**3GPP TSG RAN Meeting #109 RP-25xxxx**

**Beijing, China, Sep. 15-18, 2025**

## Status Report to TSG

**Agenda item:** 9.5.2

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| **WI / SI Name** | Study on AI (Artificial Intelligence)/ML (Machine Learning) for mobility in NR |
| included in this status report | Study Item: Yes | Core part: No | Performance part:No | Testing part:No |
| **Acronym** | FS\_NR\_AIML\_Mob |
| **Unique ID** | 1020084 |
| **TSG Tdoc of latest approved WI/SI description (if any)** | RP-242393 |
| **Target Completion Date****(indicate if changed)** | Study Item: 09/2025 | Core part: N/A | Performance part: N/A | Testing part: N/A |
| **Overall Completion level** | Study Item: 100% | Core part: N/A | Performance Part: N/A | Testing part: N/A |

Note: Overall completion level percentage numbers should use one of the colors below:

* xx%: Normal progress, no RAN plenary action needed
* xx%: Progress behind schedule, may need RAN plenary intervention. If so, SR should clearly define requested action
* xx%: Progress critically behind, RAN plenary shall intervene. SR should define requested action

**Source:**

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| **Leading WG** | RAN WG2 |
| **Rapporteur** | **Name** | Zhongda Du |
| **Company** | OPPO |
| **Email** | duzhongda@oppo.com |

## 1 Work plan related evaluation

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| **Do you want to modify the time budget for this WI/SI compared to what was endorsed at the last RAN meeting?** | No |

*If you answered No: Then please remove the Excel file from the zip file of this status report.*

*If you answered Yes: Then please fill out the attached Excel template to request a modification of the time budgets for your WI /SI. The Excel table has to be filled out for all affected RAN WGs and up to the target date of the WI/SI. The basis are the endorsed time budgets of the last RAN meeting. Please highlight all changes of the values.
 One time unit (TU) corresponds to ~ 2 hours in the meeting.
 If this status report covers a WI with Core and Performance part, then please have one line for each in the attached Excel table.
 Note: If no Excel table is attached, then this means no time budget change.*

**Additional explanations/motivations for the time budget changes in the attached Excel table:**

## 2. Detailed progress in RAN WGs since last TSG meeting (for all involved WGs)

 NOTE: Agreements and Open issues impacted cross-TSG aspects shall be explicitly highlighted

## 2.1 RAN1

#### 2.1.1 Agreements

#### 2.1.2 Remaining Open issues

## 2.2 RAN2

#### 2.2.1 Agreements

Agreements in RAN2#131 meeting:

**Agreements on L3 beam-level prediction**

* For RRM measurement prediction, L3 beam-level prediction is feasible for network sided model. CB after spec impact/overhead etc on the different cases.
* For RRM measurement prediction, L3 beam-level prediction is feasible for UE sided model. However, there are concerns on complexity and other WGs.

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| **Agreements**1. Confirm that as a baseline following agreements on applicability reporting in AI-based beam management are applicable for AI mobility:* UE may include “release configuration” flag in applicability reporting to indicate UEs preference to release a non-applicable configuration.
* Introduce a flag in OtherConfig indicating whether applicability reporting via UAI is enabled or disabled.
* When UE indicates that an inference configuration is not applicable, the gNB is expected to release the configuration (i.e., UE autonomous release is not supported).
* 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 predicted values after UE indicates that an inference configuration is not applicable.
* The UE shall report when an inference configuration becomes non-applicable.
* 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.
* Whether Option A and Option B can be configured in the same RRCReconfiguration message with the unified applicability report procedure.
* 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).

NOTE: these agreements will be aligned with AI PHY agreements at the end of this week and will not be re-discussed  |

**Agreements**

1. For the interpretation of “skipping pattern” in temporal domain Case B, RAN2 confirm that it refers to SSB configuration to indicate the timing of NW's SSB transmission—not timing of UE's SSB measurement/skipping.
2. For temporal domain Case A, NW can indicate the list of target cells for which it expects results (if available) as part of inference configuration. This list is optional.
3. For temporal domain case A, one or more instances of predicted measurement results in PW per one cell are reported in one measurementReport message
4. For temporal domain Case B, the inference report can include the latest measurement results (regardless of actual results or predicted results).
5. For frequency domain prediction, the inference report can include the latest measurement results of the predicted cell. (No change to the existing measurement report)
* A monitoring window, a window over which the performance monitoring metric can be calculated, can be configured for performance monitoring. Up to WI on which cases (if any) this monitoring window is needed.

