**3GPP TSG RAN WG2 Meeting #130 R2-250xxxx**

St. Julian’s, Malta, May 19th – 23rd, 2025

Agenda Item: 8.1.x

Source: Xiaomi, Ericsson

Title: Report of [POST129][037][AI PHY] UE candidate data collection (Xiaomi/Ericsson)

Document for: Discussion and Decision

# Introduction

This report provides a summary for the following post-meeting email discussion:

* [POST130][037][AI PHY] UE candidate data collection (Xiaomi/Ericsson)

 Intended outcome: Discuss how to capture ‘The UE doesn’t need to measure the candidate data collection configuration(s)’ in RAN2 spec, and signalling details (including contents). Provide TP(s) for candidate UE side data collection configuration.

 Deadline:  June 20th

Deadline for providing comments is Jun 20th, 2025, 10:00UTC.

Rapporteurs will provide proposals for RAN2#131 and a draft updated TP based on the outcome of this post email discussion after the deadline.

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

|  |  |  |
| --- | --- | --- |
| **Company** | **Name** | **Email Address** |
| vivo | Boubacar Kimba | kimba@vivo.com |
| Nokia | György Wolfner | gyorgy.wolfner@nokia.com |
| Qualcomm | Rajeev Kumar | rkum@qti.qualcomm.com |
| Apple | Peng Cheng | Pcheng24@apple.com |
| ZTE | Fei dong | Dong.fei@zte.com.cn |
| Huawei, HiSilicon | Jun Chen | jun.chen@huawei.com |
| Xiaomi | Ziyi | Liziyi5@xiaomi.com |
| Sharp | Rudraksh Shrivastava | shrivastavar@sharplabs.com |
| OPPO | Jiangsheng Fan | fanjiangsheng@oppo.com |
| Lenovo | Congchi Zhang, Tapisha Soni | Zhangcc16@lenovo.com, tsoni@lenovo.com |
| Google | Tingting Geng | tingtinggeng@google.com |
| Samsung | Seung-Beom | s90.jeong@samsung.com |
| LGE | MinJi Choi | stacyminji.choi@lge.com |
| Ericsson | Andra Voicu | andra.mihaela.voicu@ericsson.com |

# Discussion

During RAN2 #130 meeting, RAN2 discussed how to provide candidate UE data collection configurations and reached following agreements:

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| --- |
| 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) |

In this email discussion, we further discuss the details of how to signal candidate UE data collection configuration(s) and how to capture ‘The UE doesn’t need to measure the *candidate data collection configuration(s).*’ in RAN2 specification. Three example TPs (merged in one document for easy comparison) are provided for different possible signaling solutions to facilitate the email discussion and a draft updated TP will be provided by the Rapporteurs after the conclusion of the email discussion, based on the outcome.

It is agreed that the agreement ‘The UE doesn’t need to measure the candidate data collection configuration(s)’ will be captured in RAN2 specification. Since all options listed as examples above (*CSI-ReportConfig* or simplified signaling) are intended to use RRC signaling to provide candidate UE data collection configuration(s) towards UE, it is straightforward to capture the corresponding UE behavior upon receiving candidate UE data collection configuration(s) in RRC specification (i.e., TS 38.331).

Observation 1: The agreement ‘The UE doesn’t need to measure the candidate data collection configuration(s)’ will be captured in TS 38.331.

## Container of Candidate Configuration

It is possible for the UE to support multiple configurations for UE-side data collection and it was agreed that the network can provide a list of (i.e., multiple) candidate configurations. Therefore, it is reasonable that the UE can also indicate multiple preferred configurations for network’s consideration.

##### Q1. Do you agree that multiple preferred configurations can be indicated by the UE via UAI?

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| --- | --- | --- |
| **Company** | **Yes/No** | **Comment** |
| vivo | Yes | Based on UE capability, multiple configurations can be sent to the UE for UE-side data collection. Therefore, the UE may indicate multiple preferred configurations, e.g., for the model training of different models. |
| Nokia | No | There will be a sufficient number UEs available to perform data collection because the total number of chipset and UE hardware is finite, so many of the same chipsets and UEs will be connected to the same cell at any given time. If a vendor needs to collect data for multiple data collection configuration candidates, the data collection preference indications can be distributed, coming from many UEs.  We think that the UE should only be able to provide one preference for “start” at a time, and that indicating a new preference for “start” implies “stop” for the previous data collection candidate preference.  For that, we would like to propose to change the structure of the DataCollectionPreference-r19 IE. The UE will be able to stop the current data collection preference or switch to a new one.  DataCollectionPreference-r19 ::= CHOICE {  dataCollectionStop-r19 NULL,  dataCollectionPreferredConfiguration-r19 DataCollectionPreferredConfiguration-r19  } |
| Qualcomm | Yes | The UE should be allowed to signal multiple preferred configurations. In our understating, RS transmission may not be UE specific, i.e., the gNB may gather the statistics from multiple UEs in its coverage and decide the RS based on preference from multiple UEs. Signalling a single configuration may be inefficient, and UE may miss the opportunity to perform the data collection, if the gNB chose not to transmit on the RS signaled by the UE (if UE is allowed to signal a single configuration among candidate configurations).  Signalling multiple preferred configurations provides both network and UE more flexibility in selecting the RS for data collection. |
| Apple | Yes | First, please note that a list (i.e. multiple) of candidate data collection configurations is RAN2#129b agreement:   * 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.  We don’t think RAN2 should revisit agreement at the late stage of Rel-19, unless blocking technique issue can be identified.  Secondly, from technique perspective, we agree with Qualcomm that allowing multiple candidate data collection configuration provides both NW and UE flexibility. Please note that RAN2#129b has agreed it is finally up to NW how to configure. So, we fail to see any lose from NW perspective.  Thirdly, we fail to understand Nokia’s concern on finite number of UE hardware/chip type. Even for 2 UEs from same vendor, they may be located in different radio condition area, or moving in different speed, or served by different gNB with different beam pattern (e.g. different associated IDs), which require different data collection configurations. Furthermore, as UE vendor info is not shared with NW, we are not sure how 3GPP can specify mechanism to “distribute” data collection configurations among UEs from same UE vendor. |
| ZTE | Yes | We also think that is reasonable for UE to provide multiple preferred configuration to the NW as long as not beyond the UE capability. |
| Huawei, HiSilicon | Yes |  |
| Xiaomi | Yes | Agree with QC that this provides both NW and UE flexibility of UE-side data collection configuration. By providing a list of preferred configurations by UE, network can also further select suitable UE-side data collection configurations based on network resource allocation and implementation. |
| Sharp | Yes | The agreements made in RAN2#129b should be followed:   * Preferred configuration from a list of candidate configurations provided by NW. Details of signalling are FFS. It is up to network what it configures at the end.   We agree with Qualcomm that supporting multiple candidate data collection configurations enhances flexibility for both the network and the UE. Additionally, the UE may also arrange the multiple preferred candidate configurations in order of preference, either ascending or descending. |
| OPPO | Yes |  |
| Lenovo | Yes | We don’t see the reason to restrict to a single configuration. |
| Google | Yes | The UE can report multiple preferred configurations.  It is then up to the NW's implementation to decide whether to configure a single or multiple data collection tasks for the UE. |
| Samsung | Yes | It is reasonable given that multiple candidate list can be provided. |
| LGE | Yes | In alignment with Apple and Qualcomm's perspectives, we agree that allowing the UE to indicate multiple preferred configurations, within its capability limits, is consistent with our existing agreements and offers significant technical benefits. This approach enhances flexibility and efficiency in data collection, ensuring the network can effectively manage diverse scenarios without revisiting critical aspects of Rel-19. Therefore, we support enabling the UE to signal multiple preferred configurations via UAI, provided it adheres to UE capability constraints. |
| Ericsson | Yes | Allowing the UE to indicate multiple preferred candidate data collection configurations, with the understanding that the UE is ready to perform data collection on any of them, gives the NW more flexibility to choose which data collection configuration to send to the UE (e.g. provide the same configuration to multiple UEs), if it can provide any. |

