**3GPP TSG-SA5 Meeting #142-e *S5-222051***

e-meeting, April 04 – 12, 2022 (revision of xx-yyxxxx)

**Source: Intel, Verizon, AT&T, CMCC**

**Title: New SID Study on measurement data collection to support RAN intelligence**

**Document for: Approval**

**Agenda Item: 6.2**

3GPP™ Work Item Description

Information on Work Items can be found at <http://www.3gpp.org/Work-Items>
See also the [3GPP Working Procedures](http://www.3gpp.org/specifications-groups/working-procedures), article 39 and the TSG Working Methods in [3GPP TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm)

Title: **Study on** **measurement data collection to support RAN intelligence**

Acronym: FS\_MEDACO\_RAN

Unique identifier:

{A number to be provided by MCC at the plenary}

Potential target Release: *{Rel-18}*

# 1 Impacts

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Affects: | UICC apps | ME | AN | CN | Others (specify) |
| Yes |  |  | X |  |  |
| No |  | X |  | X |  |
| Don't know | X |  |  |  | X |

# 2 Classification of the Work Item and linked work items

## 2.1 Primary classification

|  |  |
| --- | --- |
|  | Feature |
|  | Building Block |
|  | *Work Task* |
| X | Study Item |

## 2.2 Parent Work Item

|  |
| --- |
| Parent Work / Study Items  |
| Acronym | Working Group | Unique ID | Title (as in 3GPP Work Plan) |
| N/A |  |  |  |

### 2.3 Other related Work Items and dependencies

|  |
| --- |
| Other related Work /Study Items (if any) |
| Unique ID | Title | Nature of relationship |
| 880076 | Study on enhancement for data collection for NR and ENDC | functional framework for RAN intelligence |
| 941110 | Artificial Intelligence (AI)/Machine Learning (ML) for NG-RAN | Normative works of TR 37.817 “Study on enhancement for Data Collection for NR and EN-DC” |

**Dependency on non-3GPP (draft) specification:**

# 3 Justification

5G networks are becoming increasingly complex, as new technologies, such as network densification, network slicing, and other advanced techniques, such as beamforming, mmWave, MR-DC, …, are introduced to extend the capacity while reduce the latency in mobile communication to meet the requirements of demanding applications. However, the existing network automation features, such as Self Organization Network (SON), still need some levels of human intervention. Therefore, the industry is looking into solutions of AI/ML technology to embed intelligence in the RAN.

RAN3 completed the Rel. 17 SI in TR 37.817 “Study on enhancement for Data Collection for NR and EN-DC” that includes the Model Inference function in the RAN node and the Model Training function in OAM. RAN3 has started the normative works with the approval of Rel. 18 WI RP-213602 “New WI: Artificial Intelligence (AI)/Machine Learning (ML) for NG-RAN” where it states that coordination with SA5 is needed to address OAM aspects. TR 37.817 identifies the input and output data needed to be collected by OAM to support AI/ML model training and evaluation for Network Energy Saving, Load Balancing, and Mobility Optimization. The following lists the examples of RAN3 defined data:

* Input data:
	+ From the local node: UE mobility/trajectory prediction, current/predicted Energy efficiency, and predicted own resource status information.
	+ From the UE: UE location information (e.g., coordinates, serving cell ID, moving velocity), UE radio measurement reports (e.g., UE RSRP, RSRQ, SINR measurement, etc), and UE mobility history information.
	+ From neighbour NG-RAN Nodes: current/predicted energy efficiency and resource status, predicted neighbour resource status information, UE’s successful handover information, and UE’s history information from neighbour.
* Output data: predicted energy efficiency and state, selection of target cell for mobility load balancing, UE trajectory prediction (e.g., latitude, longitude, altitude, cell ID of UE over a future period), predicted handover target node, and candidate cells in CHO.

The PM job, MDT/trace, and QoE mechanisms as they currently exist are not capable of collecting input data associated with prediction, history, radio measurement reports, and resource status from UE, the local node and neighboring nodes, and output data from RAN3 defined model inference functions. Therefore, it is necessary to study the mechanism for the collection of measurement data identified by the use cases of Network Energy Saving, Load Balancing, and Mobility Optimization in TR 37.817 for supporting AI/ML functions in OAM. It will study whether the existing management service (e.g., performance assurance, MDT/Trace, QoE) can be reused, or a new management service is needed for the collection of the measurement data from the serving node and neighboring nodes to support the AI/ML-based network energy Saving, load balancing, and mobility optimization functions as defined in TR 38.817.

# 4 Objective

The objectives of this study item include:

* Study the concept, use cases, potential requirements, and possible solutions for collecting measurement data (e.g., the UE measurement data from the serving node / neighboring nodes, and predicted results from RAN nodes) for the use cases of Network Energy Saving, Load Balancing, and Mobility Optimization in TR 37.817 to support AI/ML functions in OAM.

Note: Energy saving, LBO and MRO features in Rel-17 5G EE and SON WIs do not require UE measurements for AI/ML model training in OAM.

* Investigate whether the existing management service (e.g., performance assurance, MDT/Trace, QoE) can be reused, or a new management service is needed for the collection of the measurement data from the serving node and neighboring nodes to be used as input data to AI/ML functions residing in OAM.

This study may need to cooperate with RAN2 and RAN3.

# 5 Expected Output and Time scale

|  |
| --- |
| New specifications {One line per specification. Create/delete lines as needed} |
| Type  | TS/TR number | Title | For info at TSG#  | For approval at TSG# | Rapporteur |
| TR | 28.xyz | Study on measurement data collection to support RAN intelligence | Sep 2022 (SA#97) | Dec 2022 (SA#98) | Joey Chou, Intel, joey<dot>chou<at>intel<dot>com: primary rapporteurQi Sun, CMCC (sunqiyjy<at>chinamobile<dot>com): rapporteur for coordination with RAN2, RAN3 WGs (e.g., use cases, measurement requirements) |

{Note 1: Only TSs may contain normative provisions. Study Items shall create or impact only TRs.
"Internal TR" is intended for 3GPP internal use only whereas "External TR" may be transposed by OPs.}

{Note 2: The first listed Rapporteur is the specification primary Rapporteur. Secondary Rapporteur(s) are possible for particular aspect(s) of the TS/TR. In this case, their responsibility has to be provided as "Remarks".}

|  |
| --- |
| Impacted existing TS/TR {One line per specification. Create/delete lines as needed} |
| TS/TR No. | Description of change  | Target completion plenary# | Remarks |
|  |  |  |  |

# 6 Work item Rapporteur(s)

Chou, Joey, Intel (joey<dot>chou<at>intel<dot>com): primary rapporteur and rapporteur for the new TR.

Qi Sun, CMCC (sunqiyjy<at>chinamobile<dot>com): rapporteur for coordination with RAN2, RAN3 WGs (e.g., use cases, measurement requirements)

# 7 Work item leadership

SA WG5.

# 8 Aspects that involve other WGs

May need cooperation with RAN2 and RAN3 WGs

# 9 Supporting Individual Members

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| --- |
| Supporting IM name |
| Intel |
| Verizon |
| AT&T |
| CMCC |
| Orange |
|  |