3GPP RAN WG2 Meeting #131 R2-25xxxxx

Bengaluru, India, August 25th – 29th, 2025

Agenda Item: 8.1.1

Source: Ericsson

Title: Remaining RRC open issues in feature AIML PHY

Document for: Discussion, Decision

# Introduction

The following document includes a list of open issues according to the following email discussion:

* [POST130][026][AI PHY] 38.331 CR (Ericsson)

 Intended outcome: agree to CR and open issues list and input

 Deadline: long

Companies are invited to provide feedback on open issue list by: **5 August 2025**

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

|  |  |  |
| --- | --- | --- |
| **Company** | **Name** | **Email Address** |
| OPPO | Jiangsheng Fan | fanjiangsheng@oppo.com |
| Huawei, HiSilicon | Dawid Koziol | dawid.koziol@huawei.com |
| Xiaomi | Ziyi LiXing Yang | Liziyi5@xiaomi.comyangxing1@xiaomi.com |
| CATT | tangxun | tangxun@catt.cn |
| Sony | Vivek Sharma | Vivek.Sharma@sony.com |
| vivo | Boubacar Kimba | kimba@vivo.com |
| Apple | Peng Cheng | pcheng24@apple.com |
| NEC | Boyuan ZhangSatoaki Hayashi | zhang\_boyuan@nec.cnsatoaki-hayashi@nec.com |
| Samsung | Seung-Beom Jeong (Beom) | s90.jeong@samsung.com |
| Nokia | Jerediah Fevold | jerediah.fevold@nokia.com |
| Mediatek | Yuanyuan Zhang | Yuany.zhang@mediatek.com |
| Lenovo | Congchi Zhang/Tapisha Soni | Zhangcc16@lenovo.com , tsoni@lenovo.com |
| LG Electronics | Soo Kim | soo.kim@lge.com |
| ZTE | Fei dong | Dong.fei@zte.com.cn |

# Remaining open issues for specification TS 38.331

## LCM for UE-sided model for Beam Management use case

###### **Open issue RRC-1: Cause of inapplicability**

**Issue description:** It isFFS how to define the simple cause value of inapplicability related to model availability and how to capture it in the spec.

This issue refers to the RAN2#129bis agreement:

|  |
| --- |
| Together with inapplicability reporting, UE further indicates a simple cause value of inapplicability FFS how to define this simple cause related to model availability and how we capture it in the spec |

The issue is captured as an editor’s note in the endorsed RRC running CR [R2-2504349], clause 5.3.5.3.

**Proposed resolution:** This open issue was resolved by the RAN2#130 agreement below. The remaining FFS can be addressed directly in the RRC running CR, where companies can provide comments to the text suggestions made by the rapporteur. If it is not possible to conclude from the running CR discussion, this FFS can be discussed in the next RAN2 meeting based on a proposal from the rapporteur.

|  |
| --- |
| 1 Introduce “release configuration” flag instead of inapplicability cause to indicate UEs preference to release a configuration (e.g. due to model in availability in the local device FFS reason to be specified) |

###### **Open issue RRC-2: Content of *otherConfig* for enabling applicability reports in UAI**

**Issue description:** It is not yet clarified what the content (if any) of the UAI configuration should be, to enable the UE to report applicability in UAI, e.g. applicability updates/changes as agreed for option A. For instance, this configuration could be just a flag or could contain further information.

The issue is captured as an editor’s note in endorsed RRC running CR [R2-2504349], clause 6.3.4.

**Proposed resolution:** This open issue was resolved by the RAN2#130 agreement below. Remaining aspects for the UAI configuration for applicability reporting for option B are treated in open issue RRC-40.

|  |
| --- |
| 2 Introduce a flag in OtherConfig indicating whether applicability reporting via UAI is enabled or disabled. Assume this applies to Option A and B, FFS if anything different needs to be done for option B (if specified) |

###### **Open issue RRC-3: UE data collection request**

**Issue description:** For UE-side data collection**,** the details of UAI signaling for the UE start/stop request and especially the following aspects are not yet clarified:

* how to refer in UAI to a preferred radio resource candidate configuration from a list of candidate configurations provided by NW
* where/what the NW provides as candidate configurations
* what the content of *otherConfig* for enabling UE data collection requests in UAI should be (e.g. just a flag, the list of candidate UE data collection configurations, etc.).

This issue refers to the RAN2#129bis agreements:

The UE can request measurement configuration for data collection of AI/ML based beam management. The request can contain one or more of the following:

• An indication on start/stop of data collection

• Preferred configuration from a list of candidate configurations provided by NW. Details of signaling are FFS. It is up to network what it configures at the end.

Introduce UAI message for UE request of data collection measurement configuration. And it is up to UE implementation when to send the request.

The issue is captured as an editor’s notes in endorsed RRC running CR [R2-2504349], clause 5.7.4.3, 6.2.2, and 6.3.4.

RAN2#130 agreed:

|  |
| --- |
| 3 The UE doesn’t need to measure the candidate data collection configuration(s). This will be specified in RAN2 specs. 4 For beam management, candidate data collection configuration includes at least:- CSI-ResourceConfigId of Set A- CSI-ResourceConfigId of Set B- One/two associated IDs (up to whether Set B is equal/subset of Set A or not) according to RAN1 agreements  FFS the details of how this is signalled (e.g. CSIReport config or simplified signaling) |

**Proposed resolution:** This open issue is treated in the email discussion **[POST130][037][AI PHY] UE candidate data collection (Xiaomi/Ericsson)**.

###### **Open issue RRC-4: Activation of a periodic CSI report configuration upon change from inapplicable to applicable**

**Issue description:** RAN2#129 agreed that for periodic CSI reporting, the UE autonomously activates the applicable functionality upon sending the applicability report via *RRCReconfigurationComplete* in Step 4:

|  |
| --- |
| If option A is configured in Step 3, for periodic CSI reporting, the UE autonomously activate the applicable functionalities upon reporting applicable functionalities via RRCReconfigurationComplete in step 4 (i.e. without need to wait RRCReconfiguration in Step 5). |

Further, RAN2#129bis agreed:

|  |
| --- |
| 2 Upon receiving one or more full inference configuration(s) via RRCReconfiguration message, UE shall maintain all the full inference configuration(s) no matter the full inference configuration is applicable or inapplicable until the network releases it explicitly. |

Thus, the UE will maintain a periodic CSI report configuration that is inapplicable, but it is unclear whether/how a periodic CSI report is activated upon a change of applicability, from inapplicable to applicable, since there is no legacy procedure to activate such a configuration (other than the initial sending of the RRC configuration).

One way to solve this situation is by network implementation, namely the network can de-configure a periodic CSI report configuration after the UE initially reports it as inapplicable via *RRCReconfigurationComplete*.

**Proposed resolution:** This open issue was resolved by the RAN2#130 agreement:

|  |
| --- |
| 1. When UE indicates that a periodic CSI-ReportConfig is not applicable, the gNB is expected to release the configuration (i.e., UE autonomous release is not supported).  |

###### **Open Issue RRC-5: Reporting behaviour of inapplicable periodic beam prediction configuration**

**Issue description:** It is ambiguous what the UE should report to the NW when its periodic beam prediction configuration becomes inapplicable and whether the model would output anything at all when if, e.g., the input distribution no longer matches what is expected.

We need to determine whether the configuration should cease reporting, or send the input (measurements) to the NW once it becomes inapplicable, or continue sending (inaccurate) predictions.

**Proposed resolution:** This open issue was resolved by the RAN2#130 agreements:

|  |
| --- |
| 2. The UE continues to perform the inference and reporting until the configuration is released. It is up to network implementation what to do with UE reported beam predicted reporting after UE indicates that a CSI-ReportConfig is not applicable.3. The UE shall report when CSI-ReportConfig becomes not applicable |

###### **Open issue RRC-6: Handling of inference, applicability reporting and UE data collection preference configurations when UE goes to RRC\_IDLE/INACTIVE state and during RRCReestablishment**

**Issue description:** RAN2 made following agreements in RAN2#129bis meeting:

|  |
| --- |
| * Upon receiving one or more full inference configuration(s) via RRCReconfiguration message, UE shall maintain all the full inference configuration(s) no matter the full inference configuration is applicable or inapplicable until the network releases it explicitly.
 |

It is not clear whether UE releases inference configurations when UE goes to RRC\_IDLE/CONNECTED state or upon network configuration via RRCRelease, etc.

Furthermore, handling of applicability configurations and UE data collection preference configuration (*applicabilityReportConfig* and *dataCollectionPreferenceConfig* in RRC running CR) during RRCReestablishment and in transition to RRC\_INACTIVE state needs to be specified.

**Proposed resolution:** This open issue was resolved by the RAN2#130 agreement below. The remaining FFS on whether applicability reporting via RRCReestablishmentComplete and RRCResumeComplete comes for free is addressed in open issue RRC-42.

|  |
| --- |
| 2 (RRC6) On how to handle RRC configuration in IDLE/INACTIVE/RLF, follow the legacy UE behaviour in TS 38.331 on whether to release or keep the RRC configuration in CSI-MeasConfig (for inference configuration) and OtherConfig (for applicability reporting and UE data collection preference configurations). FFS Whether applicability reporting via RRCReestablishmentComplete and RRCResumeComplete is supported (if it comes for free). |

###### **Open issue RRC-7: Applicability reporting for option B in *RRCReconfigurationComplete***

**Issue description:** It isFFS whether the applicability report for option B (sets of inference related parameters) can be included in *RRCReconfigurationComplete* (or if it can only be included in UAI).

This issue refers to the following RAN2#129bis agreement, based on which the overall design for option B requires further input from RAN1:

|  |
| --- |
| **Agreements on option B**1 RAN2 assumes UE receives RRCReconfiguration message including one set or multiple sets of inference related parameters via OtherConfig for option B. This assumption can be confirmed (i.e., whether to reconsider CSI-ReportConfig) after receiving Option B inference related parameters (e.g., in RAN1 RRC parameters list). Potential aspects to consider if RAN2 revisit:- To reconsider CSI-ReportConfig for option B, for example, if the list of inference related parameters is fully contained within existing CSI-ReportConfig.- to take into accounts UE behaviour when confirming the assumption e.g., whether option A and option B result in different UE behavior |

Given the agreement above, it is the Rapporteur’s understanding that the procedures for option B may depend on the RAN1 list of parameters for option B, since based on this list RAN2 will confirm whether the configuration for option B is sent in otherConfig or not. For instance, if the option B configuration is indeed sent in otherConfig, it may be more suitable to send the applicability report in UAI. However, if the parameters for option B are sent within the CSI measurement framework, RRCReconfigurationComplete may be more suitable to send the applicability report.

Thus, if further procedures for option B are discussed, it is suggested to taken into account whether these procedures may depend on the list of inference related parameters from RAN1.

The issue is captured as an editor’s note in the endorsed running CR [R2-2504349], clause 5.3.5.3.

**Proposed resolution:** This open issue was resolved by the RAN2#130 agreement:

|  |
| --- |
| 1 (RRC 7) RAN2 assumes applicability report for Option B (sets of inference related parameters) can be included in both RRCReconfigurationComplete and UAI (i.e., same as Option A). This can be revisited based on RAN1 conclusions/final signaling design. |

###### **Open issue RRC-8: Coexistence between option A and option B**

**Issue description:** Considering that both Option A and B are to be specified, we need to discuss how the 2 options co-exist, whether there is any interaction between them etc. For instance, it is not clear whether both option A and option B can be configured or not. This can affect signaling design of ApplicabilityReportList.

If further procedures for option B are discussed, it is suggested to take into account whether these procedures may depend on the list of inference related parameters from RAN1.

