**3GPP TSG RAN WG1 #122 R1-250XXXX**

**Bengaluru, India, Aug 25th – 29th, 2025**

Agenda Item: 8.1

Source: Ad-Hoc Chair (Ericsson)

Title: Session notes for 8.1 Maintenance on Artificial Intelligence (AI)/Machine Learning (ML) for NR Air Interface

Document for: Discussion, Decision



## Maintenance on Artificial Intelligence (AI)/Machine Learning (ML) for NR Air Interface

[122-R19-AI/ML] Email discussion on AI/ML – Juan (Qualcomm)

* To be used for sharing updates on online/offline schedule, details on what is to be discussed in online/offline sessions, tdoc number of the moderator summary for online session, etc

**R1-2506171** Draft CR for TR 38.843 with RAN1 agreements Qualcomm Incorporated

**Agreement**

The Draft CR in R1-2506171 for TR 38.843 is endorsed.

### Specification support for beam management

R1-2505202 Maintenance of Rel-19 AI/ML for beam management Huawei, HiSilicon

R1-2505252 AI/ML based Beam Management Google

R1-2505312 Remaining issues on AI/ML-based beam management CATT

R1-2505367 Maintenance on specification support for beam management vivo

R1-2505425 Maintenance on AI/ML for beam management Xiaomi

R1-2505483 Discussion on maintenance of AI beam management ZTE Corporation, Sanechips

R1-2505530 Remaining issues on AI/ML based beam management Samsung

R1-2505657 Maintenance of AI beam management Ofinno

R1-2505731 On specification for AI/ML-based beam management OPPO

R1-2505785 Maintenance on AI/ML-based beam management Panasonic

R1-2505799 Maintenance on AI/ML Beam Management Nokia

R1-2505814 Maintenance on AI/ML for beam management LG Electronics

R1-2505872 Remaining issues in AI/ML enhancements for beam management Apple

R1-2505928 Remaining issues on specification support for beam management NEC

R1-2505958 Remaining issues on specification support for beam management Fujitsu

R1-2506044 Maintenance on AI/ML specification support for beam management Lenovo

R1-2506050 Discussion on specification support for beam management ETRI

R1-2506074 Maintenance of specification support for beam management CMCC

R1-2506168 Maintenance on Rel-19 AI/ML Beam Management Ericsson

R1-2506172 Specification support for AI-ML-based beam management Qualcomm Incorporated

R1-2506246 Remaining issues on specification support for beam management Sharp

R1-2506269 Maintenance on AI/ML for beam management NTT DOCOMO, INC.

R1-2506337 Discussion on AIML based beam management ASUSTeK

**R1-2506451**

**Agreement:**

Adopt the following TP for the clarification of ranking information.

**Reason for change:** The description of ranking information for P-CRIs or P-SSBRIs is unclear.

**Summary of change:** Clarify that the ranking information is for P-CRIs or P-SSBRIs.

**Consequences if not approved:** UE cannot generate the ranking information.

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| **TP for TS 38.214 Clause 5.2.1.4.3a P-CRI, P-SSBRI, and P-L1-RSRP reporting**  <omitted texts>  For a *CSI-ReportConfig* with *reportQuantity-r19* set to 'p-cri-r19', 'p-cri-RSRP-r19', 'p-ssb-index-r19' or 'p-ssb-index-RSRP-r19', if *nroftimeinstance-r19* is configured, the UE is configured with *TimeGap-r19* indicating a time gap between a reference time and the earliest time instance of *nroftimeinstance-r19* time instance(s) (defined in slot(s)). If *nroftimeinstance-r19* is greater than 1, the same time gap is considered between two consecutive time instances. The UE considers the reference time to be the slot of the latest one of each CSI-RS/SSB resource, for channel measurement, respective latest CSI-RS/SSB transmission occasion no later than the corresponding CSI reference resource of the CSI report.  For P-CRI or P-SSBRI reporting without P-L1-RSRP, the ranking information of the *nrofreportedpredictedrs-r19* P-CRIs or P-SSBRIs (per time instance, if *nroftimeinstance-r19* is configured) is conveyed by the order of the P-CRIs or P-SSBRIs reported in the CSI report, where the first reported P-CRI or P-SSBRI ranks first.  <omitted texts> |

**Agreement:**

Adopt the following TP for CSI reporting for monitoring.

**Reason for change:** The condition associated with CSI reporting for RS-PAI is unclear.

**Summary of change:** Clarify that the *timeinstanceformonitoring-r19*-thtime instance is used in case of BM-Case2 for condition check. Adding the description on resource mapping methods depending on the size of the set for monitoring is smaller than or the same as the size of Set A.

**Consequences if not approved:** gNB and UE may have different understanding on the condition associated with CSI reporting for RS-PAI.