**Agreements**

* Aim for a single framework for event prediction and performance monitoring. From RAN2 point of view indirect event prediction, RSRP differences can be used as the performance metric for monitoring. Capture in the TR that there is no consensus on the feasibility of performance monitoring of the direct event prediction and this would need to be resolved in WI phase before proceeding with specifying direct event prediction.
* What the UE requires to the determine applicability is similar to RRM prediction.

**Agreements**

1 For RRM measurement event prediction, the following are included in the inference configuration:

* The length of PW for the associated AIML model
* Event-related information (event type and event-related parameters)

2 For RRM measurement event prediction, the event prediction report can include:

- RRM measurements (For normative phase to define what types of measurements)

- Time-related information about the predicted event (e.g., the time/window of occurrence)

3 For measurement event determined, when the UE is configured with temporal domain case B, and frequency domain prediction, UE reports measurement event by following an approach similar legacy procedure. This can be achieved without spec impact for measurement reporting. FFS for normative phase if additional information needs to be added.

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| Agreements 1 For request/configuration for UE side data collection, the following in AI/ML PHY agreements are also applied as a baseline for RRM measurement prediction and measurement event prediction for connected mode.* 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
	+ 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.
* Data collection related configuration(s) and associated ID(s)(if needed) can be included in training data collection configuration.
* The network can provide or release the data collection configuration (at any point in time), with or without UE request.
* The following methods for network control of the initiation and configuration for data collection:
	+ The network can decide when to start/stop the data collection and send configuration.
	+ The network can configure whether UE is allowed to initiate request for data collection (e.g. start/stop indication).

 NOTE this can be aligned with AI/ML PHY agreements at the end of this1. For UE-side data collection, UE can perform measurement by re-using MOs configured for legacy RRM measurement.
2. The full list of candidate measurement configuration is not needed for AI mobility.

Capture following options in the TR. Up to normative phase to determine solution. Option 1* Network can configure a set of candidate frequencies the UE can request.
* The UE can indicate a preference for data collection within the set of candidate frequencies.

Option 2* The UE can indicate preferred frequencies for data collection (under network control).

FFS what mechanism to use. UP to normative phase if other information is required.  |

* UE can perform data collection in IDLE/INACTIVE mode without any specification impacts.

**For network sided models for inference:**

1. For cell-level temporal domain Case A, sub-case 2 the following enhancement is considered UE can report “cell-level RRM measurement results at multiple time instances in one measurement report.
2. For other cases there is no specification impact. Can be discussed in WI phase whether any additional enhancements are needed and justified (i.e. multi-instances reporting of beam)

3 Study item can conclude that all scenarios and sub-cases are feasible.

#### 2.2.2 Remaining Open issues

## 2.3 RAN3

#### 2.3.1 Agreements

#### 2.3.2 Remaining Open issues

## 2.4 RAN4

Agreements in RAN4#116 meeting:

**Issue 2-1: Impacts of measurement error on prediction accuracy**

Agreement:

RAN4 to capture the following to model measurement error to consider the impact on prediction accuracy:

* As a baseline:
	+ For BB error, use link level simulation to generate L3-RSRP difference as baseband error.
	+ For RF error model, use a truncated Gaussian distribution.
		- Further discuss in the WI phase either the same or different RF error value may be considered at least for different frequency layers and/or different RF chains.

**Issue 2-2: Relative RSRP accuracy definition**

Agreement:

Relative RSRP accuracy definition

* For intra-frequency L3-RSRP,
	+ Relative accuracy of predicted L3-RSRP = (reported predicted L3-RSRP of cell 1 – reported RSRP of cell 2) – (ground truth of RSRP of cell 1 – ground truth of RSRP of cell 2),
		- cell 1 and cell 2 are on the same frequency
		- the reported RSRP of cell2 can be measured or predicted.
	+ Relative RSRP accuracy for Beam level measurements is FFS during WI phase depending upon RAN2 progress.
* For inter-frequency L3-RSRP,
	+ Relative accuracy of predicted L3-RSRP = (reported predicted L3-RSRP of cell 1 – reported RSRP of cell 2) – (ground truth of RSRP of cell 1 – ground truth of RSRP of cell 2),
		- cell 2 is on a different frequency than cell 1 but in the same FR as cell 1
		- the reported RSRP of cell2 can be measured or predicted.
* Note: It is not precluded to update the definition based on further RAN2 progress in WI phase.

