**3GPP TSG-SA5 Meeting #155S5-243080**

**Jeju, South Korea, 27 - 31 May 2024** revision of S5-242495

**Source: Nokia, Nokia Shanghai Bell**

**Title:** **TR28.866 pCR add Multi-domain resource optimization use case in MDA management data correlation analytics**

**Document for: Approval**

**Agenda Item: 6.19.2**

# 1 Decision/action requested

***The group is asked to discuss and agree on the proposal.***

# 2 References

[1] 3GPP TR 28.866-000 “Study on Management Data Analytics (MDA) – Phase 3”.

# 3 Rationale

The data from different aspects of the network are correlated, that in many cases real analytics value comes from leveraging the correlation among the data. This pCR is to add an MDA use cases on correlation of data for different uses and from different sources.

# 4 Detailed proposal

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| **1st Change** |

## 5.3 Data correlation analytics

### 5.3.1 Description

This MDA capability is for data correlation analytics on network, computing and slice resources across different aspects consisting of network domains(RAN/ core/ transport), resource domain (network and cloud) and slice / slice subnet aspects.

### 5.3.2 Use case 1: Measurement data correlation analytics for ML training

#### 5.3.2.1 Description

For a ML model training, a large amount of measurement data instances may be collected and does not necessarily add value to training performance. The collected measurement data for ML training can be highly correlated (linear or non-linear), hence there may be high redundancy among the collected measurement data. Hence using all measurement data for a model training (and inference) can be a waste of computing resources and energy. Therefore, it’s necessary to optimise the training data preparation based on the correlation analytics and redundancy information. A correlation analytics may help to detect the redundancy pattern among the measurement data for ML training, such as:

- For a given task (e.g., an analytics, model training), analyses the correlation among the given set of measurement data, the output can be a (much) smaller set of measurement data, with which ML model (re-)training could be much more efficient with limited (or managed) impact to model training performance (comparing to use full set of data). The output may include a recommendation, for example recommendation to optimize measurement data collection for the model training.

- Regularly renew the correlation analytics as time progresses, since the correlation relationship might change; this is especially useful when there is a need to regularly re-train the ML model.

#### 5.3.2.2 Potential requirements

**REQ-MDA-CORE-1:** MDA capability for Measurement data correlation analytics for ML training should include the capability to provide the measurement data redundancy analysis including which measurement data correlate to which measurement data, the rate of redundancy, and recommendation to optimize measurement data collection for the model training.

#### 5.3.2.3 Potential solutions

##### 5.3.2.3.1 Possible solution for measurement data correlation analytics for ML training

* Introduce a data type for measurement data correlation analytics recommendation, called measurementDataCorrelationRecommendation. The data taype can be the contents of the analytics report representing the recommendations from MDA for the measurement data correlation analytics for ML training.
  + The contents of this data type may be a set of 3GPP and non-3GPP recommendations.
* An optional attribute may configure the analytics context in MDARequest. The context may include attributes
  + An optional attribute may indicate the training performance requirement.
  + An attribute may configure the scenario type of correlation as an enumeration.
    - For measurement data correlation analytics, the value may be MEASUREMENTDATACORRELATIONFORMLTRAINING
    - For correlation analytics for NF scaling and dimensioning, the value may be MULTIASPECTRESOURCEOPTIMIZATION

#### 5.3.2.4 Evaluation of solutions

### 5.3.x Use case x: Multi-domain resource optimization (MARO)

#### 5.3.x.1 Description

MDA may provide analytics on different domains of the network, including radio, core and transport domains and on different functions in these domains including physical and virtual network functions. These different domains and functions may be following different architectures ( e.g the split RAN architecture (CU-CP/ CU-UP/ DU).

The behaviour of these network domains and functions may be correlated, requiring that any optimisation actions need to be correlated between these domains or functions. The MDA may need to support a multi-domain resource optimization (MARO) capability that provides information on degree of correlation observed in the data from these network domains / functions.

Consider an example where the performance expectations for end-to-end network slice need to be fulfilled. To fulfil these requirements, the performance at relevant radio network, core network and transport network need to be considered and these different performance data from different domains need to be correlated. The information on the correlation between these domains provided by MARO capability can provide insights on how to fulfil the end-to-end performance expectations.

MARO could also evaluate the related impact of one domain on the other based on which it derives recommendations for how to optimize resources among these domains in a correlated way. For example, to optimize the allocation of load among cells, MARO may provide a report that contains recommendations on changes to be concurrently made to the edge cloud resources hosting the cells functions (CU-CP/ CU-UP/ DU) as well as on the handover parameters of the cells to allow a set of users to be moved among those cells.

##### 5.3.x.2 Potential requirements

**REQ-MDA-MARO-1:** The MnS for MDA should include the capability to provide a report on the coordinated simultaneous optimization actions to be undertaken in multiple network domains including physical and virtual infrastructure.

**REQ-MDA-MARO-2:** The MnS for MDA should have the capability to get data from different domains to prepare the correlation analytics across these domains.

#### 5.3.x.3 Potential solutions

* Enhance the existing data type Recommended3GPPAction to support the recommendations from MDA for the set of simultaneous changes to be made to different domains, including 3GPP recommendations and non-3gpp recommendations. It may introduce a timewindow attribute for a recommended action in the involved domain. A same timewindow for multi-domain may be used for simultaneous opeations and different timewindows may be used for sequencing recommendations operations.

#### 5.3.x.4 Evaluation of solutions

TBD.

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| **End Change** |