##### Q2. Do you agree that certain preferred configuration can be referred by the UE via an identifier associated to a candidate configuration?

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| --- | --- | --- |
| **Company** | **Yes/No** | **Comment** |
| vivo | Yes |  |
| Nokia | Yes |  |
| Qualcomm | Yes |  |
| Apple | Yes |  |
| ZTE | Yes |  |
| Huawei, HiSilicon | Yes | We think Q2 is related to Q3, e.g. for solution 1, it may be a new identifier associated with the candidate config. |
| Xiaomi | Yes |  |
| Sharp | Yes |  |
| OPPO | Yes |  |
| Lenovo | Yes |  |
| Google | Yes |  |
| Samsung | Yes |  |
| LGE | Yes | While the detailed method may vary based on Q3 solutions, it appears feasible for the UE to send IDs corresponding to preferred configurations (e.g., IDs of DataCollectionPreferredConfiguration) through UAI to signal its preferences effectively. |
| Ericsson | Yes |  |

The next question is which RRC parameter is used to contain the candidate configuration.

During online discussion, three main solutions were proposed to contain/signal candidate UE data collection configurations:

**Solution 1**: *OtherConfig* contains a list of candidate configurations as a list with a new IE, where the new IE (i.e., each candidate configuration) contains at least the following set of parameters as agreed in RAN2#130, i.e., identifier of the candidate configuration, *CSI-ResourceConfigId* for Set A, *CSI-ResourceConfigId* for Set B, and related associated IDs [4]. An example of *DataCollectionPreferenceConfig-r19* is shown as below:

|  |
| --- |
| DataCollectionPreferenceConfig-r19 :: = SEQUENCE {  -- Solution 1  dataCollectionCandidateConfigList-r19 SEQUENCE (SIZE (1..maxCandidateConfig-r19)) OF DataCollectionCandidateConfig-r19 OPTIONAL, -- Need N  } |

**Solution 2**: *OtherConfig* contains a list of candidate configurations as a list of *CSI-ReportConfigId*, where the candidate configurations are provided by the gNB within *csi-ReportConfigToAddModList* under *CSI-ReportConfig* [5]. An example of *DataCollectionPreferenceConfig-r19* is shown as below:

|  |
| --- |
| DataCollectionPreferenceConfig-r19 :: = SEQUENCE {  -- Solution 2  dataCollectionCandidateConfigList-r19 SEQUENCE (SIZE (1.. maxCandidateConfig-r19)) OF CSI-ReportConfigId OPTIONAL, -- Need R  } |

**Solution 3**: *OtherConfig* contains a list of candidate configurations as a new list of *CSI-ReportConfig*, i.e., creating a list of *CSI-ReportConfig* in *otherConfig*, which is independent from *CSI-ReportConfig* under *CSI-MeasConfig.* An example of *DataCollectionPreferenceConfig-r19* is shown as below:

|  |
| --- |
| DataCollectionPreferenceConfig-r19 :: = SEQUENCE {  -- Solution 3  dataCollectionCandidateConfigToAddModList SEQUENCE (SIZE (1..maxCandidateConfig -r19)) OF CSI-ReportConfig OPTIONAL, -- Need N  } |

Following agreements were further reached in RAN1 for the measured UE data collection configuration:

|  |
| --- |
| RAN1#120 Agreement  For UE-sided model, for configuring the resource for data collection purpose, support   * *CSI-ReportConfig* can used for configuring the resources for data collection purpose without CSI report.   + One *CSI-ResourceConfigId* is configured for Set A.   + One *CSI-ResourceConfigId* is configured for Set B.   + Note: UE performs measurement on all resources   + One or two associated IDs can be configured in *CSI-ReportConfig*     - When Set B is equal or a subset of set A (i.e., *NZP-CSI-RS-ResourceId*/*SSB-Index* in the resource setfor Set B is within the *NZP-CSI-RS-ResourceId*/*SSB-Index* in the resource setfor Set A), one associated ID is configured,     - Otherwise, one associated ID is configured for Set A and another one associated ID is configured for Set B   FFS: whether/how to support 'aperiodic' CSI RS  RAN1 #121 Agreement  For data collection for UE-sided model, in CSI-report configuration, *reportQuantity* is set to “*none-BM-r19*”  RAN1 #121 Agreement  For UE-sided model, regarding a *CSI-ReportConfig* for data collection,   * Reuse the existing CPU occupation time for a CSI report with *CSI-ReportConfig* with *reportQuantity* set to 'none' and TRS-info not configured |

It is observed that RAN1 has agreed, for UE measured UE-side data collection configuration provided in *CSI-ReportConfig*, considering **UE needs to measure configurations but does not need to report**, *reportQuantity* of such *CSI-ReportConfig* is set to ‘*none-BM-r19*’ and CPU occupation is 1.