**Issue 3-1: Performance metric for indirect measurement event prediction**

Agreement:

* On top of the agreement made in RAN4 #115, RAN4 to discuss whether/how to define additional performance metrics for indirect measurement event prediction in WI phase.
* Capture the candidate proposals in the WF for information purpose.

**Issue 1-1-1: Testing of Generalization aspects**

**Agreement:**

* Start discussion on the requirement and testing aspects related to the generalization in WI phase.

**Issue 1-1-2: Interoperability**

**Agreement:**

* RAN4 does not identify any interoperability issue which impacts the feasibility.

**Issue 1-1-6:** **LCM related testability aspects**

**Agreement:**

* + Leave the LCM related testing discussion to WI stage after the requirements are clear.

#### 2.4.2 Remaining Open issues

## 2.5 RAN5

#### 2.5.1 Agreements

#### 2.5.2 Remaining Open issues

#### 2.5.3 Remaining Open issues with cross-WG dependencies

## 2.6 RAN6

#### 2.6.1 Agreements

#### 2.6.2 Remaining Open issues

## 3. Detailed progress in SA/CT WGs since last TSG meeting (for all involved WGs)

NOTE: This section only needs to be filled in for WI/SIs where there is a corresponding relevant WI/SI in SA/CT.

## 3.1 SAx/CTs

#### 3.1.1 Agreements with cross-TSG impacts

#### 3.1.2 Remaining Open issues with cross-TSG impacts

NOTE: This section should also flag any critical dependencies that need TSG attention.

## 4. References

NOTE: This can be e.g. a list of all related Tdocs in the affected WGs since last TSG, references to LSs, produced TRs/TSs, the work/study item description or status reports of previous TSGs.

**RAN2 contributions in RAN2#131**

R2-2505114 Discussions on functionality management for RRM measuerment prediction DOCOMO Beijing Labs

R2-2505115 Discussions on data collection for UE sided model DOCOMO Beijing Labs

R2-2505116 Discussions on NW-sided model DOCOMO Beijing Labs

R2-2505128 Discussion on functionality management for RRM measurement prediction vivo

R2-2505129 Recommendation on specification for L3 beam-level prediction vivo, Qualcomm Incorporated, Huawei, HiSilicon, CATT, ZTE, Ericsson, CMCC, NTT DOCOMO, Interdigital

R2-2505130 Discussion on functionality management for RRM measurement event prediction vivo

R2-2505131 Discussion on UE side data collection vivo

R2-2505132 Discussion on NW-sided mode lin AI enhanced mobility vivo

R2-2505151 Discussion on functionality management for RRM prediction Xiaomi

R2-2505152 Discussion on functionality management for event prediction Xiaomi

R2-2505153 Discussion on data collection Xiaomi

R2-2505154 Discussion on NW sided model Xiaomi

R2-2505161 Text proposal of TR 38.744 to capture spec impact\_v15 OPPO

R2-2505184 Text proposal of TR 38.744 on model complexity OPPO

R2-2505185 Text porposal of TR 38.744 on conclusion of AI mobility SID OPPO

R2-2505186 Discussion on functionality management for RRM measurement prediction v3 OPPO

R2-2505187 Discussion on functionality management for measurement event prediction V3 OPPO

R2-2505188 Discussion on data collection for UE sided model-V2 OPPO

R2-2505189 Discussion on LCM procedures of network sided model OPPO

R2-2505190 Discussion on AI/ML performance monitoring for network-sided model KT Corp.

R2-2505216 Functionality management for RRM measurement prediction CATT, Turkcell

R2-2505217 Functionality management for RRM measurement event prediction CATT, Turkcell

R2-2505218 Discussion on UE-sided data collection CATT, Turkcell

R2-2505219 Discussion on Network sided model CATT, Turkcell

R2-2505337 Discussion on UE-side AIML model for RRM measurement prediction NEC

R2-2505347 Discussion on data collection for AI/ML mobility Samsung

R2-2505357 Discussion on functionality management for RRM measurement prediction Samsung

R2-2505358 Discussion on functionality management for RRM measurement event prediction Samsung

R2-2505359 Discussion on Network-sided model Samsung

R2-2505382 Network sided model Ericsson

R2-2505383 Data collection for UE sided models Ericsson

R2-2505440 UE-sided measurement prediction Apple

R2-2505441 Event prediction Apple

R2-2505442 UE-sided data collection Apple

R2-2505443 On network-sided models Apple

R2-2505460 Functionality management for RRM measurement prediction Lenovo

R2-2505461 Functionality management for RRM measurement event prediction Lenovo

R2-2505473 Discussion on Functionality Management for RRM Measurement Prediction MediaTek Inc.

