**3GPP TSG RAN2 Meeging #130 R2-250xxxx**

**Malta, 19th – 23rd May , 2025**

**Agenda item: 8.1.3**

**Title: Report of** **[AT130][029][AI PHY] NW side data collection**

**Source: ZTE, InterDigital**

**Document for: Discussion and Decision**

# Introduction

This contributions are used for offline discussion **[AT130][029][AI PHY] NW side data collection, according to the chair lady guidance,** the discussion scope includes the following:

- RRC Framework for NW side data collection

- RAN1 involvement for logged data for NW-side and UE-side data collection

- RRC-25/30 Dynamic activation/deaction of data collection for logging

# Discussion

## NW side data collection framework

### layer 3 framework and CSI-RS framework

In order to facilitate the framework down selection between layer 3 framework and CSI-RS framework, rapporteur think the down selection principle shall be aligned with companies.

In my understanding, this is the last R19 meeting for RAN1 to discuss R19 AI/ML for PHY, and there is no any TU allocated in RAN3 for R19 AI/ML for PHY, so I think the basic principle shall be:

**Basic Principle: The RRC framework that causes the minimum impact to other RAN WG is preferred from RAN2 perspective.**

Company please comments on the basic principle:

In [1], the summary for specification impact from layer 3 RRC framework (i.e. option 1a) and CSI-RS framework (i.e. option 2) is shown as below table:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **RAN2 Spec Impact** | **Potential RAN3 Spec Impact** | **RAN1 Spec Impact** | **Potential spec impact for AI mobility** |
| **Option 1a** | New RRC framework with a same level MeasConfig | F1 interface impact  - CU-DU interaction for CU to obtain the Layer 1 measurement resources for data collection from DU. | None | **RAN2:**  - Introduce a list of L3 Measurement Resource Configuration, where each one includes one L3 resource ID referencing to existing measurement resource configurations |
| **Option 2** | *Extend CSI-MeasConfig* | F1 interface impact:  - CU-DU interaction is needed for CU to retrieve the logged data upon the UE has been configured with data logging based data collection  - CU-DU interaction is needed for DU to configure the L3 event related parameter for data logging.  - CU-DU interaction is needed for CU to obtain the logged data configuration to check the validity of the received logged data reporting. | Requires updates to capture the data logging procedures in RAN1 spec (TS 38.214).  FFS whether the reporting procedure needs to be captured in in RAN1 spec (TS 38.214). | **RAN2:**  - Not extensible. It seems that the only feasible way is to touch the base of L3 RRM RRC framework (i.e. *MeasObjectNR)* because it doesn’t make sense to extend L1 CSI framework (*CSI-MeasConfig*) to L3 measurement logging.  **RAN3:**  F1 interface impact:  - CU-DU interaction regarding the layer 3 event related configuration is needed.  - CU-DU interaction regarding the Layer 3 measurement resources generation. |

Besides, in [2], the specification impact is not explicitly provided, but the following observation regarding concerns can be taken into account:

1. Including the L1 CSI resource configuration into the L3 *MeasObjectNR* IE for the NW side data collection raises the following concerns:
   1. Unclear benefits, given the current mechanisms for the gNB-DU and gNB-CU to configure the L1 CSI measurements, and the L3 measurements respectively, for a serving cell
   2. Added complexity to the gNB-CU, to change the handling of L1 measurements configurations received from the gNB-DU
   3. Added complexity to the UE, given the reception of L1 measurement configurations outside the legacy CSI-MeasConfig.
   4. Added complexity if dynamic activation/deactivation of NW-side data collection configurations is supported

Given that all of above in combination, it is noted that:

- the item a in observation, it can not be counted as either pros and cons because that description is too generic.

- the item b in observation is contained in the specification impact analysis in the table from [1].

The following CONs and PROs can be summarized based on above contributions in the below table:

|  |  |  |
| --- | --- | --- |
|  | **PROs** | **CONs** |
| **Layer 3 framework**  **[1][3]** | 1: Introduce less RAN3 impact in gNB split case  - CU-DU interaction for CU to obtain the Layer 1 measurement resources for data collection from DU.  2: Introduce none of RAN1 impact  3: There is no scalability issue for AI/ML mobility case. | 1: Added complexity if dynamic activation/deactivation of NW side data collection configuration is supported  2: Introduce a new RRC framework for NW side data collection  3: Added complexity to the UE, given the reception of L1 measurement configurations outside the legacy CSI-MeasConfig. |
| **CSI-RS framework**  **[2]** | 1: legacy Layer 1 framework has legacy MAC CE to activate or deactivate the layer measurement resources.  2: Extend the current CSI framework , e.g. adding the logging related configuration. | 1: Introduce more RAN3 impact in gNB split case:  - CU-DU interaction is needed for CU to retrieve the logged data upon the UE has been configured with data logging based data collection  - CU-DU interaction is needed for DU to configure the L3 event related parameter for data logging.  - CU-DU interaction is needed for CU to obtain the logged data configuration to check the validity of the received logged data reporting.  2:Introduce more RAN1 impact：  - Requires updates to capture the L1 measurement and data logging procedures in RAN1 spec (TS 38.214).  3: There is some scalability issues to support the use case of AI/ML mobility |

Company comments on PROs for layer 3 framework:

Company comments on CONs for layer 3 framework:

Company comments on PROs for CSI-RS framework:

Company comments on CONs for CSI-RS framework:

Proposal 1:...