Observation 2: RAN1 agreed a new *reportQuantity* ‘*none-BM-r19*’ for UE-side data collection that UE needs to measure but not need to report. CPU occupation for such measured UE-side data collection is 1.

As RAN2 agreed a new UE behaviour, i.e., ‘**UE doesn’t need to measure** the *candidate data collection configuration(s)*’, and that this needs to be captured in RAN2, the solution for signaling candidate data collection configuration(s) needs to fulfil these requirements and avoid RAN1 impact.

In order to clarify that no measurements need to be performed by the UE for the candidate configurations, Rapporteurs included the following note in Section 5.3.5.9 in all the TPs (we used the endorsed RRC running CR R2-2504349, except the NOTE highlighted in yellow):

|  |
| --- |
| **Subclause 5.3.5.9**  The UE shall:  1> if the received *OtherConfig* includes the *DataCollectionPreferenceConfig*:  2> if *DataCollectionPreferenceConfig* is set to setup:  3> consider itself to be configured to provide its preference on being configured with radio measurement resources for UE data collection configuration in accordance with 5.7.4;  2> else:  3> consider itself not to be configured to provide its preference on being configured with radio measurement resources for UE data collection configuration.  NOTE: UE does not need to measure radio measurement resources provided in *DataCollectionPreferenceConfig*. |

In solution 1/3, proponent companies understand that, since all candidate CSI-RS resource configurations are provided in *OtherConfig*, according to the NOTE, it is clear that UE does not need to perform measurement towards CSI-RS resources configured in *DataCollectionPreferenceConfig*.

In solution 2, proponent companies understand that, if the inference configurations provided in *CSI-ReportConfig* (Option A) is not applicable (for periodic, semi-persistent or aperiodic) or not activated (for semi-persistent or aperiodic) and network has not released the corresponding inference configuration (included in *csi-ReportConfigToAddModList*), UE also does not need to perform measurement towards such *CSI-ReportConfig*.

##### Q3. Do you agree that the above NOTE in subclause 5.3.5.9 in TS 38.331 is sufficient to avoid RAN1 impacts for Solution 1/2/3? If the answer to the above question is No for certain solution, please explain what other impacts or RAN1 impacts foreseen.