R2-2505474 Discussion on Functionality Management for RRM measurement event prediction MediaTek Inc.

R2-2505475 Discussion on Data Collection for UE-sided Model MediaTek Inc.

R2-2505512 Discussion on functionality management for measurement event prediction CMCC

R2-2505513 Discussion on data collection for UE-sided model CMCC

R2-2505569 Discussion on Functionality management for RRM measurement prediction for UE sided model KT Corp.

R2-2505637 Discussion on NW-side model input Sharp

R2-2505654 UE side Data collection for measurement/ event prediction Sony

R2-2505671 Functionality management for RRM measurement prediction Huawei, HiSilicon

R2-2505672 Functionality management for measurement event prediction Huawei, HiSilicon

R2-2505673 Discussion on UE-side data collection Huawei, HiSilicon

R2-2505674 Discussion on NW-sided model support Huawei, HiSilicon

R2-2505695 Discussion on network sided model Lenovo

R2-2505710 Discussion on functionality management for RRM measurement prediction Spreadtrum, UNISOC

R2-2505711 Discussion on functionality management for RRM measurement event prediction Spreadtrum, UNISOC

R2-2505836 UE-side Model – Functionality Management for RRM Measurement Prediction Ericsson

R2-2505837 UE Sided model – Functionality Management for RRM Event Prediction Ericsson

R2-2505874 Functionality management for UE sided model for RRM measurement prediction Interdigital Inc.

R2-2505875 Functionality management for UE sided model for RRM measurement event prediction Interdigital Inc.

R2-2505876 Data collection for UE sided model Interdigital Inc.

R2-2505877 Network sided model for AI/ML mobility Interdigital Inc.

R2-2505887 Functionality management for RRM measurement prediction for UE-side model Qualcomm Incorporated

R2-2505888 Functionality management for Measurement Event prediction for UE-side model Qualcomm Incorporated

R2-2505889 Data collection for UE-side model Qualcomm Incorporated

R2-2505890 Network-side model Qualcomm Incorporated

R2-2505915 UE-side data collection for AI Mobility Lenovo

R2-2505964 Discussion on RRM measurement prediction with UE sided model CMCC

R2-2505965 Discussion on RRM measurement prediction with NW sided model CMCC

R2-2505984 Functionality Management for AIML Mobility Continental Automotive

R2-2506006 Discussion on Functionality management for RRM measurement event prediction NEC

R2-2506007 Discussion on AIML mobility for Network Sided Model Performance NEC

R2-2506030 Discussion on functionality management for RRM measurement prediction ASUSTeK

R2-2506031 Discussion on functionality management for measurement event prediction ASUSTeK

R2-2506126 Discussion on functionality management for RRM measurement prediction ZTE Corporation

R2-2506127 Discussion on functionality management for measurement event prediction ZTE Corporation

R2-2506128 Discussion on data collection for UE side model ZTE Corporation

R2-2506129 Discussion on AI mobility for network side model ZTE Corporation

R2-2506133 Considerations on network-sided model Nokia, Nokia Shanghai Bell

R2-2506134 Functionality management for measurement event prediction Nokia

R2-2506135 Functionality management for RRM measurement prediction Nokia

R2-2506136 Data collection for UE-sided model Nokia

R2-2506164 Discussion on NW-side model input Sharp

R2-2506177 Discussion on UE-sided Model Functionality Management Sharp

R2-2506180 Discussion on performance monitoring Sharp

**RAN4 Contributions in RAN4#116**

R4-2509057 Topic summary for [116][214] FS\_NR\_AIML\_Mob\_Part1 Moderator (Nokia)

R4-2509058 Topic summary for [116][215] FS\_NR\_AIML\_Mob\_Part2 Moderator (OPPO)

R4-2509302 Discussion on impacts of AIML RRM measurement prediction on RRM requirements CATT

R4-2509303 Discussion on impacts of AIML measurement event prediction on RRM requirements CATT

R4-2509304 Discussion on testability and interoperability issues for AIML mobility CATT

R4-2509431 General aspects on AI/ML for mobility in NR Apple

R4-2509432 On RAN4 Impacts for RRM measurement prediction in AIML Mobility Apple

R4-2509433 On RAN4 Impacts for Measurement Event Prediction in AIML Mobility Apple