**Proposed resolution:** This open issue was resolved by the RAN2#130 agreement:

|  |
| --- |
| 3 (RRC8) RAN2 confirm that option A and option B can be configured in the same RRCReconfiguration message with the unified applicability report procedure. |

###### **Open issue RRC-9: Definition of ‘applicable AI/ML functionality’**

**Issue description:** How to update the definition of ‘applicable AI/ML functionality’ in clause 3.1, e.g. replace 'functionality', and align it with RAN1 specs and with TS 38.300.

The issue is captured as an editor’s note in the running CR, in clause 3.1. The running CR also contains an example initial definition.

**Proposed resolution:** Update the definition as in the proposal below.

1. (RRC-9) Update the definition of ‘applicable AI/ML functionality’ in clause 3.1 as: “Applicable configuration: Configuration according to which an AI/ML functionality is determined to be applicable, as defined in TS 38.300 [2].”

Companies are invited to provide feedback regarding the above open issue and possible proposed resolution:

|  |  |  |
| --- | --- | --- |
| **Company** | **Agree to proposal?** | **Other comments** |
| OPPO | Agree |  |
| Huawei, HiSilicon | Agree | “Functionality” term caused a lot of confusion from the beginning and rapporteur’s proposals solves this issue. |
| Xiaomi | Agree |  |
| CATT | Agree |  |
| Sony | Agree |  |
| vivo | No | In the definition, there is “AI/ML functionality”. AI/ML functionality is a new term which is introduced by AI. We think that it is essential to define the “AI/ML functionality”, not “applicable configuration”. We propose the following definition:**AI/ML functionality:** **Inference configuration or a set of inference related parameters** |
| Apple | Agree but with comments | We are fine with the direction Rapporteur suggested. But we think it is necessary to revise that it is UE to determine its applicable, which is intended to clarify that applicable AI/ML functionality’ is from UE view. Otherwise, it will cause some confusion whether it is from NW view.Thus, we suggest below change: **“Applicable configuration: Configuration according to which an AI/ML functionality is determined to be applicable by the UE, as defined in TS 38.300 [2].”**  |
| NEC | Agree |  |
| Samsung | Not sure | “applicable configuration” sounds very generic. If we have to change the term, it might be better to just call it applicable functionality?  |
| Nokia | Agree, with comments | We agree with the replacement of the word “functionality” with “configuration”; however, the proposed definition seems circular. Instead, we propose the following definition.“Applicable AI/ML configuration: AI/ML-enabled configuration determined to be applicable, i.e., ready for execution.” |
| Mediatek | Not sure | Including the definition of “Applicable configuration: Configuration according to which an AI/ML functionality is determined to be applicable, as defined in TS 38.300 [2],” is helpful for clarifying the specification. However, the term “AI/ML functionality” itself is still ambiguous. Therefore, we support vivo’s suggestion to define AI/ML functionality as the inference configuration or a set of inference-related parameters. This will establish a logical closed loop among the various terms and definitions. |
| Lenovo | Agree |  |
| LGE | Agree | We also think “functionality” is ambiguous. In practice, the applicability report only provides information on applicable CSI report configurations (Option A) or related CSI settings(Option B), rather than reporting on abstract AI/ML “functionalities.” |
| Qualcomm | Agree |  |
| ZTE | Agree,but | We agree to have the definition of applicable configuration instead of applicable functionality, but in the current definition,the term of AI/ML functionality is still used , or avoided to make everything clear in RAN2, Our preference is to avoid using terms of AI/ML functionality , how about:**Applicable configuration: Configurationfor the AI/ML inference as defined in TR 38.843 is determined to be applicable, .** |

###### **Open issue RRC-10: Terminology throughout RRC specs**

**Issue description:** It isFFS how to consistently update the AIML related terminology throughout the document (e.g. whether to adopt the terms 'measurement prediction', 'prediction configuration', etc.).

The issue is captured as an editor’s note in the running CR, clause 5.3.5.3.

Furthermore, the applicability reporting procedure should be based on specific fields in the configuration being present, as for legacy procedures.

**Proposed resolution:** It is suggested to address this open issue directly in the RRC running CR, where the companies can provide comments to the updated text provided by the rapporteur.

###### **Open issue RRC-11: How to configure RS configuration for UE sided data collection within CSI-ReportConfig**

**Issue description:** According to RAN1 agreements, a *CSI-ReportConfig* without an actual CSI report can be configured for UE data collection purposes. Since the *reportConfigType* field is mandatory in *CSI-ReportConfig*, further discussion is needed on how to handle this situation.

For example, instructing the UE to ignore the legacy *reportConfigType* could be considered.

**Proposed resolution:** It is suggested to address this open issue directly in the RRC running CR, where companies can provide comments to the updated text provided by the rapporteur.

###### **Open issue RRC-12: Monitoring for AI based beam management**

**Issue description:** RAN1 has made progress related to the monitoring framework, i.e., Type 1 Option 2 UE assisted monitoring wherein UE will report the monitoring metric to gNB. The RRC impact can be analysed upon RAN1 conclusion.

**Proposed resolution:** It is suggested to address this open issue directly in the RRC running CR, where the companies can provide comments to the updated text (i.e. inclusion of the RAN1 parameters for monitoring) provided by the rapporteur. If the companies identify conceptual/more general issues relates to monitoring, it is suggested that they discuss them in contributions.

###### **Open issue RRC-13: CSI prediction LCM framework**

**Issue description:** For the CSI prediction use case, it is very likely the same framework (e.g., applicability report, inference configuration, data collection, monitoring) for AI based beam management can be used, but still it is upon RAN1/RAN2’s confirmation.

From the rapporteur’s perspective it is overall straightforward to adopt the same LCM framework for the CSI prediction use case as for beam management. However, a few details need to be clarified for UE-side data collection, for the CSI prediction use case. From the rapporteur’s point of view, the procedures for UE data collection such as start/stop request, candidate configuration provision, request for preferred candidate configurations, etc. should be the same as for beam management. If this is acceptable, RAN2 needs to discuss what the content of the candidate configurations is, for the CSI prediction use case.

**Proposed resolution:** Adopt the proposal below.Further proposal(s) can be made by the rapporteur after collecting input from the companies in the table below.

1. (RRC-13) The procedures for UE data collection for the CSI prediction use case are the same as for the beam management use case (start/stop request from UE, candidate configuration provision from NW, request for preferred candidate configurations from UE, etc.).

Companies are invited to provide feedback regarding the above open issue and possible proposed resolution:

|  |  |  |
| --- | --- | --- |
| **Company** | **Agree to proposal?** | **If the proposal is agreed, what should be the content of the candidate configurations for CSI prediction? Companies can provide also other comments regarding this open issue.** |
| OPPO | Agree | Resource for set B and associated ID for set B |
| Huawei, HiSilicon | Agree, but see comments | The open issue is about overall LCM framework while the proposal is only for UE data collection. In our view the proposal should cover also other LCM aspects, in particular applicability reporting. It seems the same procedures and parameters can be reused for this purpose. |
| Xiaomi | Yes | We further suggest to add ‘**same LCM framework can be used for BM and CSI prediction**’ in the proposal, since we don’t have any agreement on this point yet.As for candidate UE-side data collection config for CSI prediction, following BM, same configuration IEs used for CSI prediction UE-side data collection configuration can be considered.  |
| CATT | Agree with comments | Considering that there is no agreement yet regarding LCM aspects for CSI prediction use case, thus, we suggest to have an overall proposal, e.g., “**The LCM framework for beam management use case is also applicable to CSI prediction use case, FFS any enhancement or difference**”. |
| Sony | Agree | Resource for measurements for model input, resource for ground-truth CSI, associated ID |
| vivo | Agree | Same with beam management. |
| Apple | Agree for UE data collection, and see comments for other LCM components | 1. We agree with Huawei that other LCM components (expect UE data collection) need to be addressed.
2. For UE data collection, we agree with Rapporteur’s proposals. On the candidate UE-side data collection config for CSI prediction, we don’t think the same configuration as AI BM can be reused due to below differences from AI BM:
	* There is no separate configuration of set A and set B (it was discussed in RAN1 but not agreed)
	* Associated ID is not needed because RAN1 has no consensus on introducing associated ID for CSI prediction.

Our assumption is that it only includes: dataCollectionCandidateConfigId-r19, one CSI-ResourceConfigId and serving cell index. 1. On applicability reporting, we think the same framework of AI BM can be reused. However, as May RAN1 meeting is the last meeting of Rel-19 AI/ML for PHY, there is no sufficient TU to study Option A and Option B similar to AI/ML based beam management. We think RAN2 can assume applicability reporting of CSI prediction only supports Option A (i.e. one or more *CSI-ReportConfig* on CSI prediction are configured for applicability reporting). Thus, we propose the following way-forward:

**Reuse applicability reporting of AI/ML based management as baseline of CSI prediction. On the configuration of applicability reporting, only support Option A without associated ID (i.e. one or more *CSI-ReportConfig* on CSI prediction can be configured for UE to report applicability via *RRCReconfigurationComplete* / UAI).**1. On performance monitoring, RAN1 introduced totally different mechanism for CSI prediction (from AI BM). We assume RAN2 may just wait for RAN1 input.
 |
| NEC | Agree |  |
| Samsung | Yes | If there is no input from RAN1, it would be safe to use same parameters sets defined in data collection configuration in CSI-ReportConfig.  |
| Nokia | Yes | The same parameters used for BM can be used for CSI prediction. If *reportQuantity-r19* is added to the candidate configuration, then the configuration can be differentiated as being for BM or CSI prediction, i.e., *none-bm-r19* and *none-csi-r19*. The second *CSI-ResourceConfig* and the associated IDs would be optional and left unset. |
| Mediatek | Yes with comment | We generally agree that the LCM for BM can be used as the baseline for CSI prediction. However, differences may arise depending on the outcome of ongoing RAN1 discussions.(RRC-13) The LCM procedures ~~for UE data collection for~~ ~~the CSI prediction use case are the same as~~ for the beam management use case can be used as the baseline for the CSI prediction use case (e.g., start/stop request from UE, candidate configuration provision from NW, request for preferred candidate configurations from UE, etc.). FFS the detailed differences, if any, based on the outcome of RAN1 discussions. |
| Lenovo | Yes | Candidate configuration for CSI prediction is per cell and includes: configuration Id, CSI resource configuration id, associated Id |
| LGE | Yes | We are fine with the Mediatek’s revision.  |
| Qualcomm | Yes | Agree with the Proposal.LCM for CSI prediction * RAN1 never discussed or agreed on option B for applicability reporting. Therefore, agreements regarding option A are applicable for the CSI prediction applicability reporting. Option B for applicability reporting is not supported for CSI prediction \.
 |
| ZTE | Yes | * We are fine with MTK’s suggestion
 |

###### **Open Issue RRC-14: Repeated reports of applicability for configurations which consistently perform poorly**

**Issue description:** UEs may repeatedly report a configuration as applicable based on the applicability determination information (UE-side and NW-side) but still perform poorly based on unforeseen factors, e.g., scenarios not captured in the dataset which trained one or more models supporting the AI/ML configuration. There is nothing we have agreed to so far to prevent a UE from repeating the same indication of applicability every time it re-enters RRC CONNECTED.

One solution is to let the UE receive feedback sufficient to adjust its applicability determination.

In the rapporteur’s view, this is an optimization and therefore it is not critical for the conclusion of the WI. As an alternative, the NW can configure performance monitoring for a certain applicable and active configuration, and if it decides that the performance is not good enough, it can de-configure that configuration.

**Proposed resolution:** Adopt the proposal below.

1. (RRC-14) Feedback from the NW to the UE to adjust the applicability determination procedure is not supported in Rel-19.

