | Proponent |
| Ericsson | Yes | Segmentation needs to be supported for SRB5 also. |
| NEC | No strong view | Follow majority |
| Nokia | Yes |  |
| LGE | Yes |  |
| Qualcomm | Yes |  |
| CMCC | Yes |  |
| ZTE | Yes |  |
| Apple | Yes |  |
| China Unicom | Yes |  |

**Q5b: Do you agree to leave the “maximum number of simultaneous QoE configurations information exchanging between MN and SN” as FFS until RAN3 decide how to split the QoE configurations?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Huawei, HiSilicon | Yes | In our paper [6] we proposed the following.:  **To ensure MN and SN do not use the same set of QoE configuration RRC identities and that UE capabilities are not exceeded, MN indicates the maximum number of QoE configurations and QoE configuration RRC identities that can be used by SN using inter-node RRC message.**  However, it seems RAN3 agreed that if SN wants to configure something, it needs to ask MN for permission. When MN gives feedback, there is a natural chance for MN to notify SN the RRC ID to use. This seems very straightforward, so we can wait for RAN3 progress on this issue. They are discussing this during this meeting to the best of our knowledge. |
| Ericsson | Yes | Fine to wait. The limitation is probably more in the UE, how many configurations the UE can be configured with. |
| NEC | Yes |  |
| Nokia | Yes | We can wait RAN3 progress on MN-SN coordination to ensure the maximum number of QoE configuration is not exceed. |
| LGE | - | No strong view |
| Qualcomm |  | It should in RAN3 scope, RAN2 does not need to discuss it. |
| CMCC | Yes |  |
| ZTE | Yes | No need for any RAN2 conclusion |
| Apple |  | Up to RAN3 |
| China Unicom | Yes |  |

**Q5c: Do you agree to reuse Rel-17 pause mechanism for NR-DC? If the answer is Yes, which option do you support?**

Option 1: all the QoE reports are paused when receiving pause indication.

Option 2: MN-related and SN-related QoE reports can be paused separately, QoE reports can be transmitted through the node that not at RAN overload.

|  |  |  |  |
| --- | --- | --- | --- |
| **Company** | **Yes/No** | **Option** | **Comments** |
| Huawei, HiSilicon | Yes |  | We are open for two options.  Option 1 is not a legacy behaviour as the pause indication is per QoE configuration. But when a certain QoE configuration is paused, then the reports should not be sent neither to MN nor SN for this QoE configuration. |
| Ericsson | Yes |  | The pause indication is configured per QoE configuration, so the pause will apply to that QoE configuration. If the node which provided the QoE configuration is overloaded, the UE can be configured to transmit the reports to the other node. Therefore, we don’t think any further enhancements to pause is needed, i.e. pause means pause for the indicated QoE configuration as in rel-17. |
| NEC | Yes | Option 1 | Option 2 sounds an optimization. Since reporting leg change is supported, such an optimization is not needed. |
| Nokia | Yes | FFS | It depends on the conclusion on whether UE can report QoE to MN and SN (via SRB4 and SRB5) at the same time. |
| LGE | Yes | Option2 | In 38.300 it is specified the QoE measurement collection pause/resume procedure is used to pause/resume reporting of one or multiple QoE measurement configurations in a UE in RAN overload situation. The RAN overload situation differs per CG, and the pauseReporting can be configured per CG.  However, when MN is overloaded, UE doesn’t need to pause the QoE reporting if SRB5 is configured in NR-DC. |
| Qualcomm | Yes | None | Same view as Ericsson, no any enhancement is needed. |
| CMCC | Yes | Option 1 | Option 2 can be replaced by explicit reporting leg indication. |
| ZTE | Yes | ffs | We prefer to further analysis the usage of pause-resume indication |
| Apple | Yes | None | We do not see a need for enhancement |
| China Unicom | Yes | Option2 |  |

## 2.4 Other issues about encapsulated QoE

Others issues for NR-DC are also discussed: for RRC IDs splitting, [9] propose that MN is responsible to pre-configure the SN specific RRC ID list and MN specific RRC ID list, and MN sends the SN specific RRC ID list to SN in advance.

For QoE configurations configured in NR-DC, in [1], it’s proposed the UE may receive two independent AppLayerMeasConfig in NR-DC.

[2] propose that for both MN and SN can configure m-based QoE configuration to UE through an RRC message, while only MN can configure s-based QoE configuration to UE through an RRC message, e.g., RRCReconfiguration and RRCResume). [6] propose that RAN visible QoE configuration is generated by the same node which generates the configuration for container based QoE. The other node will not send the RRC message to update/modify the RAN visible QoE configuration which was not configured by this node.

In Rapp’s view, for RRC IDs splitting, the issue are same as Q5b, and can be based on RAN3 decision. For QoE configuraing in NR-DC, the UE may receive two independent QoE configuration when the m-based QoE measurement are activated in NR-DC.