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| **TP for TS 38.214 Clause 5.2.1.4.3b RS-PAI Reporting**  5.2.1.4.3b RS-PAI Reporting  <omitted texts>  - at least one of the *nrofBestBeamforMonitoring-r19* identified CSI-RS resources, or SS/PBCH Block resources is mapped one of the *nrofreportedpredictedrs-r19* reported P-CRI(s) or P-SSBRI(s)~~,~~ if *nroftimeinstance-r19* is not configured, or for the *timeinstanceformonitoring-r19*-thtime instance if *nroftimeinstance-r19* is configured, of the linked report of the first CSI Reporting Setting, wherein the mapping between CSI-RS resources, or SS/PBCH Block resources of Resource Set for channel measurement of the second CSI Reporting Setting and CSI-RS resources, or SS/PBCH Block resources of Resource Set given by *resourcesForSetA-r19* of the first CSI Reporting Setting is provided by the higher layer parameter *RSMappingtoSetA* in the second CSI Reporting Setting;  - if this condition is met, the transmission occasion is counted as an accurate reference signal prediction instance; otherwise, it is not counted as an accurate reference signal prediction instance;   * determine RS-PAI as the total count of accurate reference signals prediction instance(s), and the UE shall report RS-PAI for the second Reporting Setting, with a -bit field (*M* is given by *nroftransmissionOccasion-r19*).   <omitted texts> |

**Agreement:**

Adopt the following TP in section 5.2.1.6, TS 38.214.

**Reason for change:** The CPU occupation time of the monitoring report is unclear.

**Summary of change:** For UE-sided model, regarding a CSI report with *CSI-ReportConfig* for monitoring, Rel-15 CPU occupation time is reused for CPU occupation time of the CSI report for all types of CSI reports (i.e., AP/SP/P CSI report).

**Consequence if not approved:** The CPU occupation time of the monitoring report is not aligned between the gNB and UE, leading to inefficient CSI report scheduling.

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| **5.2.1.6 CSI processing criteria**  <Unchanged part is omitted>  For a CSI report with *CSI-ReportConfig* with higher layer parameter *reportQuantity* not set to 'none', or a CSI report with *LTM-CSI-ReportConfig*, or *reportQuantity* not set to 'none-bm-r19' or 'none-csi-r19', the CPU(s) (including and/or , for CSI reports with *reportQuantity* set to 'p-cri-r19', 'p-cri-RSRP-r19', 'p-ssb-index-r19', or 'p-ssb-index-RSRP-r19' or 'rs-pai-r19', and CSI reports configured with the higher layer parameter *[RRC\_name-r19]* are occupied for a number of OFDM symbols as follows:  - A periodic or semi-persistent CSI report (excluding an initial semi-persistent CSI report on PUSCH after the PDCCH triggering the report and a semi-persistent CSI report on PUSCH configured with the higher layer parameter *codebookType* set to 'typeII-Doppler-r18' or 'typeII-Doppler-PortSelection-r18') occupies CPU(s) from the first symbol of the earliest one of each CSI-RS/CSI-IM/SSB resource, or each CSI-RS/CSI-IM resource associated with all configured sub-configurations for periodic CSI report corresponding to a *CSI-ReportConfig* that contains a list of sub-configurations provided by *csi-ReportSubConfigToAddModList*, or each CSI-RS/CSI-IM resource associated with all activated/triggered sub-configurations for semi-persistent CSI report corresponding to a *CSI-ReportConfig* that contains a list of sub-configurations provided by *csi-ReportSubConfigToAddModList*, for channel or interference measurement, respective latest CSI-RS/CSI-IM/SSB occasion no later than the corresponding CSI reference resource, until the last symbol of the configured PUSCH/PUCCH carrying the report.  <Unchanged part is omitted> |

Proposal. 3.1.1

Adopt the following TP for 38.212.

**Reason for change:** For NW-sided model, for a *CSI-ReportConfig* with the number of reported RS is the same as the size of the corresponding resource set for channel measurement, the mapping between the reported RSRPs and the resources within the resource set is unclear.

**Summary of change:** Clarify the mapping between the reported RSRPs and the resources within the resource set when the number of reported RS of a *CSI-ReportConfig* is the same as the size of the corresponding resource set for channel measurement.

**Consequence if not approved:** The understanding of resources corresponding to reported RSRPs is not aligned between the gNB and UE.