Companies are invited to provide feedback regarding the above open issue and possible proposed resolution:

|  |  |  |
| --- | --- | --- |
| **Company** | **Agree to proposal?** | **Other comments** |
| OPPO | Agree | This issue seems not essential, it’s also workable to rely on model monitoring procedure to check the real applicability, NW can decide whether to deactivate one prediction configuration based on model monitoring outcome and other implementation factors. |
| Huawei, HiSilicon | Agree | The NW can remove the configurations which consistently perform poorly.  |
| Xiaomi | Yes with comment | We understand the spirit of Rapporteur’s proposal and agree with the intention. However, we suggest to make the behavior clear. Therefore, we suggest with the followings:**It is up to network whether release the configuration of a poor-performed functionality or not based on performance monitoring of an applicable functionality.** |
| CATT | Agree | The network can de-configure or deactivate one configuration which the performance is not good enough based on the model monitoring. |
| Sony | Agree | The definition of applicability is not related to performance, they are two separate issues. So the NW can make decision based on performance monitoring results. |
| vivo | Agree |  |
| Apple | Agree | We think it is left to NW implementation as legacy. On proposal, we support Rapporteur’s version (i.e. just say it is not supported).  |
| NEC | Agree |  |
| Samsung | Yes  | NW can release corresponding CSI-ReportConfig if performance is not good.  |
| Nokia | No | Given how often a UE returns to the same cell, and how frequently a UE can enter and exit RRC connected state, there is a significant risk that the UE constantly indicates that an AI/ML-enabled configuration which consistently performs poorly is reported as being applicable. That means that the initial performance of such a UE could be consistently poor until the gNB reconfigures the UE with a different AI/ML-enabled configuration or a legacy configuration.The proposal was to simply indicate to the UE that the reason for releasing an AI/ML-enabled configuration was due to poor performance, leaving it up to UE implementation to update its applicability determination information for the poorly performing configuration such that it would not continue to report it as applicable in the future.**Note: Some have commented that the gNB can simply release the configuration, which is true and would apply while the UE is in connected mode. However, the UE is anonymous to the gNB, so it will not know that performance was bad in the previous RRC session. Therefore, the following is the situation.****Loop:**1. **UE connects to gNB and enters connected**
2. **gNB configures the UE with an AI/ML-enabled configuration**
3. **UE determines that based on the metadata, the configuration is applicable to a model it has.**
4. **UE activates model**
5. **NW determines poor performance and de-configures the AI/ML-enabled configuration**
6. **UE transitions to IDLE mode**
 |
| Mediatek | Agree |  |
| Lenovo | Agree |  |
| LGE | Agree | We also think it can be resolved by NW implementation (e.g., by releasing corresponding functionality configuration) |
| Qualcomm | No | Though we do not agree that enhancements are needed for tracking the UE performance from the previous RRC session, but we believe that network feedback is needed when the network deactivates an inference configuration to the UE. For example, whether the deactivation signal is sent to the UE due to poor performance or network overloading. The network should indicate the cause of the deactivation signal. For example, whether it is due to poor performance or the network wants to deactivate due to overloading. This is required so that the UE side can take appropriate action.  |
| ZTE | Agree | Even though we have same sympathies with Qualcomm that some optimization can obtain the benefits for both NW and UE, but considering this is the last meeting for this WI, we prefer not introducing such optimization at this moment, and can consider this in the future release or 6G. |

###### **Open Issue RRC-15: The time duration for an AI functionality to become available for inference when the UE reports applicability**

**Issue description:** The UE needs to synchronize the time duration for an AI functionality to become available for inference with the network when the UE reports applicability for either a full inference configuration or a set of inference parameters.

Unlike conventional non-AI features, where the algorithm size is fixed, AI algorithms can vary significantly in size depending on their generalization performance and specific use cases. These sizes can range from several kilobytes to tens of megabytes. Additionally, UE implementations may use various types of memory to balance cost and performance, and these different memory types and constraints can affect the access speed of stored models.

The UE should indicate the time duration for the AI functionality to become available when reporting applicability to the network. This time duration refers to how long it takes for the UE to load the AI models into RAM or another accessible memory for inference. By providing this information, the network can better understand the timeframe within which the configured radio resources and AI model can be utilized, enabling more efficient and effective resource management, especially for periodic CSI.

Another option is to let RAN4 address this time duration in terms of requirements.

**Proposed resolution:** It is suggested that companies provide contributions to resolve the issue.

###### **Open issue RRC-16: UE behaviour when the associated ID is not provided by the network**

**Issue description:** The UE behaviour when the associated ID is not provided by the network is not yet clarified.

In the rapporteur’s view, if the associated ID is not provided by the network, the UE should still be able to provide the applicability status (applicable or inapplicable) of the configurations, which is anyway subject to UE implementation.

**Proposed resolution:** Adopt the proposal below.

1. (RRC-16) If the network does not provide the associated ID, the UE the reports the applicability (applicable/inapplicable) based on the other provided information in the configuration.

Companies are invited to provide feedback regarding the above open issue and possible proposed resolution:

|  |  |  |
| --- | --- | --- |
| **Company** | **Agree to proposal?** | **Other comments** |
| OPPO | Agree with some clarification | If associated ID is not provided by the network, UE may optionally provide associated ID(s) to NW per configuration. This can help NW to better understand under which condition the configuration is applicable, which can avoid some ambiguity between UE and NW.  |
| Huawei, HiSilicon | Yes, but see comments | Agree with OPPO that in case the UE can apply the configuration only for some specific associated ID(s), the UE should indicate them to the network in the applicability report. |
| Xiaomi | Yes | We can accept OPPO’s suggestion. |
| CATT | Agree | Model monitoring can ensure the prediction performance. |
| Sony | Agree | We should keep consistent UE behaviour, UE can determine applicability based on other provided information. But in what circumstance the associated ID is not provided by the network since it is one the of the configuration parameters? |
| vivo | See comments | If the functionality is applicable for all the associated IDs, it is clear that the UE just reports applicable. If the functionality is applicable only for part of associated IDs, RAN2 can discuss the following 2 alternatives:**Alt1**: The UE feedbacks non-applicable (in order to not activate the functionality by the UE) with indicating the applicable associated ID(s). Then the network may reconfigure the inference configuration with one of the applicable associated ID(s). **Alt2**: The UE feedbacks applicable and also activates the functionality. In the case, the network performs the management based on performance monitoring. |
| Apple | See comments | 1. First, we think checking consistency between training and inference is the most important step for the UE to determine applicability. So, if NW doesn’t provide associated ID, our understanding is that UE can only report “inapplicable” because the UE can’t determine the consistency between training and inference. However, since it is the last RAN2 meeting, we can accept the following revised proposal as compromise (the original wording from Rapporteur is NOT acceptable to us because we think it is not technical feasible for UE to determine applicability based on other info)

If the network does not provide the associated ID, it is up to UE implementation how the UE ~~the~~ reports the applicability (applicable/inapplicable) ~~based on the other provided information in the configuration.~~1. We do not agree with OPPO’s suggestion. Please note that associated ID is generated from NW according to RAN1 agreement. We fail to understand how the UE can have the magic to predict one or more associated ID(s) on behalf of NW and report to NW.
 |
| Samsung | Yes with comment.  | Generally ok although we think that UE could not determine applicability without associated ID i.e. UE would declare inapplicability without associated ID. It should be clarified that UE will decide based on not only the other provided information but also UE side conditions same as a normal case.  |
| Nokia | Yes | We do not agree with OPPO’s suggestion. |
| Mediatek | Comments | We agree with Apple that if the associated ID is not provided, it should be up to the UE implementation to report applicability.Additionally, we do not support OPPO’s suggestion. |
| Lenovo | Agree | We assume a reasonable NW implementation should either provide the associated ID in both training/inference, or not provide associated ID in both training/inference. The suggestion proposed by OPPO may be only helpful in minor cases. |
| LGE  | Yes | We don’t support Oppo’s suggestion. Rather, we think it would be better for the UE to request associated IDs when it finds it difficult to determine, However, given the lack of discussion time, it is more practical to leave the determination of applicability up to UE implementation.  |
| Qualcomm | See comment | We agree with Apple and Samsung. Without the associated ID, the UE cannot determine the applicability of the configuration. So, in the absence of applicability reporting, how UE determines the applicability of an inference configuration or inference-related parameter is left up to UE implementation. |
| ZTE | Yes | We do not support OPPO’s suggestion, It must have reason why NW does not provide any associate Id, which means, NW never provide the dataset related configuration for the data collection... No matter UE provide the associated Id or not, NW just give a shot by implementation...and relying on the performance monitoring to determine whether the AI/ML functionality is suitable or not. the rapporteur’s suggestion is fine by us.  |

###### **Open issue RRC-17:** **Processing timing requirement of applicability/inapplicability report via *RRCReconfigurationComplete***

**Issue description:** According to Section 12 of TS 38.331, there are two processing latency requirements (10ms vs 16ms) between reception of *RRCReconfiguration* andreporting *RRCReconfigurationComplete,* depending on whether it is related to CA/DC operation. For Option A, it was agreed to report initial applicability report in *RRCReconfigurationComplete*. However, it is not clear what is its processing latency requirement because the applicability reporting is a new reporting different from CA/DC configuration.

As Rel-19 is the first release of AI/ML, we expect new / unpredicted challenges for the UE to handle AI/ML operation. Thus, one possibility is using relaxed RRC processing latency requirements (i.e. 16ms).

**Proposed resolution:** Adopt the proposal below.

1. (RRC-17) RRCReconfigurationComplete containing applicability reports has a processing latency requirement of 16 ms with respect to the reception of RRCReconfiguration.

Companies are invited to provide feedback regarding the above open issue and possible proposed resolution:

|  |  |  |
| --- | --- | --- |
| **Company** | **Agree to proposal?** | **Other comments** |
| OPPO | No strong view |  |
| Huawei, HiSilicon | Agree |  |
| Xiaomi | See comment | Agree the intention, but the final numbers should also be checked with RAN4. |
| CATT | Agree |  |
| Sony | See comment. | Since the processing latency of applicability report is unknown, we cannot decide the requirement yet, maybe check with RAN4 the final number |
| vivo | Agree |  |
| Apple | Agree  | On Xiaomi and Sony comment, please note that such RRC processing requirement was specified in Rel-15 in RAN2 without RAN4 involvement.  |
| Samsung | Yes | It seems reasonable to apply 16ms than 10ms.  |
| Nokia | Yes | Instead of accepting the solution proposed in RRC-15 we think that the extra 6ms of processing delay should be sufficient for determining applicability and preparing the model for execution. |
| Mediatek | See comment | The processing timing requirement for reporting applicability or inapplicability is not critical—either 10 ms or a more relaxed value such as 16 ms would be acceptable. However, as explained in RRC-15, our main concern is the total time required to prepare the model for inference, which may include loading the AI models into RAM or other accessible memory.* One possible solution is to define a more relaxed timing requirement that covers both determining applicability and preparing the model for inference, for example, 50 ms or longer.
* Alternatively, we could maintain the current processing time between reception of *RRCReconfiguration* and reporting *RRCReconfigurationComplete* (e.g.,16 ms), and introduce a separate timing requirement specifically for model preparation. We prefer this approach, as it minimizes the impact on the existing specification.
 |
| Lenovo | Yes | And it’s also relevant to Issue15. If 16ms is enough for UE to load the model, then additional time info in Issue15 is not needed. |
| LGE | Yes |  |
| Qualcomm | Yes |  |
| ZTE | See comments | We need to make sure what is the basic reason to have a more relax time for RRCReconfigurationComplete processing, If the basic reason is from the processing time of loading of the AI/ML model, and the loading shall be finished before sending out the RRCReconfigurationComplete, then the relax time is needed, otherwise the relax time seems not necessary as UE just generate the signaling as usual. |

