**3GPP TSG-SA5 Meeting #157 *S5-246249***

Hyderabad , IN, 14 - 18 October 2024

**Source: Ericsson-LG Co, ZTE, NEC, Nokia, China Mobile**

**Title: PCR TR 28.858 Pre-training Potential Solution and Evaluation**

**Document for: Approval**

**Agenda Item:AIML\_MGT\_Ph2**

# 1 Decision/action requested

***approval***

# 2 References

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 28.105: Artificial Intelligence / Machine Learning (AI/ML) management".

[3] 3GPP TS 28.104: "Management and orchestration; Management Data Analytics".

# 3 Rationale

*Adding Possible solution #2 to clause 5.1.2.4.X, which ensures compatibility with existing standards. Add evaluation description in clause 5.1.3.5.*

# 4 Detailed proposal

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| **1nd Change** |

### 5.1.2 ML pre-training

#### 5.1.2.1 Description

Pre-training refers to the process of training a MLModel using a domain-specific related dataset for multiple types of inference. For example, an ML model could be pre-trained with the dataset from SLS analysis capability group covering type of inference including ServiceExperienceAnalysis, NetworkSliceThroughputAnalysis, NetworkSliceTrafficAnalysis, NetworkSliceLoadAnalysis and E2ElatencyAnalysis (see TS 28.104 [3]).

The pre-training is not intended to support a specific aIMLInferenceName but rather focuses on commonality among number of use cases.

The ML model training process defined in TS 28.105 [2] covers pre-training.

#### 5.1.2.2 Use cases

##### 5.1.2.2.1 Consumer requested ML pre-training

The pre-training type follows the standard procedure of ML model training, however the information provided in training request differs.

#### 5.1.2.3 Potential requirements

**REQ-ML\_ TRAIN -****MLPT-1:** The ML training MnS producer shall have a capability to enable an authorized consumer to request a pre-training of an ML model.

Editor note: It is for further discussion if the same requirements in existing TS 28.105 [2] Table 6.2a.1.3-1 related to training function also applies for pre-training.

5.1.2.4 Possible solutions

5.1.2.4.1 Possible solution #1

The exsting MLTrainingRequest IOC and MLModel IOC can be enhanced to support pre-traning.

**Enhancement on MLTraingRequest IOC**: Since the exsting MLTrainingRequest IOC cannot support consumer requested ML pre-training, it is proposed to introduce following attributes into MLTrainingRequest IOC:

* PreTrainingIndication, indicates that the request model is a Pre-training Model. Besides, change the support qualifier of “aIMLInferenceName” to CM, where the condition is that the ML Model requested to train is not a pre-training ML Model.
* PotentialInferenceScope, indicates a set of types of inference, which may include a list of supported aIMLInferenceName.

**Enhancement on MLModel IOC**: Since the pre-training is not aimed to support a specific inference capability but focuses on commonality in use cases, it’s proposed to introduce following attributes:

* PreTrainingModelIndication, indicates the ML Model is a Pre-training Model. Besides, the support qualifier of “aIMLInferenceName” should be changed to CM, which means this attribute should be present when the MLModel MOI represents a Pre-training Model.
* PotentialInferenceScope. Definition is documented above.

5.1.2.4.X Possible solution #2

The exsting MLTrainingRequest IOC and MLModel IOC can be enhanced to support pre-traning.

**Enhancement on MLTraingRequest IOC**: Since the exsting MLTrainingRequest IOC cannot support consumer requested ML pre-training, it is proposed to introduce following attributes into MLTrainingRequest IOC:

* MLTrainingType, indicates the type of training, e.g. initial training, re-training, pre-training, etc.
* PotentialInferenceScope, indicates the inference capabilities. It can be an an NG/RAN capability, MDA capability or any other extension.

**Enhancement on MLModel IOC**:

* PotentialInferenceScope. Definition is documented above.

The existing ML training procedures in TS 28.105 [2] already include all the necessary mechanisms for initial training and re-training an ML model. The existing MLTrainingRequest IOC can be utilized to support pre-training by reusing the defined attribute MLTrainingType, and PotentialInferenceScope which are of type string and allows for one or more values.

#### 5.1.3.5 Evaluation

Potential Solution #2 offers a simpler, more efficient, and flexible approach to pre-training models by reusing existing attributes , IOCs and mechanisms in TS 28.105[2]. It minimizes complexity, aligns with current standards making it the preferred solution over Solution #1.

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| **END of Change** |