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| --- | --- | --- | --- | --- |
| **Company** | **Solution 1 Yes/No** | **Solution 2 Yes/No** | **Solution 3 Yes/No** | **Comment** |
| vivo | Yes | No (Up to RAN1) | Yes | For solution 2, both legacy *CSI-resourceResourceConfig* and *CSI-ReportConfig* are configured. In the existing 38.214, there are some descriptions on the UE behaviour (e.g., active duration for measurement) upon activation of the resources. Therefore, in addition to the clarification in the RRC spec, RAN1 may further check and decide whether there are additional specification impacts from the RAN1 perspective. |
| Nokia | No | No | No | We do not see the need for the note. Instead, we could add to the field description of the eventual solution that the UE need not measure anything based solely on the data collection preference configuration (See our answer to Q4). We think that according to the 3GPP drafting rules a NOTE shall not be used to specify normative UE behaviour.  The intention of the note is to say that when the UE is provided a data collection candidate configuration that the candidate configuration is not to be interpreted as instructions for the UE to perform measurements. The context of the note is related to **Solution 2** in case a periodic reporting configuration is provided as a candidate. A periodic report configuration is enabled immediately and cannot be disabled or enabled, in legacy. The consequence is that Solution 2 isn’t feasible unless we were to restrict it to semipersistent and/or aperiodic, but there has been no such desire.  However, we see that **Solution 1** has no RAN1 impact because the UE isn’t being provided anything which instructs the UE to measure, but rather a subset of an eventual configuration. Nothing in the specification requires the UE to measure these. And **Solution 3** has no RAN1 impact because the CSI-ReportConfigs are provided in otherConfig, unrelated to CSI-MeasConfig, so nothing in the specification requires the UE to measure based on the candidate configurations. |
| Qualcomm | Note needed, but open to add note or field description | Note needed, but open to add note or field description | Note needed, but open to add note or field description | **CSI-ResourceConfig for UE side data collection does not instruct UE to immediately start measuring the resources, rather the note agreed in RAN1 instructs UE to measure all resources when UE is performing measurements for data collection. The purpose of the note in RAN1 is to highlight the distinction between data collection configuration and inference configuration, where for inference only resources for set B need to be measured. While for data collection both set A and set B need to be measured, therefore the note instructs UE to measure both set A and set B resources.**  **We believe that neither note or field description is needed. But if other companies believe note and/or field description are needed, we are okay to include them in RAN2 / RAN1 specification.**  We want to highlight the in the legacy CSI report, if the RS is periodic, it does not imply that UE should immediately start measuring the RS. As can be seen from the Table 5.2.1.4-1 in TS 38.214, the RS can be periodic, but reporting can be semi-persistent or aperiodic. In the legacy CSI-ReportConfig, the reportConfigType indicates when the UE should start measuring the CSI RS.  In the data collection configuration, the *reportQuantity* is set to “*none-BM-r19*”, therefore, UE is not required to immediately start measuring the CSI RS, rather the below note indicates that when UE is measuring CSI RS, it performs measurements on all resources (set A, set B).   * + Note: UE performs measurement on all resources   Therefore, CSI-ResourceConfig for UE side data collection does not instruct UE to immediately start measuring the resources, rather the note agreed in RAN1 instructs UE to measure all resources when UE is performing measurements for data collection. The purpose of the note in RAN1 is to highlight the distinction between data collection configuration and inference configuration, where for inference only resources for set B need to be measured. While for data collection both set A and set B need to be measured, therefore the note instructs UE to measure both set A and set B resources.  Table 5.2.1.4-1 in TS 38.214 illustrates supported combinations of CSI reporting configuration and CSI-RS Resource configuration (also copied below).   |  |  |  |  | | --- | --- | --- | --- | | **CSI-RS Configuration** | **Periodic CSI Reporting** | **Semi-Persistent CSI Reporting** | **Aperiodic CSI Reporting** | | Periodic CSI-RS | No dynamic triggering/activation | For reporting on PUCCH, the UE receives an activation command, as described in clause 6.1.3.16 of [10, TS 38.321]; for reporting on PUSCH, the UE receives triggering on DCI | Triggered by DCI; additionally, subselection indication as described in clause 6.1.3.13 of [10, TS 38.321] possible as defined in Clause 5.2.1.5.1. | | Semi-Persistent CSI-RS | Not Supported | For reporting on PUCCH, the UE receives an activation command, as described in clause 6.1.3.16 of [10, TS 38.321]; for reporting on PUSCH, the UE receives triggering on DCI | Triggered by DCI; additionally, subselection indication as described in clause 6.1.3.13 of [10, TS 38.321] possible as defined in Clause 5.2.1.5.1. | | Aperiodic CSI-RS | Not Supported | Not Supported | Triggered by DCI; additionally, subselection indication as described in clause 6.1.3.13 of [10, TS 38.321] possible as defined in Clause 5.2.1.5.1. | |
| Apple | Yes (also OK to add normative text) | No | Yes (also OK to add normative text) | 1. At this late stage, we think the most important thing is to avoid RAN1 spec impact. For example, Section 5.2.6.1 of 38.214 specify the rule for UE to calculate its occupied CPU, e.g. in case of beam management Procedure 3:  *For a CSI report with CSI-ReportConfig with higher layer parameter reportQuantity set to 'none' and CSI-RS-ResourceSet with higher layer parameter trs-Info not configured, the CPU(s) are occupied for a number of OFDM symbols as follows:..*  Please note solution 2 use *CSI-ReportConfig* under *CSI-MeasConfig*, Thus, if solution 2 is adopted, TS 38.214 need to specify a similar text as above for the case “*For a CSI report with CSI-ReportConfig with higher layer parameter reportQuantity set to ' none-BM-r19*”. It should be avoided because RAN1 Rel-19 work has finished.  2. We think the NOTE proposed by Rapporteur is sufficient. Please note that current TS 38.331 has multiple similar NOTEs. For example (in section 5.2.2.3.2):  NOTE 2: The UE is not required to monitor PDCCH monitoring occasion(s) corresponding to each transmitted SSB in SI-window.  But we are open to add normative text (e.g. in field description).  3. On whether the UE immediately starts periodic CSI upon reception of *CSI-ReportConfig* with periodic CSI-RS resource, we have similar view as QC: it depends on the linked reporting type (e.g. SP or Aperiodic reporting or newly introduced “*none-BM-r19*”). However, we believe RAN2 should not discuss these aspects which may mislead RAN1. The different understanding between QC and Nokia is exactly one of our main concerns on introducing solution with RAN1 impact (e.g. Solution 2). It may lead to different RAN1 understanding on RAN2 agreement (i.e. the UE doesn’t need to measure candidate configuration) and chaos in RAN1 how to capture it in RAN1 spec. Thus, we prefer to introduce solution with only RAN2 impact (i.e. solution 1 or 3). |
| ZTE | No | No | It Depends on where the CSI-ResourceConfig is from. | * For the solution 1, It means the CSI resource configuration in the *otherConfig* is still from the CSI-MeasConfig. In our understanding, every CSI-ResourceConfig configured to UE shall be measured in different purposes (i.e. beam management , tracking, etc), and this solution is to propose that the CSI-ResourceConfig can be provided for UE not to measure anything which deviates the original intention, so we are understanding that RAN2 cannot have such note for this solution.. * For the solution 2, it has the same concern with solution 1 which may need RAN1 to confirm, RAN2 cannot have such note for this solution. * For the solution 3, we have a question:   What should be associated to the new CSI report configuration, CSI-ResourceConfigId from CSI-MeasConfig, or new CSI-ResourceConfig independent with CSI-MeasConfig  If the answer is the former one , then it is quite as similar as solution 1, the RAN1 impact is inevitable, and hence the note cannot be concluded solely in RAN2.  If the answer is the later one, then this can avoid the RAN1 impact which is our preference , and the note seems reasonable under this solution. |
| Huawei, HiSilicon | Yes | No | Yes | For Solution 2, as the email rapporteur mentioned, if the configuration is applicable, the UE may perform measurements according to network configurations. This argument was used during solution direction discussion at RAN2#130, and some companies were concerned about this direction, because they thought that as long as the network uses *CSI-ReportConfig*, RAN1 impacts are inevitable.  For Solution 1 and 3, we wonder the necessity of this Note.  Firstly, in legacy CSI measurement, RAN1 defined UE behaviours, and RAN1 just follows this principles for Rel-19 AI for PHY.  Secondly, for Solution 1 and 3, it should be clear to the UE already that the configurations are preference indication only as they are places outside CSI-MeasConfig, which is only defined in RAN2. In other words, if we are going to have this Note, the UE behaviours on CSI measurements will be defined in both RAN1 and RAN2 specifications, which is not following legacy principle. |
| Xiaomi | Yes | No | Yes | For Solution 1/3, we understand the concern from Nokia that all UE behavior should be defined in normative context. Therefore, we are ok to also having this as normative context (in field description), instead of a NOTE.  For Solution 2, since the configuration is provided in *CSI-ReportConfig*, even though *reportQuantity* is set to ‘*none-BM-r19*’, we think RAN1 impact is unavoidable, as candidate UE-side data collection UE behavior is totally different from UE-side data collection. This is the part that was never discussed in RAN1 and therefore current RAN1 specification has not considered this agreement. We share the same view with Apple that we should avoid RAN1 impact especially RAN1 has completed their work in Aug. |
| Sharp | Yes | No | Yes | For solution 1 and 3: The candidate configurations are separate from regular measurement configs (since configs are not in CSI-*MeasConfig.*). The NOTE clearly applies, so UE does not measure. Therefore, No effect on RAN1.  For solution 2: UE might perform measurements as per network configuration, leading to RAN1 impact. Therefore, we should avoid any RAN1 impact at this stage, considering solution 2 was not discussed in RAN1 and RAN1 has already finished their work (as also indicated by Xiaomi above) . |
| OPPO | Yes | No | Yes | RAN1 impact should be avoided, so solution 2 should be ruled out. As for solution 1 and solution 3, solution 1 is more aligned with RAN2 agreements made in last meeting and we’re also fine to use field description to capture UE not measure the candidate data collection configuration. |
| Lenovo | Yes | No | Yes | 1. we are also fine to capture as normative text  2. as pointed out by some companies, there could be additional RAN1 specification impact, which need to be checked.  3. we are also fine to capture as normative text. |
| Google | Yes | No | Yes | Firstly, as indicated by some companies, solution 2 would involve RAN1 impact and should be excluded.  For solutions 1 or 3, we are open to capture it in a NOTE or normative text. |
| Samsung | No | Yes with comment | No | For 1 and 3, if we have clear field description on IEs, there seems no need to have a NOTE.  For solution 2, it may be more clear if the NOTE is described more explicitly e.g. RRC layer doesn’t apply CSI-ReportConfig (i.e. doesn’t provide CSI-ReportConfig to PHY layer) if the corresponding index is included in DataCollectionPreferenceConfig.  The NOTE in the procedure text should be enough. |
| LGE | Yes | No | Yes | For Solution 2, potential compatibility issues with existing operations may exist due to the simultaneous configuration of legacy CSI-resourceConfig and CSI-ReportConfig without introducing new IEs or lists. This scenario may necessitate additional scrutiny and potential adjustments from RAN1 to thoroughly assess the impact of these new configurations on existing measurement behaviors.  Regarding ZTE's comment on Solution3, in legacy behavior, the RAN1 specification does not explicitly state whether the UE should perform measurements when only resource set configurations are present and no report configuration is provided. Since this is already how the spec has been interpreted and implemented, and considering that the current case is mainly for logging purposes, it may not be necessary to make changes in the RAN1 specification. A clarification through a note or field description in RAN2 should be sufficient. |
| Ericsson | Yes | Yes (with some limitations) | Yes | For solutions 1 and 3 we agree with Huawei and Sharp that there is no RAN1 impact anyway, since the candidate configurations are outside *CSI-MeasConfig*. Due to this, the NOTE is not needed at all, but we are open to keeping it as a clarification.  For solution 2, the NOTE (or intention of the NOTE) is needed, since only inactive semi-persistent and aperiodic reporting configurations in *CSI-ReportConfig* would be possible. This could be solved further by network implementation and RAN1 would not need to be involved. |

