**3GPP TSG-SA5 Meeting #141-eS5-221217**

**e-meeting, 17 - 26 January 2022**

**Source: Huawei**

**Title: pCR 28.104 Add description of coordinated analysis**

**Document for: Approval**

**Agenda Item: 6.4.15**

# 1 Decision/action requested

***For approval***

# 2 References

[1] 3GPP TR 28.104 V0.3.0 Management and orchestration; Management Data Analytics (MDA)

# 3 Rationale

Clause 7.2.2.2.2 implies that the MDAS producers are responsible for assuring the throughput performance. This is changed to make it clear that the MDAS producers are responsible for analysing the throughput performance.

Clause 7.2.2.2.2 describes that “The two levels of MDAS producers worked in a coordinated way to assure the throughput performance”, but there is no detail on the meaning of “in a coordinated way”. It is proposed to add text to clause 7.1 to explain the meaning of “in a coordinated way”. This is added to clause 7.1 because the concept is valid for multiple use cases.

# 4 Detailed proposal

This contribution proposes to make the following changes in [1].

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| **1st change** |

##### 7.2.2.1.2 Use case

Service experience of end user is key indicator directly reflects the user satisfaction degree. In 5G system, the diversity of network service are explored and the requirements of different service especially form vertical users are standardized. Considering these diverse requirements (e.g., priorities of SLA related attributes such as latency, throughput, maximum user number or different required values of these attributes), the service experience as a comprehensive indicator is analysed.

Service experience analysis can be for a specific domain or for cross-domain. The two levels of MDAS producers may work in a coordinated way to analyse the service experience. Domain-level MDAS producers analyse the service experience within a specific domain (CN or RAN). Cross-domain MDAS producer may use the domain-level service experience analysis as input to analysis of end-to-end service experience.

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| **2nd change** |

##### 7.2.2.2.2 Use case

Throughput is of great importance which represents the end users' experiences and also reflects the network problems, e.g., low UE throughput may be caused by the resource shortage. In order to satisfy the requirements of dL/ulThptPerSlice in the ServiceProfile, MDAS may be utilized for throughput related analysis/predictions for network slice instance.

MDAS producer should have the capability to receive the request from the consumer to analyse the network slice throughput related issues and identify the root cause to assist throughput assurance.

Network slice throughput analysis can be for a specific domain or for cross-domain. The two levels of MDAS producers may work in a coordinated way to analyse the throughput performance. Domain-level MDAS producers analyse the throughput performance per S-NSSAI within a specific domain (CN or RAN). Cross-domain MDAS producer may use the domain-level analysis of throughput performance as input to analysis of network slice throughput performance.

The producer of MDAS is able to provide the MDA report including the network slice throughput analytics output.

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| **3rd change** |

##### 7.2.2.3.2 Use case

It is desirable to use MDAS to get the network slice traffic predictions including individual traffic predictions on each of the constituent network functions instances present in the network slice. The individual traffic predictions can be used for better resource management of the network slice. For example, resources can be pre-configured considering the predicted traffic on the network slice.

Network slice traffic prediction can be for a specific domain or for cross-domain. The two levels of MDAS producers may work in a coordinated way to predict network slice traffic patterns. Domain-level MDAS producers predict traffic patterns per S-NSSAI within a specific domain (CN or RAN). Cross-domain MDAS producer may use the domain-level analysis of traffic patterns as input to prediction of network slice traffic patterns.

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| **4th change** |

##### 7.2.2.4.2 Use case

E2E latency is an important parameter for URLLC services. User data packets should be successfully delivered within certain time constraints to satisfy the end users requirements. Latency could be impacted by the network capability and network configurations. These factors may be the root cause if the latency requirements cannot be achieved. Packet transmission latency may dynamically change if these factors change. The latency requirement should be assured even if some of the network conditions may degrade. It is important for the MDAS producer to analyze the latency related issues to support SLS assurance.

Latency analysis can be for a specific domain or for cross-domain. The two levels of MDAS producers may work in a coordinated way to analyse latency. Domain-level MDAS producers analyse latency within a specific domain (CN or RAN). Cross-domain MDAS producer may use the domain-level latency analysis as input to analysis of end-to-end latency.

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| **5th change** |

##### 7.2.2.5.2 Use cases

Network slice load may vary during different time periods. Therefore, network resources allocated initially could not always satisfy the traffic requirements, for example, the network slice may be overloaded or underutilized. Overload of signalling in control plane and/or user data congestion in user plane will lead to underperforming network. Besides, allocating excessive resources for network slice with light load will decrease resource efficiency.