###### **Open issue RRC-40: Configuration for Option B for applicability reporting**

**Issue description:** RAN2 is still to confirm the assumption that option B is configured in otherConfig.

RAN2#129bis agreed that:

|  |
| --- |
| RAN2 assumes UE receives RRCReconfiguration message including one set or multiple sets of inference related parameters via OtherConfig for option B. This assumption can be confirmed (i.e., whether to reconsider CSI-ReportConfig) after receiving Option B inference related parameters (e.g., in RAN1 RRC parameters list). Potential aspects to consider if RAN2 revisit:- To reconsider CSI-ReportConfig for option B, for example, if the list of inference related parameters is fully contained within existing CSI-ReportConfig.- to take into accounts UE behaviour when confirming the assumption e.g., whether option A and option B result in different UE behavior |

Subsequently, RAN1#121 agreed that:

|  |
| --- |
| AgreementFor option B of applicability check, RAN 1 assumes that at least the following RRC parameters are to be reused: * For both BM-Case 1 and BM-Case 2:
	+ *associatedIDforSetA-r19, resourcesForSetA-r19, resourcesForChannelMeasurement, associatedIDforSetB-r19, reportQuantity-r19, reportConfigType, nrofreportedpredictedrs-r19*
* For BM-Case 2:
	+ *TimeGap-r19, nroftimeinstance-r19,*

 Note: this doesn’t imply the associated ID is always present |

**Proposed resolution:** Adopt the proposal below.

1. (RRC-40) RAN2 confirms that UE receives RRCReconfiguration message including one set or multiple sets of inference related parameters via OtherConfig for option B.

Companies are invited to provide feedback regarding the above open issue and possible proposed resolution:

|  |  |  |
| --- | --- | --- |
| **Company** | **Agree to proposal?** | **Other comments** |
| OPPO | Agree | We see no serious problem to confirm this working assumption, and this way forward can also limit the spec impact to RAN2 only. |
| Huawei, HiSilicon | Agree | There seem to be no reasons to challenge the working assumption and we agree this is the simplest way forward. Furthermore, option B configuration does not have to be serving cell specific which is not possible when option B is configured via CSI-ReportConfig. |
| Xiaomi | Agree |  |
| CATT | Agree |  |
| Sony | Agree |  |
| vivo | Agree |  |
| Apple | Agree |  |
| NEC | Disagree | In the RAN1 LS (R1-2503242 LS on Rel-19 higher layers parameters list Post RAN1#121,attachenment is R1-2503243), the RAN2 parent IE of all Rel-19 AI/ML-related higher-layer parameters is CSI-ReportConfig (i.e., the list of inference-related parameters is fully contained within the existing CSI-ReportConfig and is common to both Option A and Option B). Based on the above, we prefer to adhere to the agreement in RAN2#129bis to reconsider CSI-ReportConfig for Option B since there is no special reason to stick to OtherConfig which would introduce redundancy. It would be appreciated if proponent/rapporteur can provide further reason when they would like to stick to OtherConfig.Reconsidering CSI-ReportConfig for Option B means to configure one or multiple sets of inference-related parameters for applicability reporting for Option B via CSI-ReportConfig. A flag in CSI-ReportConfig would indicate whether Option A or Option B is required in our understanding.With these approaches, a unified applicability inquiry/reporting procedure can be supported for both Option A and Option B. |
| Samsung | Agree | RAN2 should confirm the working assumption based on RAN1 agreement.  |
| Nokia | Yes, and comments | Given that all the parameters are contained in CSI-ReportConfig, we think that CSI-ReportConfig should be the container for inference-related parameters based on the following agreement from RAN2#129-bis as well as RAN1#121 agreement regarding the RRC parameters concerning inference-related of Option B applicability determination .RAN2 assumes UE receives RRCReconfiguration message including one set or multiple sets of inference related parameters via OtherConfig for option B. This assumption can be confirmed (i.e., whether to reconsider CSI-ReportConfig) after receiving Option B inference related parameters (e.g., in RAN1 RRC parameters list). Potential aspects to consider if RAN2 revisit:- To reconsider CSI-ReportConfig for option B, for example, if **the list of inference related parameters is fully contained within existing CSI-ReportConfig**.- to take into accounts UE behaviour when confirming the assumption e.g., whether option A and option B result in different UE behavior**Huawei noted that for Option B, the configuration might not be serving cell specific, but it is necessarily so. The CSI-ResourceConfigId was proposed as one of the parameters for Option B by RAN1, and the CSI-ResourceConfigId is serving cell-specific.** |
| Mediatek | Agree |  |
| Lenovo | Agree |  |
| LGE | Agree |  |
| Qualcomm  | Agree |  |
| ZTE | Agree |  |

###### **Open issue RRC-41: Value range for associated ID**

**Issue description:** RAN1 left the value range for the associated ID (associatedIDforSetA and associatedIDforSetB) up to RAN2, according to the list of RAN1 parameters in [R2-2505000].

In the rapporteur’s view, the associated ID is simply an integer, namely INTEGER (0..FFS). Thus, RAN2 needs to agree on the maximum value of the associated ID, assuming that both associatedIDforSetA and associatedIDforSetB get values from the same pool of IDs.

**Proposed resolution:** A proposal will be made by the rapporteur after collecting input from the companies in the table below.

Companies are invited to provide the maximum value for the associated ID and explain why they suggest that value:

|  |  |  |
| --- | --- | --- |
| **Company** | **Maximum value for associated ID (integer)** | **Other comments** |
| OPPO | 216 or 224 | This is related to the dataset type possibility, we understand for future proof flexibility, the ID length can be a little bit longer, so lightly suggest to consider 16 and 24. |
| Huawei, HiSilicon | 256 | There may be numerous configuration options for a cell, so to be on a safe side and to accommodate various NW implementations, we prefer a larger maximum value, i.e. 256 (8 bits). |
| Xiaomi | See comment | We think RAN2 should first discuss on whether this associated ID can be multi-cell specific or not, then we can define a proper range for associated ID. |
| CATT | See comment | No strong view, but for the flexibility of the network side, we suggest to consider a larger maximum value, e.g., 256 (8bits) or larger. |
| vivo | See comment | Agree with Xiaomi. If associated ID is per cell, it can be short, and if it is per area, long associated ID is desirable.  |
| Apple | See comment | We have similar view as Xiaomi and vivo.  |
| Samsung | 128 | We prefer to have enough range of IDs to be used for both cell specific and multi-cell specific ID.  |
| Nokia | 16,777,215 | We suggest a 24-bit range to accommodate the possibility that every one of an operator’s cells could have a different associated ID. The actual number of associated IDs could be smaller, but a large range allows room for growth. |
| Qualcomm | See comment | Agree with Xiaomi, vivo, and Apple. |
| ZTE | 128 | 128, even 64 is sufficient for cell specific associated Id as the associated Id just represents NW hardware settings. |

###### **Open issue RRC-42: Whether applicability reporting comes for free in RRCReestablishmentComplete and RRCResumeComplete**

**Issue description:** RAN2 to confirm whether applicability reporting via RRCReestablishmentComplete and RRCResumeComplete comes for free or not.

RAN2#130 agreed:

|  |
| --- |
| 2 (RRC6) On how to handle RRC configuration in IDLE/INACTIVE/RLF, follow the legacy UE behaviour in TS 38.331 on whether to release or keep the RRC configuration in CSI-MeasConfig (for inference configuration) and OtherConfig (for applicability reporting and UE data collection preference configurations). FFS Whether applicability reporting via RRCReestablishmentComplete and RRCResumeComplete is supported (if it comes for free). |

In the rapporteur’s understanding, “comes for free” means that there is no specification impact, i.e. no need to make modifications to add applicability reports in the Complete message.

Given this assumption, applicability reporting cannot come for free in RRCReestablishmentComplete, since the UE releases the entire configuration.

For RRCResumeComplete, the only case when the applicability reporting comes for free is when the network sends in RRCResume a configuration for the SCG, so the UE can report in RRCResumeComplete the applicability of the inference configurations for the SCG. Namely, the UE replies with RRCResumeComplete including *nr-SCG-response*, which contains RRCReconfigurationComplete, as a response to RRCResume including *mrdc-SecondaryCellGroup* set to *nr-SCG*, which includes RRCReconfiguration.

For other cases of RRCResumeComplete, the applicability reporting does not come for free. Nonetheless, before sending RRCResumeComplete, the UE may already have some inference configurations based on legacy procedures, so including their applicability status in RRCResumeComplete would require minor specification changes (i.e. add applicability report in RRCResumeComplete and the corresponding procedural text), so would come almost for free. To the rapporteur’s understanding, the UE may have inference configurations before sending RRCResumeComplete in the following cases:

* The UE restores MCG (for PCell)
* The UE restores MCG-SCells, if configured in RRCResume
* The UE restores SCG, if configured in RRCResume
* The UE receives a configuration for the MCG in RRCResume.

**Proposed resolution:** Adopt the proposals below.

1. (RRC-42) No enhancements are pursued for reporting applicability in RRCReestablishmentComplete.
2. (RRC-42) The UE can report applicability via RRCResumeComplete for SCG inference configurations received in RRCResume, without specification impact beyond already agreed applicability reporting procedure.
3. (RRC-42) Applicability reporting is added in RRCResumeComplete for inference configurations that exist at the UE based on legacy procedures (restored or received in RRCResume).

Companies are invited to provide feedback regarding the above open issue and possible proposed resolution:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Company** | **Agree to P7?** | **Agree to P8?** | **Agree to P9?** | **Other comments** |
| OPPO | Agree | Agree | Agree |  |
| Huawei, HiSilicon | Agree | Agree | Agree | We agree with the rapporteur that the specifications impact is so minor that it would be a waste not to support it for resume case. |
| Xiaomi | Yes | Yes with comment | Yes with comment | For both proposal 8 and 9, a condition ‘if full inference configuration is included’ should be added in the proposal, as UE reports the applicability based on configuration provided in RRCResume message, rather than configuration received before UE goes to RRC\_INACTIVE state. Furthermore, considering applicability status may be changed during UE RRC\_INACTIVE state, we suggest to remove ‘restored’, as RRCResumeComplete should not be used for the purpose to update the applicability status. |
| CATT | Agree | Agree | Agree |  |
| Sony | Yes | May be | May be | If it needs to be done, then P8 and P9 are agreeable, but we wonder if it is urgent to do the changes for RRCResume |
| vivo | Agree | Agree | Agree |  |
| Apple | Agree | Agree | Agree | We agree with Rapporteur that only supporting SCG resume is a reasonable way-forward. We disagree with Xiaomi proposed restriction:1. Technically, the UE can use restored inference configuration + delta configuration from RRCResume (e.g. providing a different Set B or a different associated ID in RRCResume) to report applicability in RRCResumeComplete. We see no technical reason to restrict to only support full inference configuration from RRCResume.
2. The benefit of RRC resume is the signaling overhead reduction by restoring configuration. If “restore” is remove, we are not sure why we still need to support RRC resume.
3. If “restore” is removed, it will need spec change to disable restore operation in RRC resume, which goes against the spirit of “come for free”.
 |
| Samsung | Agree | Agree | Agree |  |
| Nokia | Yes | Yes | Yes | If the UE resumes to the same cell, then the legacy configuration is kept and the UE can report applicability. If the UE resumes to a new cell, then a new inference configuration can be provided to the UE in *RRCResume* and the UE can report applicability in *RRCResumeComplete*. |
| Mediatek | Yes | Yes | Yes |  |
| Lenovo | Agree | Agree | Agree |  |
| LGE |  Yes | Yes | Yes |  |
| Qualcomm | Agree | Agree | Agree |  |
| ZTE | Agree | Agree | Agree |  |

## NW side data collection

###### **Open issue RRC-18: NW control on retaining logged data at HO**

**Issue description:** Thesignaling details of the network control on how data should be retained at handover are FFS, based on the RAN2#129 bis agreement:

Introduce 1-bit indication on whether to release or retain un-retrieved data in RRCReconfiguration during/before HO. Source gNB decides whether the data should be kept. The indication is provided in RRCReconfiguration (i.e. not in RRC Reconfiguration from target cell). FFS signaling details.