Finally, if you agree with the intention of the NOTE, Rapporteurs would like to ask if companies see the need to capture in the procedural text the NOTE highlighted above or somewhere else (e.g. field description), please comment on that.

##### Q4. Do you agree to capture the above NOTE in subclause 5.3.5.9 in TS 38.331? If no, please comment in case you agree with the intention of the NOTE, but you prefer to include this information somewhere else (e.g. in the field description).

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| --- | --- | --- |
| **Company** | **Yes/No** | **Comment (where and subclause to capture)** |
| vivo | No | Prefer to add the UE behaviour in the field description.  In addition, the content should be refined as the UE can measure the resources if they are associated with other *CSI-ReportConfig* or after the gNB feedback requested resources are activated:  UE does not need to measure radio measurement resources provided in *DataCollectionPreferenceConfig* if they are not associated with other *CSI-ReportConfig* or before the *CSI-ReportConfig* for data collection purpose is configured and activated. |
| Nokia | No | We prefer to include in the field description for *dataCollectionCandidateConfig*,  “The UE is not expected to perform measurements solely based on the configurations provided by this IE.” |
| Qualcomm | Note needed, but open to add note or field description. | Please see our response to Q3. |
| Apple | Yes, but open to add in field description. | It is also fine to add it in field description as normative text. We can follow majority view, although we slightly prefer the way proposed by Rapporteur. |
| ZTE | No | Nokia’s solution is better than the note. |
| Huawei, HiSilicon | No | See our comments to Q3. For Nokia's solution, as we mentioned in Q3, the configurations are preference indication only as they are places outside CSI-MeasConfig, and then the 38.331 CR will capture something like: the UE will use this configuration only for checking preferred configuration. In this case, it clearly defines the UE behaviour so that Nokia's solution is not needed. |
| Xiaomi | Yes, but open to have it in field description. |  |
| Sharp | Yes | We support the intention of the NOTE in subclause 5.3.5.9 but prefer to capture it in the field description of *dataCollectionCandidateConfig.* rather than as a NOTE in procedural text. This avoids normative behaviour in NOTES and prevents overlap with RAN1 responsibilities. |
| OPPO | Yes, but open to have it in field description. |  |
| Google | Yes, but open to have it in normative text. | We slightly prefer to define the UE behaviour in field description or in the text section. |
| Samsung |  | For option 1/3, see comments in Q4.  For option 2, with the current NOTE, 5.3.5.9 would be ok. If we update the NOTE as we proposed, 5.3.5.3 might be more suitable than 5.3.5.9. |
| LGE | No | We think it would be sufficient to just write it in the field description. |
| Ericsson | Yes, but prefer to move it to field description. | We are also fine with the modifications suggested by Nokia. |

## Content

Following candidate configuration contents were agreed in RAN2 #130 meeting:

|  |
| --- |
| 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 |

In the following, we discuss how to represent the above agreed content for each of the Solutions 1/2/3, and whether additional parameters are needed.