The analysis of network slice load should consider the load of services with different characteristics (e.g., QoS information, service priority), load distribution to derive the corresponding resource requirements. Load distribution analytic result may be provided, e.g., load distribution for network slices, different locations and/or time periods etc.

Traffics and resources related performance measurements and UE measurements can be utilized by MDAS producer to identify degradation of the performance measurements and KPI documented in an SLS due to load issues, e.g., radio resource utilization. MDAS producer may further provide recommendations to the network slice load issue. This analytics results can be considered as an input to support SLA assurance to perform further evaluation.

Network slice load analysis can be for a specific domain or for cross-domain. The two levels of MDAS producers may work in a coordinated way to analyse network slice load. Domain-level MDAS producers analyze load per S-NSSAI within a specific domain (CN or RAN). Cross-domain MDAS producer may use the domain-level analysis of load as input to analysis of network slice load.

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| **6th change** |

There are multiple types of faults in the 5G system and it needs extensive troubleshooting. In order to reduce network and service failure time and performance degradation by faults, it is necessary to supervise the status of various network functions and resources, and predict the running trend of network and potential faults to intervene in advance.

Due to the fact that fault prediction could depend on the existing alarm incidents and relevant historical and real-time data (performance measurement information, configuration data, network topology information, etc.), there is a possibility for MDA to be used in conjunction with AI/ML technologies for model training and potential faults prediction.

In order to avoid the occurrence of faults and abnormal network states, it is necessary for users to obtain the required details of potential fault and the corresponding degradation trend (abnormal KPI, performance measurement information, possible alarm type, fault root cause, etc,). Therefore, MDA, may in conjunction with AI/ML technology, be required to obtain basic health maintenance knowledge (e.g., the relationship between the faults or potential faults and the related maintenance actions) through predefined expertise or model training, so as to effectively predict potential faults. The basic health maintenance knowledge could be updated with feedback.

Fault prediction analysis can be for a specific domain or for cross-domain. The two levels of MDAS producers may work in a coordinated way to predict potential faults. Domain-level MDAS producers predict faults in a specific domain (CN or RAN). Cross-domain MDAS producer may use the domain-level fault predictions as input to prediction of cross-domain faults.

If necessary, MDA could provide corresponding recommended actions for fault prevention.

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| **7th change** |

#### 7.2.4.2 Use cases

Operators are aiming at decreasing power consumption in 5G networks to lower their operational expense with energy saving management solutions. Energy saving is achieved by activating the energy saving mode of the NR capacity booster cell or 5GC NFs (e.g., UPF etc). The energy saving activation decision making is typically based on the load information of the related cells/UPFs, the energy saving policies set by operators and the energy saving recommendations provided by MDAS producer. Under the energy saving state, the required network performance and network experience should also be guaranteed. Therefore, it is important to formulate appropriate energy saving policies (start time, dynamic threshold setting, base station parameter configuration, etc.).

To achieve an optimized balance between the energy consumed and the network performance, MDA can be used to assist the MDAS consumer to make energy saving decisions. To make the energy saving decision, it is necessary for MDAS consumer to determine where the energy efficiency issues (e.g., high energy consumption, low energy efficiency) exist, and the cause of the energy efficiency issues. Therefore, it is desirable for MDA to correlate and analyze the energy saving related performance measurements (e.g., PDCP data volume of cells, power consumption, etc.) and the network analysis data (e.g., observed service experience related network data analytics) to provide the analytics results of current network energy efficiency.

To make the energy saving decision, it is necessary for MDAS consumer to determine which EE KPI related factor(s) (e.g., traffic load, end-to-end latency, active UE numbers, etc) are affected or potentially affected. The MDAS producer can utilize historical data to predict the efficiency KPI related factors (e.g., load variation of cells at some future time, etc). The prediction result of these information can then be used by operators to make energy-saving decision to guarantee the service experience.

Energy efficiency analysis can be for a specific domain or for cross-domain. The two levels of MDAS producers may work in a coordinated way to analyse energy efficiency. Domain-level MDAS producers analyse energy efficiency within a specific domain (CN or RAN). Cross-domain MDAS producer may use the domain-level energy efficiency analysis as input to analysis of end-to-end energy efficiency.

The MDAS producer may also provide energy saving related recommendation to the MDAS consumer, The MDAS consumer may take the recommendations into account for making energy saving decisions. After the recommendations have been executed, the MDA producer may start evaluating and further analyzing network management data to optimize the recommendations.

Editor’s Note: The energy saving related recommendation and the current energy saving state of cell are both necessary for consumer. The current energy saving state of cell can be discussed in the future.

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| **End of changes** |