The issue is captured as an editor’s note in the running CR, in clause 5.3.5.3 and 6.2.2.

It the rapporteur’s view, it should be clarified Whether/how the 1-bit indication can be sent during or before HO, taking into account that the source gNB decides whether the data should be kept. From the rapporteur perspective, it is not possible for the source gNB to add the 1-bit indication during HO, in the same RRCReconfiguration that encapsulates the RRCReconfiguration from the target gNB. Thus, the rapporteur sees the following two possible solutions for this issue:

* The source gNB sends the 1-bit indication to the UE before HO.
* The source gNB decides if the 1-bit indication is needed and, if so, sends it to the target gNB, which includes it in the RRCReconfiguration sent to the UE during HO. No RAN3 impact is expected if the transmission of the 1-bit indication is limited to the case in which the target gNB is from the same vendor as the source gNB.

**Proposed resolution:** This open issue was resolved by the RAN2#130 agreement:

|  |
| --- |
| 1 (RRC-18) 1-bit indication on whether to release or retain un-retrieved data in RRCReconfiguration with synch is introduced. In case of HO, the source sends the 1-bit indication to target cell in HO preparation message. This 1-bit indication is included in HO command by target cell (if the target cell wants to keep the data). We should have single UE behaviour, when it receives the indication it keeps it, otherwise it removes it. Notify RAN3 |

###### **Open issue RRC-19: Reporting assistance information related to logged measurements**

**Issue description:** It is not yet clearwhat the *otherConfig* should contain to enable the UE to report assistance information via UAI, related to logging of radio measurements. For instance, should the low power, buffer full, and buffer threshold reached indications be all configured with a single bit, or should the configurations be separated?

This issue is related to the RAN2#129bis agreement:

|  |
| --- |
| **Agreements on availability indication*** Availability indication can be triggered due to:
	+ Full buffer being reached (if configured)
	+ Buffer threshold being reached (if configured).
	+ Low power (if configured)
* The UE send a UAI that indicates:
	+ Data is available
	+ Reason for trigger (full buffer, threshold)
	+ Low power indication
* The encoding of the data is available/UAI and the cause value is FFS

NOTE: it is up to UE Implementation how buffer threshold reached and low power is determined |

The issue is captured as an editor’s notes in the running CR, in clause 5.3.5.9, 5.7.4.3, 6.2.2, and 6.3.4.

**Proposed resolution:** Suggest to address this open issue directly in the RRC running CR, where the companies can provide comments to the text provided by the rapporteur.

###### **Open issue RRC-20: Further procedures for UE assistance information related to logging**

**Issue description:** It has not yet been discussed whether further procedures for UE reporting assistance information related to logging is need. Such further procedures may be, e.g. prohibit timers, indication that battery state is not low any longer, indication that the memory is not full any longer, etc.

The issue is captured as an editor’s note in the running CR, in clause 5.7.4.2 and 5.7.4.3.

**Proposed resolution:** This issue was resolved by the RAN2#130 agreements:

|  |
| --- |
| 3 UAI related to buffer status or low power state is triggered only once when specific conditions are met (e.g., buffer full/threshold, and low power state). A prohibit timer is not necessary for UAI related to buffer status or low power state4 No additional signaling from the UE is required when the low power issue is resolved5 No additional signaling from the UE is required when the buffer full issue is resolved |

###### **Open issue RRC-21: Time related content of logged data**

**Issue description:** It has not yet been clarified whatinformation needs to be included with the logged data, to indicate a time gap between the logged data entries (i.e. a gap that is longer than the logging data periodicity).

This issue refers to the RAN2#129bis agreement:

1. For temporal domain, the network is made aware whether there is a gap between two consecutive samples. FFS amount of gap and whether this is implicit or explicit

RAN2#130 agreement:

|  |
| --- |
| Data is collected on per data logging configuration basis and UE indicates data logging configuration ID. An indication of the “gap” is needed. “Gap” is time interval larger than the configured logging periodicity. FFS if timestamp and relative time stamp for each group is needed per “group”.  |

The issue is captured as an editor’s note in the running CR, in clause 5.7.10.3 and 6.2.2.

**Proposed resolution:** It is suggested that companies provide contributions to the following meeting to resolve the issue.

###### **Open issue RRC-22: RAN1 involvement for logged data for NW-side and UE-side data collection**

**Issue description:** Procedures for performing the L1 measurement results are captured in RAN1 specification, i.e. TS 38.214. Rapporteur assumes that the same should be applied for the case of radio measurements logging for the NW-side data collection and UE-side data collection. Hence RAN1 involvement is expected to capture procedures related to the radio measurements logging, e.g. in the UE variable *VarCSI-LogMeasReport* for the case of NW-side data collection.

From the rapporteur’s perspective, an LS should be sent to RAN1.

The issue is captured as an editor’s note in the running CR, in clause 5.7.10.3.

**Proposed resolution:** This issue was resolved by the RAN2#130 agreement below. Further related issues are addressed in the email discussion **[POST130][031][AI PHY] NW side data collection (Ericsson/ZTE)**.

|  |
| --- |
| As a starting point, the data logging is captured in RRC specs.  |

###### **Open issue RRC-23: Cell ID stored with logged data for NW-side data collection**

**Issue description:** It has not been clarified what type of cell ID the UE needs to log along with the logged data, in order to unambiguously identify the cell in which the UE performed the data logging, e.g. CGI, PCI-ARFCN etc.

The issue is captured as an editor’s note in the running CR, in clause 6.2.2.

**Proposed resolution:** This open issue was resolved by the RAN2#130 agreement:

|  |
| --- |
| The UE should report the CGI of the serving cell whenever feasible. If CGI is unavailable, the UE shall log PCI-ARFCN as a fallback. |

###### **Open issue RRC-24: Where to include the logging configuration from NW to UE**

**Issue description:** It isFFS whether the logging configuration is included in the CSI framework (whether in *CSI-ReportConfig* or directly under *CSI-MeasConfig*) or at L3.

This issue was discussed in RAN2#129bis and the following outcome was captured:

|  |
| --- |
| * Next meeting proponents should work together and bring complete proposals to show specification impact and consider future use cases.
 |

The issue is captured as an editor’s note in the running CR, in clause 6.3.2.

Configuration details of events for event-based logging configuration, e.g. whether we reuse configuration in reportConfig, can be included.

**Proposed resolution:** This open issue is addressed in the email discussion **[POST130][031][AI PHY] NW side data collection (Ericsson/ZTE)**.

###### **Open issue RRC-25: Dynamic activation/deactivation of data collection configurations for logging**

**Issue description:** RAN2#127 made the following agreement regarding NW-side data collection:

|  |
| --- |
| 1 As the baseline approach, the UE receives the measurement configuration for AI/ML-enabled features/FGs for data collection and logging of measurements. The network can explicitly configure the UE whether the corresponding data collection and logging (if supported) should be immediately started. FFS if multiple configurations can be provided to the UE. FFS if dynamic activation/deactivation is support. |

The second FFS on dynamic activation/deactivation has not yet been addressed, as also pointed out in the stage-2 running CR draft.

**Proposed resolution:** It is suggested that companies provide contributions to the following meeting to resolve the issue.

###### **Open issue RRC-26: Multiplexing legacy logged data and AIML logged data in new SRB**

**Issue description:** RAN2#129bis agreed that

|  |
| --- |
| 2. New SRB can be configured for NW-side data collection (with lower priority) |

Given the agreement on the new SRB for the transmission of the *UEInformationResponse*, Rapporteur’s understanding is that the new SRB may be used also for the transmission of the legacy SON/MDT reports (e.g. logged MDT measurements, RLF-Report, RA-reports, successful HO reports, etc.), whenever the *UEInformationResponse* carries both a legacy SON/MDT report and AIML logged data. However, this would impact how legacy SON/MDT reporting is performed which can only be at the moment on SRB1 or SRB2.

From the specification perspective, this affects primarily RRC clause 5.7.10.3 and it would impact also other specifications, e.g. TS 37.320.

Another simpler option is to not allow multiplexing of legacy logged data and AIML logged data in the UEInformationResponse, i.e. only AIML logged data can be sent in the new SRB.

**Proposed resolution:** Adopt the proposal below.

1. (RRC-26) Multiplexing of legacy SON/MDT report and AIML logged data in the new SRB is not supported.

Companies are invited to provide feedback regarding the above open issue and possible proposed resolution:

|  |  |  |
| --- | --- | --- |
| **Company** | **Agree to proposal?** | **Other comments** |
| OPPO | Agree | Seems not essential, multiplexing of legacy SON/MDT report and AIML logged data in the new SRB may also cause data transmission priority issue, i.e. which type of report can be reported first if collision happens, considering this is the last meeting, we should focus on essential issues first. |
| Huawei, HiSilicon | See comments | Our preference is to allow multiplexing as we think there are no major issues with that. It could be up to UE implementation whether to actually multiplex different types of information and put them in a single message on SRBx or whether to construct two separate messages and send them on SRB2 and SRBx respectively.Having said that, we are also OK not to support multiplexing but we are against introducing a new RRC message due to this. We should reuse current UEInformationResponse message and either add a note that the UE does not multiplex data collection info with other information in one message (simpler) or modify the procedural text accordingly (a bit more complex).  |
| Xiaomi | Agree |  |
| CATT | Agree | MDT could only use SRB1 or SRB2, and it is not needed to multiplex the MDT data with AI data. |
| Sony | Agree | The purpose of new SRB is to carry AI/ML data, no need to change the legacy SON/MDT report SRB. Multiplexing the two types of data will add complexity. This may be changed in future to reduce the burden on SRB1 and SRB2. |
| vivo | Agree |  |
| Apple | Agree | 1. Multiplexing is not necessary because it is rare case that the UE needs to report both MDT and data collection at the same time. Even if such rare case happens, NW implementation can request them in 2 separate UEInformationResponse.
2. On Huawei concern, we think the NOTE and corresponding procedure text changes are not needed because the same RRC message naturally can’t multiplex two SRBs (SRBx and SRB2 for MDT). Instead, if we allow multiplexing, it will introduce spec change (e.g. when multiplexing in same message, procedure text is needed whether to use SRB2 or SRBx)
 |
| Samsung | No | We do not support the restriction for multiplexing. Without such a restriction, NW can choose whether to allow multiplexing or not. i.e., 1) If NW is okay with multiplexing, it can request both types of data at a time via the UEInformationRequest message.2) If NW has any concern on multiplexing, it can request one type of data at a time via the UEInformationRequest message. |
| Nokia | Yes | It is further good to clarify that simultaneous request for legacy SON/MDT report and AIML logged data is disallowed. Proposal 10 should be extended to clarify this. Alternatively, if multiplexing is allowed, then the *UEInformationResposnse* should be sent over the lowest applicable SRB. |
| Mediatek | Agree |  |
| Lenovo | Agree |  |
| LGE  | Agree |  |
| Qualcomm | No  | Same view as Samsung. The Low-priority SRB (defined for data collection reporting) can also be used to send the MDT report. |
| ZTE | Agree | As this is the last meeting for the new feature discussion, it is safe to not allow the legacy MDT report to be combined with logged data reporting temporariely |

###### **Open issue RRC-27: How to set logging periodicity**

**Issue description:** Regardless of the chosen logging framework, further discussion is needed on how to set the logging periodicity for each logging RS.