**Q6a: Do you agree with that the UE may receive two independent AppLayerMeasConfig in NR-DC?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Huawei, HiSilicon | Yes | According to RAN3 agreements, for m-based QoE, MN or SN can generate QoE configurations and then send them to UE, so we think this was already agreed. |
| Ericsson |  | If the configurations are independent, they should have two different *measConfigAppLayerId*s and such configuration is already possible. |
| NEC | Yes |  |
| Nokia | See comments | Yes, it is possible only for m-based QoE configuration, but under NW coordination and RRC Ids should not overlap. |
| LGE | Yes | Same view as rapporteur. |
| Qualcomm | Yes | Same view as rapporteur. |
| CMCC | Yes | Agree with rapporteur |
| ZTE | Yes | Unless RAN3 revise their decision, for now it is possible. |
| Apple | Yes |  |
| China Unicom | Yes | We use “may” not “always”, so we think both s-based and m-based QoE configuration are considered. |

**Q6b: Do you agree with that both MN and SN can configure m-based QoE configuration to UE through an RRC message, while only MN can configure s-based QoE configuration to UE through an RRC message, e.g., RRCReconfiguration and RRCResume)?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Huawei, HiSilicon | Yes | For s-based QoE, we are fine use SRB1 to provide all the QoE configurations to UE (like proposed by China Unicom). And we are also fine to use RRCReconfiguration and RRCResume.  For m-based QoE, it is related to Q6a, and we think it is possible for both MN and SN to send QoE configuration. |
| Ericsson | Yes | This is inline with RAN3 agreements. No additional impact in RAN2 seems to be needed, this is already supported. |
| NEC | Yes |  |
| Nokia | Yes | It was agreed by RAN3. |
| LGE | Yes |  |
| Qualcomm | Yes | Already agreed. |
| CMCC | Yes |  |
| ZTE | Yes |  |
| Apple | Yes |  |
| China Unicom | Yes |  |

## 2.5 Support RVQoE for NR-DC

[2][6][9][10][11] propose to consider RVQoE configurations and reporting for NR-DC.

For RVQoE configurations, [2] propose SN can configure the QoE configuration to UE through SRB3, [10] propose two options for SN to send the RVQoE configuration directly via SRB3 or split SRB1, or to MN and MN forward to UE with or without modification. [6] also propose that RAN visible QoE configuration is generated by the same node which generates the configuration for container based QoE. The other node will not send the RRC message to update/modify the RAN visible QoE configuration which was not configured by this node.

**Q7a: Do you agree with that SN can configure the QoE configuration to UE? If the answer is Yes, which option do you prefer to configure SN-related RVQoE configuration?**

Option 1: send the RVQoE configuration directly via SRB3.

Option 2: send the RVQoE configuration directly via split SRB1.

Option 3: send the RVQoE configuration via SRB1 (to MN and MN forward to UE with or without modification).

|  |  |  |  |
| --- | --- | --- | --- |
| **Company** | **Yes/No** | **Option** | **Comments** |
| Huawei, HiSilicon | Yes |  | We think RAN3 has already agreed:  SN can send an RVQoE configuration to the UE.  Firstly, we think Q7a is relevant to Q7b and Q7c.  Secondly, in Q7b, we are the proponent so we are positive. If Q7b is agreeable, it should be possible to use option 1/2/3 for the configuration transmission. |
| Ericsson | Yes |  | Option 1 is possible. Option 2 we don’t understand. Doesn’t split SRB1 always terminate in the MN? I.e. it doesn’t matter whether it is split or not, it will anyhow be a configuration from the MN. Option 3 we assume is the encapsulated case which is fine, but the MN cannot modify the SN configuration. |
| NEC | Yes | Option 1 |  |
| Nokia | Yes |  | Wait for more RAN3 progress |
| LGE | Yes | - | Option 1 can be a baseline, but SRB1 can be used if SRB3 is not configured. |
| Qualcomm | Yes |  | Wait for RAN3 progress. RAN3 is discussing how MN and SN coordinate RVQoE configuration. |
| CMCC | Yes |  | Can wait for RAN3’s conclusion |
| ZTE | Yes | Both Option 1 and option 3 is feasible per RAN3 decision. | Per RAN3’s decision, it is possible MN or SN can configure UE this the configuration, therefore both option 1 and option 3 is possible. As for split SRB1, not sure about the use case here, what’s that gain of this kind of configuration. |
| Apple | Yes |  | We are open to all options |
| China Unicom | Yes |  | Wait for more RAN3 progress |

**Q7b: Do you agree with that RVQoE configurations can only be generated by the same node which generates the configuration for container based QoE?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Huawei, HiSilicon | Yes | Proponent |
| Ericsson | No | We think it should be possible to configure RVQoE independently of the QoE configuration. We don’t understand the reason for the current restriction. |
| NEC | Yes |  |
| Nokia | See comments | In RAN3 agreement it is said that the first RVQoE is configured blindly to the UE. However, if the other node is the one that provides the bearers for the service then the other node can re-configure the UE and also receives the RVQoE reports. Therefore, we believe for the first configuration is fine that the node that generates the container-based QoE generates the RVQoE blindly, but if the other node provides the bearers then it can modify later. |
| LGE | Yes | It is RAN3 scope. |
| Qualcomm |  | At least, when the RAN node generates RVQoE configuration, the RAN node should have the container based QoE configuration or related RVQoE assistance information. |
| CMCC | Yes |  |
| ZTE |  | It is under RAN3 discussion and we can follow RAN3’s decision. No need for duplicating the discussion here. |
| Apple | Yes | We think this is reasonable |
| China Unicom |  | It’s in RAN3 scope. |