## NW side data collection framework related issue

### RRC-22 RAN1 involvement for logged data for NW-side and UE-side data collection

[R2-2503716](file:///C:\\Users\\panidx\\OneDrive%20-%20InterDigital%20Communications,%20Inc\\Documents\\3GPP%20RAN\\TSGR2_130\\Docs\\R2-2503716.zip) Remaining issues on NW-sided data collection Apple discussion Rel-19 NR\_AIML\_air-Core

Proposal 8a: As NW-side data collection is RAN2-led objective, no need of RAN1 involvement on logged measurement.

[R2-2503562](file:///C:\\Users\\panidx\\OneDrive%20-%20InterDigital%20Communications,%20Inc\\Documents\\3GPP%20RAN\\TSGR2_130\\Docs\\R2-2503562.zip) Remaining issues on NW side Data Collection LG Electronics discussion Rel-19 NR\_AIML\_air-Core

Proposal 8. [Open issue RRC-22] Logging conditions and control procedures, particularly those related to when and how logging is triggered, should be specified in the RRC layer

[R2-2504637](file:///C:\\Users\\panidx\\OneDrive%20-%20InterDigital%20Communications,%20Inc\\Documents\\3GPP%20RAN\\TSGR2_130\\Docs\\R2-2504637.zip) NW-side data collection for beam management and positioning Ericsson discussion

Proposal 8 (RRC-22) L1 procedures to perform radio measurements and logging for the NW-side data collection purpose are not captured in RAN2 specification. RAN1 to evaluate impact in TS 38.214.

Regarding the RAN1 involvment for NW side data collection, rapporteur understands it may be related to which framework shall be applied for NW side data collection (e.g. Layer 3 framework, CSI-RS framework), so rapporteur suggest companies think about the following two questions, and provide comments:

Q1: Assuming Layer 3 RRC framework is applied for NW sided data collection, whether and how much RAN1 involvement would needed?

Company comments on Q1:

Q2: Assuming CSI-RS framework is applied for NW sided data collection, whether and how much RAN1 involvement would be needed?

Company comments on Q2:

Proposal 2:...

### RRC-25/30 Dynamic activation/deaction of data collection for logging

[R2-2503395](file:///C:\\Users\\panidx\\OneDrive%20-%20InterDigital%20Communications,%20Inc\\Documents\\3GPP%20RAN\\TSGR2_130\\Docs\\R2-2503395.zip) Leftover Issue Discussion on NW side data collection OPPO discussion Rel-19 NR\_AIML\_air-Core

Proposal 11: (RRC-25) One set or multiple sets of CSI-ResourceConfig can be configured to UE per data collection configuration and the configured periodic CSI resource is immediately activated by UE upon receiving RRCReconfiguration message.

Proposal 12: (RRC-25) Dynamic data collection configuration activation/deactivation via low layer signaling (e.g. DCI or MAC CE) is not supported in R19.

[R2-2504637](file:///C:\\Users\\panidx\\OneDrive%20-%20InterDigital%20Communications,%20Inc\\Documents\\3GPP%20RAN\\TSGR2_130\\Docs\\R2-2504637.zip) NW-side data collection for beam management and positioning Ericsson discussion

Proposal 15 (RRC-25) Dynamic activation/deactivation of logging configurations for NW-side data collection is supported. FFS whether to introduce a new MAC CE or to enhance a legacy MAC CE, based on the outcome of open issue RRC-24.

For supporting dynamic activation/deactivation of logging configuration for NW side data collection, Ericsson paper [4] provides the argument as shown in below:

|  |
| --- |
| It is useful to allow the gNB to activate the NW-side data collection based on L1 measurements received over the UCI. Especially since the NW-side data collection based on L1 events is not supported, then there is the need to give the possibility to the NW to dynamically activate the data collection based on real-time L1 measurements received from the UE. Otherwise, there is the risk with periodic resources that the gNB collects a lot of redundant data, that were already previously collected. The dynamic activation/deactivation of a logging configuration can be performed via a MAC CE and it can be further discussed if a new MAC CE is needed, or whether a legacy MAC CE can be enhanced for this, depending also on the outcome of open issue RRC-24 on where the logging configuration will be transmitted. |

In addition, Ericsson paper [2] also provides argument for support dynamic activation/deactivation of NW side data collection:

|  |
| --- |
| Hence, in order to support the agreement reached in RAN2#129, i.e. “Support the use of L3 measurement event triggered (i.e. L3 serving cell measurements becoming worse/better than a threshold for TTT) to determine whether the UE performs logging or not”, two alternatives might be considered:   1. Include in the CSI measurement configuration, the L3 events that the UE would need to monitor, i.e. the A1/A2 thresholds, and the TTT. 2. Upon receiving an ordinary L3 measurement report (e.g. A1/A2 event-based report), the gNB activates/deactivates or configures/releases the L1 data collection [4]. No changes are foreseen to the legacy signalling of CSI measurement configurations. |

Q1: Do companies think the motivation of supporting dynamic activation/deactivation NW side data collection is valid?

Companies comments on Q1

Proposal 3:...

# Conclusion

In this contribution, we provide our views on RRC framework for NW side data collection . We have the following observations and proposals:

**The proposals will be added after discussion**

# References

1. R2-2503849 Discussion on NW side data collection framework ZTE Corporation, Apple, MediaTek, OPPO, Samsung, Lenovo, Xiaomi, CMCC, China Telecom, vivo, NTT DOCOCMO discussion
2. R2-2504644 Discussion on NW-side data collection framework Ericsson, Nokia, Huawei, T-Mobile USA, BT Plc. Discussion

[3] R2-2503590 Consideration on NW side data collection CATT discussion