##### Q5-1. For Solution 1, besides the above parameters agreed in RAN2#130 (which are already captured in the proposed TP), which other parameters, if any, need to be included in candidate UE data collection configuration? Please explain your reasons.

|  |  |  |
| --- | --- | --- |
| **Company** | **Additional RRC parameters as candidate configuration in Solution 1? (Yes/No)** | **Comment (please list the RRC parameter and explain why this is needed as part of candidate data collection configuration)** |
| vivo | No |  |
| Nokia | Yes | We think that at least the **full list of parameters selected for sets of inference parameters** for inference should be part of the data collection candidate configurations such that the UE can determine the purpose of the data collection candidate configuration and decide to signal one as a preference based on training a model for a specific use case. That is, the UE will collect data such that in the future, it can report “applicable” for an AI/ML configuration. Therefore, it should be clear, e.g., that a data collection candidate configuration is associated with beam management case 1 vs. beam management case 2 based on the nature of the configuration without naming use cases. |
| Qualcomm | Maybe | RAN2 should check with RAN1 whether these parameters are sufficient for determining preferred data collection configurations at the UE. |
| Apple | No, and we can send final agreement to RAN1 to check issue | These parameters are from RAN1#120b agreement, which we think it is sufficient.  As the configuraiton is for data collection purpose, we fail to understand why inference parameters need to be included. Whether to include inference related parameters in data collection configuration was not even discussed in RAN1…  Thus, we suggest:  1) Make agreement like “RAN2 assume that…”  2) Complete CR based on RAN2 assumption in 1).  3) Send the agreement to RAN1 to check any issue. |
| ZTE | Yes | I guess the candidate configuration is per serving cell, then at least the serving cell id may be needed. |
| Huawei, HiSilicon | Maybe | RAN1 has agreed on the higher layers parameters list in their LS, and companies may check these parameters and see if some are missing here. In addition, if needed, RAN2 may check with RAN1 regarding Q5-1. |
| Xiaomi | No | But we are fine to follow RAN1 RRC parameter for UE-side data collection. |
| Sharp | No | We consider the existing parameters agreed at RAN2#130 and reflected in the TP to be sufficient for candidate data collection configuration. These parameters align with the RAN1 agreement for UE-side data collection, and no additional inference-related parameters are needed at this stage. If further clarification is required, we support sharing the assumption with RAN1 to confirm completeness. |
| OPPO | No | We understand candidate configuration ID is already taken into account for solution 1 based on Q2 answer. |
| Lenovo | Maybe | Same view as Huawei. |
| Google | No |  |
| Samsung | No | We can add if there is any input from RAN1. |
| LGE | Yes | CSI-ReportConfig is configured per cell, while otherConfig is configured per CG. Therefore, an additional configuration is required to specify which cell's CSI resource configuration the solution1/2 configuration follows. For this, the serving cell index-related information may need to be included. |
| Ericsson | Maybe | RAN2 should check with RAN1. Additionally, we agree with ZTE that the cell ID is needed on top, assuming the new ID of the candidate configuration for solution 1 is defined to be unique within a cell. The new ID for solution 1 should be included in the dataCollectionPreferenceConfig, e.g. it should indicate to which cell ID the candidate new IDs are associated to. |

##### Q5-2. For Solution 2 and 3, do you agree that the above parameters agreed in RAN2#130 would be already included as part of the *CSI-ReportConfig* (i.e., the above parameters would be already introduced in the ASN.1 in the *CSI-ReportConfig* to support the UE side data collection configuration)?

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comment** |
| vivo | Yes |  |
| Nokia | Yes |  |
| Qualcomm | Yes |  |
| Apple | Yes |  |
| ZTE | Solution 2 Yes, Solution 3 see my comments in Q4 |  |
| Huawei, HiSilicon | Yes |  |
| Xiaomi | Yes |  |
| Sharp | Yes |  |
| OPPO | Yes |  |
| Lenovo | Yes |  |
| Google | Yes |  |
| Samsung | Yes |  |
| LGE | Yes |  |
| Ericsson | Yes |  |

##### Q5-3. For Solution 2 and 3, besides the above parameters agreed in RAN2#130, which other parameters, if any, need to be included within the *CSI-ReportConfig* as candidate UE data collection configuration? Please explain your reasons.

|  |  |  |
| --- | --- | --- |
| **Company** | **Additional RRC parameters as candidate configuration in Solution 2/3? (Yes/No)** | **Comment (please list the RRC parameter and please explain why this is needed as part of candidate data collection configuration)** |
| Nokia | No | We just have one caveat to note for the eventual configuration.  The CSI-ReportConfig will include *resourcesForChannelMeasurement* and *resourcesForChannelPrediction*, which will be interpreted to mean Set B and Set A, respectively. In an inference configuration, the UE is not expected to measure Set A, but in a data collection configuration, the UE should measure Set A and Set B. So, in the eventual configuration for data collection, it must be made clear everything which is to be measured.  We think it would be useful to send an LS to RAN1 asking them whether a UE can measure both *resourcesForChannelMeasurement* and *resourcesForChannelPrediction* when the *reportQuantity-r19* is set to *none-r19*. In case *resourcesForChannelMeasurement* is a subset of *resourcesForChannelPrediction*, the UE is only required to make and store a measurement once per common resource.  For example, if Set A is 64 beams, and Set B is 8 beams and entirely a subset of Set A, then the UE would only be required to measure the Set A beams since the Set B beams would be inherently captured by Set A. |
| ZTE | Yes | For both solution 2 and solution 3, if agreed, the serving cell Id may be needed to identify the serving cell each data collection configuration is for. |
| Sharp | No | We note that in data collection configurations, the UE is expected to measure both r*esourcesForChannelPrediction* (Set A) and *resourcesForChannelMeasurement* (Set B), unlike in inference configurations. Therefore, as Nokia suggested, to avoid ambiguity, it should be clarified whether the UE can measure both sets when reportQuantity-r19 is set to none-r19. If Set B is a subset of Set A, the UE should not need to duplicate measurements. Therefore, an LS to RAN1 can be sent to confirm this interpretation and avoid unnecessary measurement overhead. |
| OPPO | No |  |
| Samsung | Comment | The advantage of solution2/3 would be that we don’t need to take care of parameters for candidate configuration separately. So, this question might be skipped for solution 2/3 to take advantage of solution 2/3. |
| Ericsson | No | No other parameters are needed within CSI-ReportConfig, but for solutions 2 and 3 (as well as for solution 1) it is needed to introduce the cell ID on top, to clarify to which cell the candidate configurations are associated to. |

As discussed in Q1, network may provide an ID for each candidate configuration (either the new *DataCollectionCandidateConfigId* for Solution 1 or a *CSI-ReportConfigId* for Solutions 2 and 3). UE can directly report these ID(s)representing its preferred configuration(s). Besides the preferred candidate configuration ID(s), is there any other information needed that the UE should include in UAI along with the preferred configuration(s)?