**Q7c: Do you agree with that the other node will not send the RRC message to update/modify the RAN visible QoE configuration which was not configured by this node?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Huawei, HiSilicon | Yes | Proponent |
| Ericsson | Yes | Only the node which made the configuration should be able to update the configuration. It would be very strange if nodes started changing each other’s configurations, the nodes may even belong to different vendors. |
| NEC | Yes |  |
| Nokia | No (for now) | It needs further discussion on how to coordinate the RVQoE in NR-DC which is still in RAN3 discussion. |
| LGE | Yes |  |
| Qualcomm | No (for now) | Too early, it needs further discussion on how to coordinate the RVQoE in NR-DC which is still in RAN3 discussion. |
| CMCC | Yes |  |
| ZTE |  | Too early to decide |
| Apple |  | This discussion may need RAN3’s input, as it may still be possible if MN and SN can coordinate |
| China Unicom | Yes |  |

For RVQoE reports, [11] propose the UE AS layer can directly send the RV QoE reports to configuration initialled node separately or send the RV-QoE reports with node indication to one node according to the reporting leg indication. [9] also propose that UE may differentiate the RV-QoE configuration and report of MN and SN according to the node indication. However, [6] propose that a common reporting leg indication is used to indicate reporting leg that is used by the UE for both container-based and RAN visible QoE if both have been configured by the network.

In Rapp’s view, whether a new indication for RVQoE reporting is needed for leg selection need to be focused firstly.

**Q7d: Do you agree with that RVQoE reports and encapsulated QoE reports are reported together to the separate node (MN or SN) in NR-DC?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Huawei, HiSilicon | Yes | In Rel-17, both RVQoE and container-QoE are reported to a single node (i.e. MN), and we think it will be easy to follow this logic in Rel-18, i.e. for the same RRC ID, both reports are transmitted to the same node as network indicated.  We should also remember that RAN3 agreed that QoE reports can be forwarded between the nodes if needed and that reporting leg can be changed, .e.g. so that reports are sent to the node which serves the application.  For Q7d, we wonder the meaning of “sent together to the separate node”. If it means for the same RRC ID, the UE can report RVQoE and container-QoE to different node, we would like to see how it works and the benefit (compared with our proposal). |
| Ericsson |  | Fine to discuss the leg selection first. The reports should be sent to the node which made the configuration unless otherwise indicated. Each node can decide its QoE and RVQoE configuration. |
| NEC | Yes |  |
| Nokia | Yes | This is legacy behaviour. |
| LGE | Yes |  |
| Qualcomm | Yes | Legacy behaviour should be taken as baseline. |
| CMCC | Yes |  |
| ZTE | Yes |  |
| Apple | Yes |  |
| China Unicom | Yes |  |

## 2.6 Others

Please provide comments below if any other views are missed in the above discussion.

|  |  |
| --- | --- |
| **Company** | **Comments** |
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|  |  |

# 3 Conclusion

[To be added]

# 4 References

[1] R2-2302951 Discussion on SRB5 configuration and procedure NEC discussion Rel-18 NR\_QoE\_enh-Core

[2] R2-2303109 Discussion on QoE measurement for NR-DC ZTE Corporation, Sanechips discussion Rel-18 NR\_QoE\_enh-Core

[3] R2-2303309 Support of QoE measurements for NR-DC LG Electronics Inc. discussion Rel-18

[4] R2-2303320 Discussion on switching reporting leg in NR-DC Samsung discussion Rel-18

[5] R2-2303364 Views on QoE Reporting for NR-DC Apple discussion Rel-18 NR\_QoE\_enh-Core

[6] R2-2303598 Discussion on QoE measurements in NR-DC Huawei, HiSilicon discussion Rel-18 NR\_QoE\_enh-Core

[7] R2-2303643 QoE configuration and reporting in NR-DC Nokia, Nokia Shanghai Bell discussion Rel-18 NR\_QoE\_enh-Core

[8] R2-2303678 QoE measurements in NR-DC Ericsson discussion Rel-18 NR\_QoE\_enh-Core

[9] R2-2304038 Discussion on support of QoE measurement for NR-DC CATT discussion Rel-18 NR\_QoE\_enh-Core

[10] R2-2304085 Discussion on QoE configuration and reporting for NR-DC China Unicom discussion NR\_QoE\_enh-Core

[11] R2-2303511 RAN2 issues to support QoE collection in NR-DC Qualcomm Incorporated discussion NR\_QoE\_enh-Core