To provide flexibility in the logging timing, two options could be considered for logging periodicity:

(i) aligning with the RS transmission periodicity, or

(ii) introducing an optional logging interval setting.

From the rapporteur’s perspective, introducing a configurable logging interval offers more flexibility to not log redundant data, especially if the RSs are very frequent in time, e.g. the same RSs could be used also for other purposes.

**Proposed resolution:** Adopt the proposal below.

1. (RRC-27) The logging periodicity of a NW-side data collection configuration is configurable.

Companies are invited to provide feedback regarding the above open issue and possible proposed resolution:

|  |  |  |
| --- | --- | --- |
| **Company** | **Agree to proposal?** | **Other comments** |
| OPPO | Agree |  |
| Huawei, HiSilicon | No strong view | We think RS resource periodicity can be reused and no explicit configuration is really needed, but we are OK either way. |
| Xiaomi  | Agree |  |
| CATT | Agree | The logging interval could be configured which is not align with the RS transmission periodicity. |
| Sony | Agree |  |
| vivo | Agree |  |
| Apple | Agree | We can’t reuse CSI periodicity for measurement periodicity, whose rule is specified in 38.214 and different from CSI periodicity. Thus, we think logging periodicity has to be configurable. |
| Samsung | No | We feel it seems optimization. NW can control it using the RS transmission periodicity. |
| Nokia | Yes | If the same RS are being used for legacy operation and for NW-side data collection, then a different periodicity might be useful for logging since unique CSI resources can only be configured once. |
| Mediatek | No strong view | we tend to agree with Samsung that the network can control this through the RS transmission periodicity. Is there any reason for the network to transmit RSs without instructing the UE to measure and log the results for those RSs? If certain RSs are intended for other purposes, they could be configured as a separate RS-ResourceSet and identified by a different ResourceConfigId. |
| Lenovo | Agree |  |
| LGE | Agree with comments | We agree with Nokia. If certain Resource Sets (RSs) are also designated for different purposes (e.g., for legacy usage) and configured as separate RS-ResourceSets, this could lead to redundant resource configurations. To have flexibility, we believe we can consider both approaches.* The logging interval can be set in the logging configuration
* If no logging interval is configured, the UE can perform logging based on the RS resource periodicity.
 |
| Qualcomm | Agree | Same view as Apple |
| ZTE | Partly Agree | We should discuss this case by case.For the spatial beam management prediction, yes, it can be set a logging period.For the temporal beam prediction, as the measurement and prediction occasion are strictly defined, it is not appropriate to introduce another logging period as this may cause the collected data quality degradation |

###### **Open issue RRC-28: Handling of configuration to report data availability and low power state during RRCReestablishment, transition to RRC\_INACTIVE etc**

**Issue description:** Handling of configuration for UE assistance information, to report data availability and low power state(LoggedDataCollectionAssistanceConfig in RRC running CR) during RRCReestablishment and in transition to RRC\_INACTIVE state needs to be specified.

In the rapporteur’s view, handling the UAI configuration for reporting data availability and low power state should follow the way that the logging configurations are handled, which depends on the solution that RAN2 will adopt based on the email discussion **[POST130][031][AI PHY] NW side data collection (Ericsson/ZTE)**.

**Proposed resolution:** Adopt the proposal below.

1. (RRC-27) Handling the configuration for UE assistance information to report data availability and low power state upon IDLE/INACTIVE/RLF follows the UE behaviour for handling the logging configurations.

Companies are invited to provide feedback regarding the above open issue and possible proposed resolution:

|  |  |  |
| --- | --- | --- |
| **Company** | **Agree to proposal?** | **Other comments** |
| OPPO | Agree |  |
| Huawei, HiSilicon | See comments | We do not see the direct relation to logging configurations handling. It is clear that this assistance information is included in OtherConfig, similarly as other types of UE assistance information. Hence, its handling can follow the same principles as for other types of UAI info. This is similar to what has been agreed for applicability reporting and UE data collection:“(RRC6) On how to handle RRC configuration in IDLE/INACTIVE/RLF, follow the legacy UE behaviour in TS 38.331 on whether to release or keep the RRC configuration in CSI-MeasConfig (for inference configuration) and OtherConfig (for applicability reporting and UE data collection preference configurations). FFS Whether applicability reporting via RRCReestablishmentComplete and RRCResumeComplete is supported (if it comes for free).”We propose to apply the same handling for assistance info related to NW-side data collection. |
| Xiaomi | Agree |  |
| CATT | Agree |  |
| vivo | Agree |  |
| Apple | See comments | Same view as Huawei. We are not sure why Rapporteur think it has dependency with email discussion **[POST130][031][AI PHY] NW side data collection (Ericsson/ZTE)**. |
| Samsung |  | RAN2 agreed to discard all the logged data for transition to IDLE/INACTIVE and RLF (We believe it applies to generic RRE). So, we assume the both UAI configuration and logging configuration are released on the for transition to IDLE/INACTIVE and RRE. |
| Nokia | Yes | If it decided that the logging configuration is released upon IDLE/INACTIVE/RLF, then the configuration of *UEAssistanceInformation* to report on logging is also released.Generally, we should release the configuration for reporting of status through *UEAssistanceInformation* in any case where there is a configuration being released which is associated with a *UEAssistanceInformation* reporting configuration. |
| Lenovo | Agree |  |
| LGE | Comments | We also agree with Huawei that the UE applies the same(legacy) handling for assistance information related to NW sided data collection.Based on my understanding of legacy operations:* When the UE initiates an RRC Release procedure (transitioning to idle or inactive state), it releases the configuration related to assistance information.
* When the UE initiates an RRC Re-establishment procedure, it releases the configuration related to assistance information.
 |
| Qualcomm |  | Same view as Samsung |
| ZTE |  | Same view as SAMSUNG |

###### **Open issue RRC-29: Whether data availability indication should be sent when the UE has data below the threshold and low power state is sent, and what cause should be included then**

Whether data availability indication should be sent when the UE has data and low power state is sent and what cause should be included then. The UE may have some data when indicating low power state. Even though this data volume may be lower than full buffer/threshold, it is still useful to let the network know about that so that the data can be fetched.

**Proposed resolution:** It is suggested that companies provide contributions to resolve the issue.

###### **Open issue RRC-30: Semi-persistent resources for data collection**

**Issue description:** RAN2 excluded usage of aperiodic CSI resource for data collection, but it is still unclear whether semi-persistent resources are needed for this.

**Proposed resolution:** It is suggested that companies provide contributions to resolve this issue.

###### **Open issue RRC-31: The release of logged AIML data in UE’s buffer**

**Issue description:** RAN2 needs to discuss and capture in the spec when the logged data for AIML in UE buffer will be released. In addition to the retain/release of logged data during HO covered in Open issue RRC-7, the following can be also considered:

- Power off or deregistration

- 48 hrs after the release of logged measurement configuration

- Explicit indication from the serving gNB.

**Proposed resolution:** It is suggested that companies provide contributions to resolve this issue.

###### **Open issue RRC-32: UE behavior during the period that L3 measurement triggered data logging event is fulfilled**

**Issue description:** In RAN2 Athens meeting, RAN2 confirmed to support L3 measurement event triggered data logging method. But it’s still unclear what is the UE behavior during the period that L3 measurement triggered data logging event is fulfilled.

A MDT-like solution can be considered as the baseline, i.e. UE performs data logging periodically during the period that L3 measurement triggered data logging event is fulfilled. If L3 measurement triggered data logging event is not fulfilled, UE just stops data logging.

This issue can be discussed once the L1 data collection configuration framework is settled.

**Proposed resolution:** This open issue is covered by the email discussion **[POST130][031][AI PHY] NW side data collection (Ericsson/ZTE)**.

###### **Open issue RRC-33: Whether separate user consent for gNB centric training is needed**

**Issue description:** It can be discussed whether a separate user consent is required for gNB-centric training, as it may differ from the conventional MDT user consent.

To address the potential impact on gNB and OAM regarding data collection, it may be necessary to send an LS to RAN3 and SA5, including agreements related to logging.

From the rapporteur’s perspective, this issue is outside the scope of RAN2 and it is unclear why separate user consent is needed, given that the gNB can already obtain the same data with legacy reporting (without logging), for the beam management use case considered in Rel-19.

**Proposed resolution:** Adopt the proposal below.

1. (RRC-33) RAN2 does not discuss user consent related aspects for NW-side data collection in Rel-19.

Companies are invited to provide feedback regarding the above open issue and possible proposed resolution:

|  |  |  |
| --- | --- | --- |
| **Company** | **Agree to proposal?** | **Other comments** |
| OPPO | Disagree | Although gNB can already obtain the same data with legacy reporting, no logging behaviour is introduced in legacy, which is totally different compared to AI use cases (data logging seems critical for AI usage), so it’s still valid to have some discussion, of course, RAN3 and SA3 involvement can be helpful for this issue. |
| Huawei, HiSilicon | Agree | Although we think data privacy and user consent may be needed, this is not in the RAN2 area of expertise and there is no impact on RAN specifications. Hence, this issue should be discussed directly in other WGs, e.g. SA3/SA5. |
| Xiaomi | No | We understand the legacy user consent can’t be reused, because the use cases are different. UE may have different preferences regarding MDT and AIML data collection.Even the spec impact is not within RAN2, we can send LS to ask SA3 on this issue. |
| CATT | Agree | For NW-sided data collection, it is the NW side to trigger which UE(s) for collecting data. So we think the user consent is similar as in MDT. It is not needed to be discussed by RAN2. |
| Sony | Agree |  |
| vivo | No | Relevant discussion on user consent would not be in RAN2. But we agree it can be addressed by SA3/SA5.We suggest to Ls SA3/SA5 on this user consent issue |
| Apple  | No | Same view as OPPO, vivo and Xiaomi. |
| Samsung | No | We think user consent is needed for NW-side data collection and we can reuse the existing user consent framework for MDT. |
| Nokia | Yes | This is not in the scope of RAN2 |
| Mediatek | Agree |  |
| Lenovo | No | We can consult SA3/SA5 if the legacy MDT UE consent can be reused. |
| LGE | No | Agree with Oppo, Xiaomi, and Vivio (Suggest sending LS to RAN3/SA3/SA5) |
| Qualcomm | No strong view | Can consult SA3 |
| ZTE | Agree |  |

###### **Open issue RRC-34: Whether enhancements for NW-side data collection are per use case or common for all AI-related use cases**

**Issue description:** It can be discussed whether the enhancements for NW-side data collection are per use case or common for all AI-related use cases, e.g., AS layer memory, logged data availability, low-power state indication.

**Proposed resolution:** It is suggested that companies provide contributions to resolve the issue.

###### **Open issue RRC-35: Release/retain un-retrieved data upon inter-RAT handover**

**Issue description:** RAN2 agreed to introduce 1-bit indication on whether to release or retain un-retrieved data in RRCReconfiguration during/before HO. It needs to be discussed whether this is applicable for inter-RAT handover also. Since it is agreed that UE releases the logged L1 measurements for AI/ML while moving to RRC\_IDLE/RRC\_INACTIVE and RLF, if this agreement is applied for inter-RAT HO, there will be changes in LTE for releasing AI/ML measurements in LTE RLF, moving to LTE idle etc. Moreover, it is not possible to retrieve the data by eNB.