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| **Table 6.3.1.1.2-8G: Mapping order of CSI fields of one report for CRI/RSRP or SSBRI/RSRP reporting, if *nrofReportedRS* is configured**   |  |  | | --- | --- | | **CSI report number** | **CSI fields** | | CSI report #n | CRI or SSBRI #1 as in Table 6.3.1.1.2-6 | | CRI or SSBRI #2 as in Table 6.3.1.1.2-6, if reported | | … | | CRI or SSBRI # as in Table 6.3.1.1.2-6, if reported | | RSRP #1 as in Table 6.3.1.1.2-6 | | Differential RSRP #2 as in Table 6.3.1.1.2-6, if reported | | … | | Differential RSRP # as in Table 6.3.1.1.2-6, if reported | | NOTE: The value of is configured by the higher layer parameter *nrofReportedRS*. If is equal to the number of SSB/CSI-RS resources in the corresponding resource set for channel measurement, Differential RSRP #m, m= 2, …, , corresponds to the k-th (k=1,…, M-1) SSB/CSI-RS resource in the resource set other than the resource corresponding to CRI/SSBRI#1.    NOTE: The value of is configured by the higher layer parameter *nrofReportedRS*. If is equal to the number of SSB/CSI-RS resources in the corresponding resource set for channel measurement, Differential RSRP #m, m= 2, …, , corresponds to the (m-1)-th SSB/CSI-RS resources in the resource set other than the resource corresponding to CRI/SSBRI#1. | | |  | | |

### Specification support for positioning accuracy enhancement

R1-2505178 Remaining Issues of AI/ML for Positioning Accuracy Enhancement Ericsson Telecom S.A. de C.V.

R1-2505203 Maintenance of Rel-19 AI/ML for positioning accuracy enhancement Huawei, HiSilicon

R1-2505253 AI/ML based Positioning Google

R1-2505313 Remaining issues on AI/ML-based positioning CATT, CICTCI

R1-2505368 Maintenance on specification support for positioning accuracy enhancement vivo

R1-2505484 Discussion on maintenance of AI positioning enhancement ZTE Corporation, Sanechips

R1-2505531 Remaining issues on AI/ML based positioning Samsung

R1-2505732 On specification for AI/ML-based positioning accuracy enhancements OPPO

R1-2505800 Maintenance on AI/ML Positioning Accuracy Enhancement Nokia

R1-2505829 Remaining issues on AI/ML based positioning InterDigital, Inc.

R1-2505873 Remaining issues on Specification support for positioning accuracy enhancement Apple

R1-2505925 Remaining issues on AIML based positioning accuracy enhancement NEC

R1-2506075 Maintenance of specification support for positioning accuracy enhancement CMCC

R1-2506173 Specification support for AI-ML-based positioning accuracy enhancement Qualcomm Incorporated

R1-2506247 Remaining issues on specification support for AI/ML based positioning accuracy enhancements Sharp

R1-2506270 Maintenance on AI/ML for positioning accuracy enhancement NTT DOCOMO, INC.

**R1-2506436**

**Agreement:**

Adopt the text proposal to TS 38.215 v19.0.0 in Section 3 of R1-2505531.

**Agreement:**

For UE-based positioning Case 1, include the IE for Associated ID (i.e., implicit indication of Info #7) in higher layer parameter list to RAN2.

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|  | **Sub-feature group** | **RAN2 Parent IE** | **Parameter name in the spec** | **New or existing?** | **Description** | **Value range** | **Per (UE, cell, TRP, …)** |
| **Associated ID for Info #7** | UE-based positioning Case 1 | FFS for RAN2 | AssociatedID-TRP-LocationInfo | New | The associated ID provides implicit indication of Info #7. For given TRP(s), the same associated ID implies that geographical coordinates of the TRP(s) can be understood as consistent by the UE. The associated ID is not expected to provide the real value of Info #7 (i.e., geographical coordinates of the TRP(s) are not disclosed). An associated ID is configured per-cell (e.g., NCGI-r15). Note: Info #7 can be provided either explicitly (as in legacy UE-based DL-TDOA) or implicitly by Associated ID. | FFS for RAN2 (e.g., 0..255) | Per cell |

**Agreement:**

For UE-based positioning Case 1, include the IE for assistance data of Info #1 ~ Info #15 in higher layer parameter list to RAN2.

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|  | **Sub-feature group** | **RAN2 Parent IE** | **Parameter name in the spec** | **New or existing?** | **Description** | **Value range** | **Per (UE, cell, TRP, …)** |
| **Assistance data Info #1 ~ Info #15** | UE-based positioning Case 1 | FFS for RAN2 | (It is up to RAN2 to decide which existing IEs to include for providing Info #1 ~ Info #15) | Existing | LMF can provide UE all assistance information (optional as in legacy) from legacy UE-based DL-TDOA, i.e., Info #1 ~ Info #15 in Table 8.12.2.1.0-1 in 38.305 v18.3.0.  Note: Info #7 can be provided either explicitly (as in legacy UE-based DL-TDOA) or implicitly by Associated ID. | Reuse existing | Per UE |

**Proposal 4.2.2**

Include the IE for Rel-19 enhanced measurement (i.e., UL SRS-TDCT, UL SRS-TDCP in 38.215) in higher layer parameter list to RAN3.