R4-2509434 Testability and Interoperability Issues for AIML Mobility Apple

R4-2509645 Discussion on testability and interoperability for AI/ML mobility Tejas Network Limited

R4-2509646 Study of RAN4 impacts for RRM measurement prediction for AIML mobility in NR Tejas Network Limited

R4-2509672 TP on RAN4 aspects for TR 38.744 OPPO, Nokia

R4-2509673 Study of impacts on RAN4 requirements for RRM measurement prediction OPPO

R4-2509674 Study of impacts on RAN4 requirements for measurement event prediction OPPO

R4-2509675 Study of testability and interoperability for AI mobility OPPO

R4-2509750 Discussion of RAN4 impacts for RRM measurement prediction LG Electronics Inc.

R4-2509763 Discussion on impacts on RAN4 requirement for RRM measurement prediction in AI mobility Xiaomi

R4-2509764 Discussion on impacts on RAN4 requirement for measurement event prediction in AI mobility Xiaomi

R4-2509773 Discussion on study of testability and interoperability for AIML mobility Xiaomi

R4-2509922 On RAN4 Impacts for RRM measurement prediction in AIML Mobility Nokia

R4-2509923 On RAN4 Impacts for Measurement Event Prediction in AIML Mobility Nokia

R4-2509924 On General aspects in AIML Mobility Nokia

R4-2510106 Discussion on general aspects for AI mobility MediaTek Inc.

R4-2510107 Discussion on RAN4 impacts for measurement event prediction MediaTek Inc.

R4-2510108 Discussion on testability and interoperability of AI mobility MediaTek Inc.

R4-2510167 Discussion on general part for AI/ML for mobility CMCC

R4-2510168 Discussion on RAN4 impacts for RRM measurement prediction CMCC

R4-2510169 Discussion on RAN4 impacts for measurement event prediction CMCC

R4-2510170 Discussion on testability and interoperability for AI/ML for mobility CMCC

R4-2510443 Discussion on the interoperability and testability aspects ZTE Corporation, Sanechips

R4-2510444 Study of RAN4 impacts for RRM measurement prediction ZTE Corporation, Sanechips

R4-2510445 Discussion on General Aspects of AIML Mobility ZTE Corporation, Sanechips

R4-2510446 Discussion on impacts for measurement event prediction ZTE Corporation, Sanechips

R4-2510486 Discussion on general aspects for AI mobility vivo

R4-2510487 Discussion on RAN4 impacts for RRM measurement prediction vivo

R4-2510488 Discussion on RAN4 impacts for measurement event prediction vivo

R4-2510489 Discussion on testability and interoperability for AI mobility vivo

R4-2510577 Discussion on genereal aspects in AIML mobility Huawei, HiSilicon

R4-2510578 Discussion on impacts for RRM measurement prediction Huawei, HiSilicon

R4-2510579 Discussion on impacts for measurement event prediction Huawei, HiSilicon

R4-2510580 Discussion on testability and interoperability issues in AIML mobility Huawei, HiSilicon

R4-2510706 Discussions on requirements for RRM measurement prediction on AIML mobility NTT DOCOMO, INC.

R4-2510707 Discussions on requirements for measurement event prediction on AIML mobility NTT DOCOMO, INC.

R4-2510761 Corrections to TP on RAN4 aspects in TR 38.744 Ericsson

R4-2510762 General discussion on AI/ML for mobility Ericsson

R4-2510763 On requirements for RRM measurement prediction for AI/ML based mobility Ericsson

R4-2510764 On requirements for even prediction for AI/ML based mobility Ericsson

R4-2510765 On testing of AI/ML based mobility Ericsson

R4-2511092 Discussion on AI mobility regarding testability and interoperability Samsung

R4-2511223 Testability and Interoperability Issues for AIML Mobility Nokia

R4-2511226 Discussion on AI mobility regarding RAN4 requirements impact Samsung

R4-2511516 Impact of AI based mobility on RRM measurement prediction Qualcomm Incorporated

R4-2511517 Impact of AI based mobility on RRM event prediction Qualcomm Incorporated

R4-2511598 Discussion on testability aspects for AI/ML based mobility Rohde & Schwarz

R4-2512126 Ad-hoc minutes for FS\_NR\_AIML\_Mob Nokia

R4-2512127 WF on FS\_NR\_AIML\_Mob\_Part1 Nokia

R4-2512128 WF on FS\_NR\_AIML\_Mob\_Part2 OPPO

R4-2512160 TP on RAN4 aspects for TR 38.744 OPPO, Nokia