A solution is to always discard logged L1 measurements during inter-RAT handover without considering the indication.

**Proposed resolution:** This open issue was resolved by the RAN#130 agreement below, since the UE discards the logged data if it does not receive the 1-bit indication in HO command.

|  |
| --- |
| 1 (RRC-18) 1-bit indication on whether to release or retain un-retrieved data in RRCReconfiguration with synch is introduced. In case of HO, the source sends the 1-bit indication to target cell in HO preparation message. This 1-bit indication is included in HO command by target cell (if the target cell wants to keep the data). We should have single UE behaviour, when it receives the indication it keeps it, otherwise it removes it. Notify RAN3 |

###### **Open issue RRC-36: How data is forwarded to OAM or source gNB after HO**

**Issue description:** RAN2 agreed that target gNB can fetch data collected in the source gNB after HO. We need to decide how this data is forwarded to OAM or source gNB, e.g. via inter-node RRC message or in some other way. RAN3 involvement may be needed.

**Proposed resolution:** It is suggested that companies provide contributions to resolve the issue.

###### **Open issue RRC-37: Source gNB aware of whether the UE has data available during HO**

**Issue description:** How can the source gNB be aware of whether the UE has data available during HO, e.g. should the UE inform source gNB about data availability before HO is executed?

In the rapporteur’s view, the source gNB already has means to find out whether the UE has data available before HO is executed. For instance, the source gNB may set the buffer threshold to be very low, so that the UE can send the data availability indication as soon as it has some logged data in the buffer. Another option is that the source gNB sends a UEInformationRequest to probe if the UE has logged data. Introducing a new condition/indication for the UE to inform source gNB about data availability before HO is executed seems to be an optimization.

**Proposed resolution:** Adopt the proposal below.

1. (RRC-37) No further indication/condition is specified (beyond already agreed ones) for the UE to inform source gNB about data availability before HO in Rel-19.

Companies are invited to provide feedback regarding the above open issue and possible proposed resolution:

|  |  |  |
| --- | --- | --- |
| **Company** | **Agree to proposal?** | **Other comments** |
| OPPO | Agree |  |
| Huawei, HiSilicon | Disagree | We do not think setting the data threshold to a very low value just for the sake of HO or sending UEInformationRequest ‘just in case’ are reasonable solutions. This contradicts the purpose of having the data threshold and specific data availability triggers. For the HO case, the UE should be able to indicate the data availability in the measurement report in case it is configured with NW data collection configurations. |
| Xiaomi | Agree |  |
| CATT | Agree | There is no enough time to send the indication just before HO. Since the UE could send the indication via UAI to the serving, optimization of data available indication in source gNB is un-necessary.  |
| Sony | Agree |  |
| vivo | Agree |  |
| Apple | Agree | We agree with Rapporteur that source cell implementation can handle it well. We see no need to further enhance this non-essential issue. |
| Samsung | Agree |  |
| Nokia | Agree |  |
| Mediatek | Agree |  |
| Lenovo | Agree |  |
| LGE | Agree |  |
| Qualcomm | Agree |  |
| ZTE | Agree |  |

###### **Open issue RRC-38: Minimum AS layer memory size supported by the UE**

**Issue description:** The following agreement was made in RAN2#127, to specify a minimum AS layer memory size across all use cases, similar to logged MDT. And the specific value of the memory size is FFS, but it has not been addressed yet.

|  |
| --- |
| UE stores the logged training data at AS layer with a minimum AS layer memory size supported by the UE. FFS on the memory size. This is across all use cases |

This issue can be part of the capability discussions.

**Proposed resolution:** It is suggested to address this open issue in the capability discussions.

###### **Open issue RRC-39: The naming of IEs related to NW-side data collection**

**Issue description:** The naming of IEs related to NW-side data collection can be revisited. We will have more CSI-based and other use cases, each with different measurement logs and we should minimize the risk of having to replicate the NW-side DC procedures and ASN.1 for every new use case.

One solution direction is to make the naming of procedures and ASN.1 related to NW-side DC generic and enclose use case specific IEs / data logs within so that our framework can support future use cases.

An alternative is to name the IEs based on the use case, which would help to write the procedural text in a simpler way, while being clear.

This issue refers to the following field/IE and variable names:

* The name of the variable to store logged data. This can be use case specific (i.e. *VarCSI-LogMeasReport* as proposed by the rapporteur in the draft RRC running CR) and a new variable would be added in the future for e.g. the AIML mobility use case, or it can be changed to have a more generic name and include lists of logged data for different use cases. Note that defining a variable per use case still allows the UE to use a shared memory size for all use cases.
* The name of the field to request logged data from the UE and the name of the field where the UE provides the report with logged measurements can be specific per use case (as proposed by the rapporteur in the draft RRC running CR, i.e*. csi-LogMeasReportReq* in *UEInformationRequest* and *csi-LogMeasReport* in *UEInformationResponse*, respectively) or can be more generic. The rapporteur sees the benefit in having use case specific names, since this way the NW can select which logged data to retrieve from the UE and the UE can select that logged data to report it.
* The name of the field to indicate to the NW that the UE has logged data during handover can be use case specific (i.e. *csi-LogMeasAvailable* in *RRCReconfigurationComplete*, as proposed by the rapporteur in the draft RRC running CR) or can be more generic. As in the point above, in the rapporteur’s view it is beneficial to have use case specific naming, so that the NW can distinguish which kind of logged data the UE has.

**Proposed resolution:** Adopt the proposals below.

1. The UE stores logged data in a use case specific variable.
2. The name of the fields/IEs to request logged data from the UE and to report logged data or the availability of logged data to the NW are use case specific.

 Companies are invited to provide feedback regarding the above open issue and possible proposed resolution:

|  |  |  |  |
| --- | --- | --- | --- |
| **Company** | **Agree to P15?** | **Agree to P16?** | **Other comments** |
| OPPO | Agree | Agree |  |
| Huawei, HiSilicon | Agree | Agree |  |
| Xiaomi | Agree with comment | Agree with comment | Agree with the intention. We understand the variable should be per data quantity, rather than per use case. In current running CR, data of beam and CSI prediction are stored in the same variable, because the data of the two use cases is the same, i.e., L1 CSI-RS/SSB measurment result. |
| CATT | Agree | Disagree | Only some of the use case could use the same Var content, e.g. BM and CSI prediction. Others may have different data content thus different Var should be defined. But the name of request or available indicator of logged data could be a single one, and the UE could report all its stored AI/ML data irrespective the use case. |
| Sony | See comment | See comment | we should have a generic logging method and not per use case in RAN2. We think the distinction should be done at system level.  |
| vivo | Agre | Agree |  |
| Apple | Agree | Agree | We think it is not essential issue and Rapporteur can just draft running CR with their preference.  |
| Samsung | Agree | Agree | But we wonder if “csi" or “CSI” is suitable for BM. Prefer using ”BM”. |
| Nokia | Partially | No | **P15**: The variables should be data type or configuration type specific, i.e., for data collection configured with a *CSI-ReportConfig* should go in a variable specific to CSI-type measurements. Depending on the use case, some optional elements in the variable would not be used. The gNB is aware of the use case because it configured the data collection and the data is tagged with the configuration ID.**P16**: We agreed on a single buffer, which stores samples. If the gNB needs specific data and has priorities, then other types of data collection should not be configured. It is optimal to allow the UE to fill its *UEInformationResponse* with as much data as possible, no matter the use case or type of data being collected.For example, the buffer could be configured with a reporting threshold of 9KB. There could be three use cases configured, each with 3KB of samples in the buffer. If we use use-case specific request fields, then it would take three iterations of UEInformationRequest and UEInformationResponse.**Therefore, we propose a single field to request any data in the buffer.** |
| Mediatek | Agree  | Agree |  |
| Lenovo | Agree with comment | Agree with comment | If it is use case specific, then we need to distinguish BM and CSI prediction. If it is measurement quantity specific, then “csi” can work for both BM and CSI prediction. Either way is ok. |
| LGE | Fine but | Fine but | Since we are considering the BM case only for network-side data collection, logging data can be viewed as being stored on a per-use-case basis. However, if this scope is expanded to include mobility use cases, distinguishing by use case alone may become ambiguous. It might be more appropriate to categorize the data based on the contents of the reports rather than by use case. |
| Qualcomm | Disagree | Disagree | How UE allocates the memory is UE's implementation.For the retrieval of the logged data, we have the same view as Nokia, i.e., “**single field to request any data in the buffer.”** |
| ZTE | See comments | Disagree | For the first proposal, we are wondering how to reflect it in the RRC spec?For the second proposal, we share the same view with Qualcomm and Nokia, one field to request all the logged data in the buffer  |

###### **Open issue RRC-43: Value range for buffer threshold**

**Issue description:** The value range for the buffer threshold needs to be specified.

RAN2#130 agreement:

|  |
| --- |
| 2 Buffer threshold to trigger data availability indication should be set based on specific size, e.g., KB instead of percentage |

**Proposed resolution:** A proposal will be made by the rapporteur after collecting input from the companies in the table below. The proposal may be conditioned by the capability discussion for the memory size.

Companies are invited to provide possible value ranges for the buffer threshold:

|  |  |  |
| --- | --- | --- |
| **Company** | **Value range for buffer threshold** | **Other comments** |
| OPPO | See comments | {1KB, 2KB, 4KB, 8KB, 16KB, 32KB} |
| Huawei, HiSilicon | See comments | The values for the threshold depend on the UE capability discussion, i.e. whether the UE can report additional memory size on top of the minimum memory requirement (similar as for QoE). But in general there is no need for too much granularity here, so we believe we can already agree to introduce 8 threshold values. We can decide on the exact values depending on the outcome of UE capability discussion (i.e. after we know whether only 64kB is supported or also higher memory values). |
| Xiaomi | Depends on the supported memory size | Since it’s up to UE to decide whether data has reached threshold, we don’t see the point of introducing multiple threshold values. Just one or two values are enough. The exact value depends on the supported minimum memory size. |
| CATT | See comments | {45KB, 52 KB, 58 KB, 60 KB, 62KB } If the memory size is 64KB. |
| vivo |  | There is no need to introduce multiple values. With 64KB as high memory value, 48KB is enough as buffer threshold |
| Apple |  | We can use OPPO proposal as baseline (assuming up to 64KB):{1KB, 32KB, 48KB, 64KB} |
| Samsung |  | Depends on capability discussion. |
| Nokia | bufferThreshold-r19 INTEGER (3..8)Field Description: bufferThreshold-r19 is expressed in a scale of 2^K where K is the exponent. The unit is KB. | 2^K with a range of 3..8 would allow reporting 8KB, 16KB, 32KB, 64KB, 128KB, and 256KB, which would cover UEs with the capability of a higher buffer capacity. |
| Mediatek | Depends on the supported memory size | We agree with Xiaomi. Since it has been decided to use KB instead of percentage to define the threshold, we first need to determine the supported memory size, especially considering that the memory may be shared among different use cases. |
| Qualcomm |  | Significantly low thresholds such as 1KB, 2KB, etc should be avoided. The minimum threshold should be 16 KBs or 32 KBs. |
| ZTE | Depends on supported memory size |  |

# Other identified open issues

Companies are invited to describe any other identified open issues not currently included within this document and critical for the completion of the WI.

|  |  |
| --- | --- |
| **Company** | **Other identified open issues? (please describe)** |
| OPPO | 6> if *reportConfigType* in *CSI-ReportConfig* is *periodic*:7> if the *applicabilityStatus* is set to *applicable*:8> consider the *CSI-ReportConfig* to be activated;8> indicate to the lower layers to activate the *CSI-ReportConfig*;7> else:8> consider the *CSI-ReportConfig* to be deactivated;8> indicate to the lower layers that the CSI-ReportConfig is deactivated;In the latest RRC running CR, the above parts highlithted green are implemented by the Rapporteur, but actually, RAN2 had discussed this issue in RAN2#129bis meeting based on OPPO proposal (the information is given below for your reference), i.e. P3, but no conclusion was made yet, we understand this issue may have further RAN1 involvement, RAN2 needs more discussion for clarification. |
| Apple | **Open issue RRC-xx: NW control on retaining logged data at CHO/LTM****Issue description:** the following RAN2#130 agreement is only applicable to regular HO, but it is not applicable to CHO and LTM because the target cell configuration of CHO and LTM can only be provided to the UE before HO execution.

|  |
| --- |
| 1 (RRC-18) 1-bit indication on whether to release or retain un-retrieved data in RRCReconfiguration with synch is introduced. In case of HO, the source sends the 1-bit indication to target cell in HO preparation message. This 1-bit indication is included in HO command by target cell (if the target cell wants to keep the data). We should have single UE behaviour, when it receives the indication it keeps it, otherwise it removes it. Notify RAN3 |

**Proposed resolution:** We propose to address this issue via the following simplest solution:* Source cell makes decision, and it includes a list of 1-bit indication corresponding to each candidate cell configuration in *RRCReconfiguration* to include LTM configuration or CHO condition.
 |
| Samsung | 1) Data content for NW-side data collectionRAN2 agreed in RAN2#127bis:1. For data collection for both NW-sided/UE sided BM model training, at least L1-RSRPs and/or beam-IDs needs to be collected by UE. FFS if other data needs to be collected based on RAN1 progress.