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|  | **Sub-feature group** | **RAN3 Parent IE** | **Parameter name in the spec** | **New or existing?** | **Description** | **Value range** | **Per (UE, cell, TRP, …)** |
| **Rel-19 enhanced measurement** | NG-RAN node assisted positioning Case 3b | ~~TRP Measurement Request Item; Measured Result Item~~ | ~~Rel-19 enhanced channel measurement~~ | New | Rel-19 enhanced channel measurement  Either (a) or (b): (a) UL SRS-TDCT; (b) paired UL SRS-TDCT and UL SRS-TDCP. |  | Per UE |

### Specification support for CSI prediction

R1-2505139 Maintenance for CSI prediction Ericsson

R1-2505151 Text proposal on specification support for AI/ML processing unit FUTUREWEI

R1-2505204 Maintenance of Rel-19 AI/ML for CSI prediction Huawei, HiSilicon

R1-2505254 AI/ML based CSI Prediction Google

R1-2505314 Remaining issues on AI/ML-based CSI prediction CATT

R1-2505369 Maintenance on specification support for CSI prediction vivo

R1-2505426 Discussion on remained issues on AI based CSI prediction Xiaomi

R1-2505485 Discussion on maintenance of AI CSI prediction ZTE Corporation, Sanechips

R1-2505532 Remaining issues on AI/ML based CSI prediction Samsung

R1-2505733 On specification for AI/ML-based CSI prediction OPPO

R1-2505765 Specification support for CSI prediction Quectel

R1-2505801 Maintenance on AI/ML CSI Prediction Nokia

R1-2505815 Maintenance on CSI prediction LG Electronics

R1-2505874 Remaining issues for AI based CSI prediciton Apple

R1-2505934 Remaining issues on specification support for CSI prediction NEC

R1-2505996 Discussion on AI/ML for CSI prediction HONOR

R1-2506076 Maintenance of specification support for CSI prediction CMCC

R1-2506174 Specification support for CSI prediction Qualcomm Incorporated

R1-2506248 Remaining issues on specification support for AI/ML based CSI prediction Sharp

R1-2506271 Maintenance on AI/ML for CSI prediction NTT DOCOMO, INC.

R1-2506338 Discussion on AIML based CSI prediction ASUSTeK

**R1-2506500**

Proposal 2.5-1.

Adopt following TPs for TS38.214 Section 5.2.1.4.6.

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| Reason for change | Based on the agreement, the reported wideband SGCS is the average of SGCS values across all subbands, not directly derived from the average precoder. |
| Summary of change | The definition of SGCS needs to be changed to the average of SGCS values across all subbands. |
| Consequences if not approved | Incorrect capture of the agreement. |
| **TS38.214**  5.2.1.4.6 CSI-PAI reporting  << Unchanged parts are omitted >>  to report CSI-PAI for the second Reporting Setting, the UE shall:  - determine predicted PMI (see Clause 5.2.2.2.10 or Clause 5.2.2.2.11) for each of the subband(s) configured by *csi-ReportingBand* for the -th time instance configured by *timeinstanceforCSImonitoring-r19* in the second Reporting Setting ( , with provided in the first Reporting Setting), based on the CSI prediction performed by the UE using the channel measurement corresponding to the first Reporting Setting,  - determine non-predicted PMI for each of the subband(s) configured by *csi-ReportingBand*, which is corresponding to the -th time instance of the report of the first Reporting Setting, based on the CSI-RS resource(s) in the resource set for channel measurement for the report corresponding to the second Reporting Setting.  - determine non-predicted PMI for each of the subband(s) configured by *csi-ReportingBand*, based on the latest CSI-RS resource transmission occasion, no later than the CSI reference resource of the CSI report, corresponding to the first Reporting Setting  - for , is the RI reported for the CSI report corresponding to the first Reporting Setting, calculate SGCS value(s) as,  ,  ,  where is the predicted precoder represented by predicted PMI for -th layer,  ~~averaged over all the subbands configured by~~ *~~csi-ReportingBand~~*~~,~~ -th subband, and for -th time instance corresponding to the report of the first Reporting Setting, is the precoder represented by non-predicted PMI for -th layer,  ~~averaged over all the subbands configured by~~ *~~csi-ReportingBand~~*~~,~~ -th subband, based on the channel measurement corresponding to the second Reporting Setting, and is the precoder represented by PMI for -th layer and ~~averaged over all the subbands configured by~~ *~~csi-ReportingBand~~* -th subband, corresponds to the subbands configured by *csi-ReportingBand* of the first Reporting Setting, based on the latest CSI-RS resource transmission occasion, no later than CSI reference resource, corresponding to the report of the first Reporting Setting.  << Unchanged parts are omitted >> | |