##### Q6. What information does UE include in its preferred configuration via UAI (except configuration ID in Q2 if agreed)?

|  |  |  |
| --- | --- | --- |
| **Company** | **Parameter (besides configuration ID if agreed in Q2) in Solution 1, 2, 3** | **Comment (please explain why this is needed as part of preferred data collection configuration)** |
| vivo | None (start/stop indication and ID are sufficient) |  |
| Nokia | None | The candidate data collection configurations are self-sufficient |
| Qualcomm | Priorities of preferred data collection configurations (of signaled multiple preferred configuration). | UE should be allowed to signal multiple preferred data collection configuration. Additionally, the UE should be allowed to provide priorities of preferred configuration. UE may indicate the sequence of configuration IDs to indicate the priority or can explicitly indicate the priority. |
| Apple | None (start/stop indication and configuration ID should be sufficient) | Same view as vivo. Open to discuss priority proposed by QC after baseline discussion is finalized. |
| ZTE | None | We do not think the start/stop indication is needed to inform NW from UE. |
| Huawei, HiSilicon | None |  |
| Xiaomi | None |  |
| Sharp | None | No additional info. is needed at this stage. |
| OPPO | None |  |
| Lenovo | None |  |
| Google | None |  |
| Samsung | 1) Preferred time information  2) Configuration IDs to prefer to stop  3) Simultaneous “start” and “stop” | 1) It might be beneficial if UE can indicate how long UE would collect data so that NW can consider.  2) As discussed in Q1/Q2, we assume UE can indicate its preference to start multiple configuration IDs (e.g., ID=1,2). Then NW may also configure multiple configurations (e.g., ID=1,2) for UE’s actual data measurement/collection. Here, if UE only indicates “stop” (i.e., without configuration IDs it prefers to stop), NW would release all 3 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 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 needed. In this case, there should be a way to stop only configuration 2 (i.e., selective stop)  3) We also think UE should be able to indicate both configuration ID(s) to start and configuration ID(s) to stop, simultaneously. For example,  - 1. NW provides candidates of configurations (e.g., ID=1,2,3)  - 2. Then, UE sends its preference to start configuration 1 and 2  - 3. NW configures actual measurement/collection configuration 1 and 2  - 4. UE starts measure/collection for 1 and 2  - 5. UE wants to stop 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). |
| LGE | None |  |
| Ericsson | Cell ID | Please see our related comments for Q5-1 and Q5-3. |

##### Q7. Do you think prohibit timer should be considered for UE indicating its preferred data collection configuration?

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comment** |
| vivo | No | The preference for UE data collection is not expected to change frequently. Thus, the prohibit timer is not needed. |
| Nokia | No, but | The prohibit should prohibit the UE from requesting to start a data collection candidate for a configurable amount of time since the UE requested to start or stop any data candidate. A request to stop is not subject to the prohibit timer. This is necessary since the UE is mandated to make measurements based on the configured UE-side data collection configurations. The prohibit timer starts when the UE requests to start any data collection preference.  For example, we could start with the following procedure:  1> if configured to provide its preference to be configured with radio measurement resources for UE data collection:  2> if the UE did not transmit a *UEAssistanceInformation* message with *dataCollectionPreference* since it was configured to provide its preference to be configured with radio measurement resources for UE data collection; or  2> if the data collection preference is different from the last transmission of the *UEAssistanceInformation* message including *dataCollectionPreference*:  3> if the data collection preference includes *dataCollectionStartStop* set to *stop*:  4> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to report the UE preference to be configured with radio measurement resources for UE data collection;  3> else if timer Txx is not running:  4> start or restart timer <Txx> with the timer value set to the *dataCollectionPreferenceProhibitTimer;*  4> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to report the UE preference to be configured with radio measurement resources for UE data collection;  The above procedure could be modified to match our answer to Q1, which is to support only a single active data collection preference at a time and modifying the preference configuration IE as follows:  DataCollectionPreference-r19 ::= CHOICE {  dataCollectionStop-r19 NULL,  dataCollectionPreferredConfiguration-r19 DataCollectionPreferredConfiguration-r19  }  3> if the data collection preference includes *dataCollection~~Start~~Stop* ~~set to~~ *~~stop~~*: |
| Qualcomm | No | Similar view as VIVO. |
| Apple | No strong view | From technique wise, it is not necessary as vivo mentioned (we agree that such reporting is not expected to be frequent). But if NW vendor has concern on UE frequent reporting, we are fine to have a simple per UE Prohibit timer, i.e. we disagree to consider optimization like per configuration Prohibit timer or differentiated start and stop Prohibit timer. |
| ZTE | No |  |
| Huawei, HiSilicon | Yes | At RAN2#130, we suported this prohibit in our Tdoc R2-2504239 (i.e. section 2.4). Here is the reason:  We need to consider a scenario where the UE initiates a data collection request but does not receive a response from the network (i.e., the network fails to provide the necessary configuration for UE-side data collection), the UE may repeatedly send request messages, leading to excessive signaling overhead. To mitigate this issue, it is essential to implement mechanisms to limit such abnormal behavior and prevent the associated signaling overhead. This is related to the following FFS in the running CR:  Editor's Note: FFS other procedures, e.g. prohibit timer.  As a commonly used method to avoid the frequent request by UE, a prohibit timer can be configured. After UE sends a request for data collection configuration, prohibit timer should start, and while it is running, the UE should not send the request again, even if the NW does not send data collection configuration to the UE. **In summary, we prefer to have a per UE Prohibit timer.**  Regarding some comments above, i.e. the preference for UE data collection is not expected to change frequently, we think it is just an assumption based on one UE implementation. However, we have no idea whether other UE implementation will lead to frequent UAI reporting. Here are some reasons:  (1) the reason mentioned above, i.e. the UE may repeatedly send request messages if the NW does not respond  (2) whether/when the UE sends the request is totally up to UE implementation  (3) in the agreed procedure, the NW first sends a list to UE, and the UE will check the list and provide feedback to NW. The list may include lots of candidate configurations, so the UE's choice may change in time (it may be slow or quick)  (4) if RAN2 does not adopt this per UE Prohibit timer and frequency UAI reporting happens, it is not possible to restrict UE implementation, and instead we have to consider standard-based approach in the future.  In summary, from network point of view, the per UE Prohibit timer is helpful and it can be used to avoid frequency UAI reporting if UE implemenation does that. |
| Xiaomi | No | Same view as Vivo |
| Sharp | Yes | Yes, we support introducing a per-UE prohibit timer for data collection preference reporting.  It helps:   * Avoid repeated preference reports when the network doesn't respond. * Prevent repeated reconfiguration attempts by the network when UE marks a configuration inapplicable or not preferred.   This would help reduce signalling overhead and improve stability in the procedure. |
| OPPO | No |  |
| Lenovo | No |  |
| Google | Yes | Same view as Huawei and Sharp.  For UE-initiated requests or reports (e.g., OSI requests), a prohibit timer should be introduced. This mechanism would prevent the UE from sending repeated or new requests too frequently, particularly if a response from the NW is not received. |
| Samsung | No | Underlying assumption is that UE won’t send UE preference so often. |
| LGE | No | We share the same view with Vivo. Since UE data collection preferences are not anticipated to fluctuate often, a prohibit timer may not be required. |
| Ericsson | Yes | We agree with Sharp and Huawei that the main purpose of the prohibit timer would be to avoid repeated start requests with the same preference from the UE, in case the NW does not provide a data collection configuration according to that preference. We also think that Nokia’s proposal to always allow sending a stop request (regardless of the prohibit timer) is beneficial, to inform the network as soon as possible that the resources can be released. |