However, there has been no discussion/progress in RAN1 afterwards. So, RAN2 should ask RAN1 whether other data content needs to be supported or not.2-1) We left a comment for UEInformationResonseSRBX section in 6.2.2 in running CR. That is, given periodic CSI-RS or SSB resources, we assume UE can measure/log the same resource multiple times. So, UE should be able to log a list of L1-RSRPs for each resource. 2-2) Assuming multiple L1-RSRP per resource is supported (as suggested in 2-1) and the interval for logging or measurement could be short (e.g., a tens of millisecond), a number of L1-RSRPs could be collected by UE. In that sense, it is important to reduce their size for reporting. Therefore, we suggest to use differential RSRP like in L1 CSI reporting. For example, “absolute” L1-RSRP (8 bits) is used in the 1st entry of an data list, but “differential” L1-RSRPs (4 bits) are used for the subsequent entries in the same data list.3) We left a comment for UEAssistanceInformation section in 6.2.2 in running CR to suggest the update of DataCollectionPreference IE. That is:- Comment 1. Let’s assume UE is configured with two data collection configuration (i.e., configuration 1 and 2). According to the current ASN.1, there is no way for UE to indicate its preference for stop selectively i.e., per configuration. It means if UE just indicates “stop” (i.e., without configuration IDs it prefers to stop), NW would release all 2 configurations. However, we think the data measurement/collection time needed by UE or UE server could be different per configuration. For example, UE wants to stop configuration 1 first, as sufficient data for configuration 1 has been acquired or model training for this configuration has completed. At the same time, UE wants to keep configuration 2 as more data collection is still needed. In this case, there should be a way to stop only configuration 2 (i.e., selective stop)- Comment 2. We also think UE should be able to indicate both configuration ID(s) to start and configuration ID(s) to stop, simultaneously. For example, UE wants to stop ongoing measurement for configuration 1, but instead wants to start 3 newly (for another model training). Given UE’s capability is limited, UE may not be able to measure all preferred configurations at the same time. So, it is practical scenario to request its preference to stop one and start another simultaneously (i.e., in a single UAI message).4) As we agreed that 1 bit indication (whether to retain logged data during handover) needs to be provided by the target cell at the time of handover based on indication from the source cell, the indication, if needed, has to be provided by E-UTRA RRCConnectionReconfiguration for Inter-RAT handover. Since 36.331 changes are not in the scope of WI, we need to add the below in TS 38.331 for closing this OI.5.4.3.4 Successful completion of the mobility from NRUpon successfully completing the handover, at the source side the UE shall:discard the logged measurement entries included in *VarCSI-LogMeasReport,* if any;Please note that without this change, we also need more changes in 36.331 to discard *VarCSI-LogMeasReport* during *E-UTRA RLF and E-UTRA* state transition *to RRC\_IDLE.*5) In RAN1, it was not concluded whether associated ID should be cell specific ID or multiple cell specific ID. Depending on the coverage, the UE and gNB would handle associated ID differently. It is necessary to determine the coverage of associated ID.  |
| Nokia | RAN1 LS (R2-2505000) needs careful implementation and adoption to ASN.1 principles and RAN2 agreements. In particular, proposed structure for predictionConfiguration-r19, based on RAN1 LS, introduces differentiation of purposes: beamPrediction, csi-InterferencePrediction, channelMonitoring, DataCollection, which are blended in a way that is compromising signaling clarity and actual purpose of each.  We propose to address this by an open issue RRC-xx: FFS: on how to unify and simplify ASN.1 and corresponding procedures for AI/ML configuration  |
| Apple 2  | **Open issue RRC-xx: How the UE can differentiate whether it is for Rel-19 AI/ML based CSI prediction or Rel-18 “non-AI CSI prediction”****Issue description:** In RAN1#120b, one agreement with RAN2 impact was made:AgreementFor CSI prediction using UE-side model, at least for inference, introduce new RRC parameter for CSI report configuration to distinguish CSI report of AI-CSI prediction and non-AI CSI prediction.* Note: terminology of “AI-CSI prediction” and “non-AI CSI prediction” is separate discussion
* Detailed parameter name is upto RAN2

The issue is that the *CSI-ReportConfig* of Rel-19 AI/ML based CSI prediction is same as the *CSI-ReportConfig* of Rel-18 “non-AI CSI prediction” (i.e. CSI prediction with *typeII-Doppler-r18*). Thus, the UE needs to differentiate whether one *CSI-ReportConfig* is for Rel-18 or Rel-19 CSI prediction. **Proposed resolution:** We think the simplest solution is to add one indication under *CSI-ReportConfig* for this purpose. **Introduce one indication under *CSI-ReportConfig* for the UE to differentiate whether it is for Rel-19 AI/ML based CSI prediction or Rel-18 “non-AI CSI prediction” (i.e. CSI prediction with *typeII-Doppler-r18*). In details, it is for Rel-19 CSI prediction when this indication is present. Otherwise, it is for Rel-18 CSI prediction.**  |
| Lenovo | 1. **Open Issue RRC-x: Data collection per configuration**

RAN2#130 agreement:

|  |
| --- |
| Data is collected on per data logging configuration basis and UE indicates data logging configuration ID. An indication of the “gap” is needed. “Gap” is time interval larger than the configured logging periodicity. FFS if timestamp and relative time stamp for each group is needed per “group”.  |

RAN2 agreed “data is collected on per data logging configuration”, while in current running CR, when NW requests data from UE via UEInformationRequest, it is not distinguished if NW requests data of all or specific data logging configuration. Proposed resolution: When gNB requests data from UE via UEInformationRequest message, gNB also indicates the concerned data collection configuration Id.1. **Open Issue RRC-x: Applicability information transfer over HandoverPreparationInformation**

In the previous RAN2 discussion, it was believed the existing UAI framework can be reused for the source gNB to transfer the applicability information to the target gNB. * Source cell UAI (as is) can be sent from source cell to target cell using existing signaling. No further optimizations will be considered in RAN2 related to UAI.

However, source gNB will only send the last received UAI to the target gNB following the current spec, which only contains an incomplete list of lastly changed applicability information. Proposed resolution: Source gNB transmits to target gNB a complete applicability information list currently maintained at the source gNB considering the UAI and RRCReconfigurationComplete received in the past. Via UAI (needs to update the description), or via a dedicated IE (maybe cleaner?).1. **Open Issue RRC-x: LPP message over SRBx**

Since SRBx is introduced for low priority training data collection, we understand it applies to the training data collection for LMF as well. The transmission of LPP message containing training data collection via SRBx should also be allowed.  |
| LGE | **Open issue RRC-xx: Logged data management upon receiving a new logging configuration**According to both TPs for NW data collection, logging configuration is set through a list-based structure (*ToAddModList* and *ToReleaseList*). Since delta configuration is possible, it is inefficient to discard all logged data unconditionally.**Proposed resolution****:** a delta approach can be applied to ensure efficient data retention and avoid unnecessary loss of valid training data. For example, the UE can retain any logged data that is not associated with configuration IDs in either the *ToAddModList* or the *ToReleaseList*.* e.g., If a configuration ID in the *ToAddModList* matches an existing logged data entry, the UE discards the corresponding logged data
* e.g., If a configuration ID in the *ToReleaseList* matches an existing logged data entry, the UE discards the associated logged data
* e.g., The UE retains any logged data that is not associated with configuration IDs in either the *ToAddModList* or the *ToReleaseList*

**Open issue RRC-xx: Logging resumption when memory issue is resolved**When the buffer issue is resolved, e.g., by memory being cleared or space becoming available, it is unclear whether the UE can autonomously resume logging according to the retained configuration, at least for periodic CSI-RS logging. A similar behavior is observed in legacy MDT operations, where logging can be paused due to IDC issues. In such cases, once the issue is resolved, the UE autonomously resumes logging without requiring explicit instruction or reconfiguration from the network.**Proposed resolution:**  When the buffer limit issue is resolved, UE resumes logging at least for periodic CSI-RS according to the retained configuration. This approach avoids unnecessary signaling while maintaining continuity in data collection. |
| Qualcomm  | **Open issue RRC-x: Suitability of data collection configuration (for both UE side and network-side training)**When the UE determines that the data collection configuration is not suitable, it is not able to measure the RS configured in the data collection; it should be able to indicate to the network.**Proposed resolution:**  Indicate to the network when the data collection configuration is not suitable.**Open issue RRC-x: Applicable configuration signalling** The current implementation of CR enforces UE to report complete list of applicability of the CSI-ReportConfig / inference related parameter sets configured by previous RRC Reconfiguration in the latest RRCReconfiguraitonComplete (even when the applicability was reported earlier).**Proposed resolution:** The applicability report from the UE in RRCReconfigurationComplete * Full applicability of the CSI-ReportConfig / inference related parameter sets configured by latest RRCReconfiguration
* Change in applicability of the CSI-ReportConfig / inference related parameter sets by previous RRCReconfigurations.

**Open issue RRC-x: applicability reporting of inference related parameter after the corresponding full inference configuration is provided** Once the network provides full inference configuration for applicable inference related parameter, it would be highly inefficient if UE keeps reporting both full inference configuration ID and inference related parameter config ID upon change in applicability. The UE should either provide the applicability of inference related parameter or inference configuration once the inference configuration is provided based on the applicability of inference related parameter set.**Proposed resolution:** The UE should either provide the applicability of inference related parameter or inference configuration once the inference configuration is provided based on the applicability of inference related parameter set. |

# Conclusions

The following observations are made based on the list of open issues above:

**Observation 1 The following open issues were resolved by RAN2#130 agreements: ...**

**Observation 2 The following open issues are treated in the email discussion [POST130][037][AI PHY] UE candidate data collection (Xiaomi/Ericsson): ...**

**Observation 3 The following open issues are treated in the email discussion [POST130][031][AI PHY] NW side data collection (Ericsson/ZTE): ...**

**Observation 4 The following open issues are treated in the RRC running CR: ...**

The following proposals are made based on the list of open issues above:

[Proposals for easy agreement]

...

[Proposals for discussion]

...