##### Q8. Among Solution 1/2/3, which solution is acceptable/not acceptable?

|  |  |  |
| --- | --- | --- |
| **Company** | **Acceptable (Solution 1/2/3)** | **Not acceptable (Solution 1/2/3)** |
| vivo | From our understanding, the selection of the solutions depends on backward compatibility and signaling overhead of configuration/feedback:  - For **Solution 1**, the *DataCollectionCandidateConfig* is decoupled with the existing CSI report. Thus, no BC issue. The gNB needs to reconfigure the *CSI-ReportConfig* to activate the resource for measurements. In this case, the Set A/B and associated ID are duplicated in the configuration and feedback.  - For **Solution 2**, the NW may provide the candidates *CSI-ReportConfig* along with the legacy *CSI-ReportConfig*, which will impact the maximum number of legacy *CSI-ReportConfig*.  - For Solution 3, the gNB needs to reconfigure the *CSI-ReportConfig* to activate the resource for measurements. In this case, all the fields in *CSI-ReportConfig* are duplicated in the configuration and feedback.  In general, **Solution 1** is acceptable. | Solution 2, 3 |
| Nokia | Solution 3 | Solution 1 and 2 |
| Qualcomm | Solution 1 and 2 | Solution 3  We prefer not to create a list of *CSI-ReportConfig* in *otherConfig.* |
| Apple | Solution 1 (1st preference) because:   1. It has smallest overhead 2. It is cleanest solution (i.e. no legacy UE impact as vivo commented) 3. It doesn’t have extra RAN1 spec impact   We can also accept Solution 3:   1. Cons: it has larger overhead than solution 1 (i.e. useless other parameters in *CSI-ReportConfig*). 2. Pros: we don’t need to check RAN1 on whether other parameters beyond RAN1#120b agreement (i.e. *CSI-ResourceConfigId* of Set A, *CSI-ResourceConfigId* of Set B, associated ID) are needed. | Solution 2: we should avoid RAN1 spec change at this late stage. |
| ZTE | Not in any solution 1~ Solution 3 can be acceptable solely by RAN2  In our understanding, the solution which can be determined not to have RAN1 impact shall be as below:   * All the CSI report configuration (e.g. no matter how to name it) contained in the OtherConfig shall be independent from CSI-MeasConfig. * All the CSI resource configuration (e.g. no matter how to name it) contained in the OtherConfig and associated with CSI report configuration shall be independent from the CSI-ResourceConfig List in CSI-MeasConfig, the NZP-CSI-ResourceSetId can be used instead. | Solution 1~ solution 3 |
| Huawei, HiSilicon | Solution 1 | Solution 2. Reason: as we commented for Q3, RAN1 impacts are inevitable.  Solution 3: Reason: it introduces unnecessary overhead. |
| Xiaomi | Solution 1/3 is acceptable, considering there’s no RAN1 impact on specifying UE behavior.  However, we prefer Solution 1 better, since it is less signaling overhead compared to Solution 3. | Solution 2 (unavoidable RAN1 impact) |
| Sharp | Solution 1,3 | Solution 2: impact on legacy CSI-*ReportConfig* limits and the requirement for potentially late-stage RAN1 specification changes (that should be avoided at this point).  Solution 3: comes with increased overhead and may duplicate parameters, making it less efficient. |
| OPPO | Solution 1 | Solution 2 |
| Lenovo | Solution 1.  Another point is that the discussion has some similarity as the design for Option B in applicability reporting. We also prefer a unified design principle in both cases, i.e., the parameters are explicitly conveyed in the OtherConfig without referring to the CSIReportConfig. | Solution 2, 3 |
| Google | Solution 1 | Solution 2, 3 |
| Samsung | Solution 1/2/3 |  |
| LGE | Solution 1 (1st priority)  Solution 3 (2nd priority) | Solution 2 : See our comment for Solution2 on Q3. |
| Ericsson | Solutions 2 and 3  Solution 2 because the NW can indicate some inapplicable inference configurations as candidates for UE data collection. We assume the NW would anyway want to provide UE data collection configurations that are related the possible inference configurations that it can offer.  Solution 3 is also fine, given that it would limit the discussion needed in RAN1 (candidate configurations are outside *CSI-MeasConfig* and all the possible parameters are included). | Solution 1, since it may need more discussion with RAN1 to understand which other parameters need to be included. |

# Conclusion

# Reference

[1] R2-2504309 Remaining open issues: LCM for UE-sided model for BM use case InterDigital

[2] R2-2504353 Open Issues on LCM for UE-sided Models for Beam Management and CSI Prediction Qualcomm Incorporated

[3] R2-2503775 Further Discussion on LCM of UE-sided Model for AI BM MediaTek Inc.

[4] R2-2503449 Discussion on open issues of AI/ML air LCM Xiaomi

[5] R2-2504414 On Enhancements for NW Involvement in UE-side DC for BM Nokia, T-Mobile USA Inc., Ericsson, BT plc, Verizon, Deutsche Telekom AG