**3GPP TSG-SA5 Meeting #155 *S5-242940***

**Jeju, Korea (Republic Of), 27th May 2024 - 31st May 2024**

**Source: Samsung, DTAG**

**Title: Software Upgrade Validation**

**Document for: Approval**

**Agenda Item: 6.19.2**

# 1 Decision/action requested

***In this box give a very clear / short /concise statement of what is wanted.***

# 2 References

None

# 3 Rationale

This provides the new use case of MDAS.

# 4 Detailed proposal

|  |
| --- |
| **First Change** |

### 5.8.x Use case 1: Software Upgrade Validation

#### 5.8.x.1 Description

Upgrades in the network including software upgrades are typically conducted during less busy times such as night time. Even though the software upgrade task is performed during the night (anticipating that as a lean period), the validation window following the upgrade can be large because it involves a series of pre-and post-checks. These checks include the evaluation of a set of Key Performance Indicators (KPIs). In this process the operations team has to carefully scrutinize hundreds of such KPI's. This team has to monitor trends and detect spikes/falls in the data to find anomalous KPI’s after the NF is upgraded. This whole process of finding outlying KPIs can take anywhere from a few hours to a few days depending upon the circle/area under analysis. Finding root cause of problem by correlating KPI with FM/CM changes and see whether the problem is due to software upgrade has impacted performance.

If the above validation of the software upgrade fails, a neighbour NF is selected to take the load until the re-upgrade and re-validation is done. Typically, it takes weeks or even longer to validate the new software upgrade for the complete network because the upgrade needs to be monitored for weeks before it is considered valid. The validation process requires checking for performance measurements and KPIs for any degrade. If degradation has occurred the validation will be considered as failed, resulting in the re-upgrade making the entire management process inefficient. MDAS analytics can be used to validate the SW upgrade, for a future point of time, right after the upgrade is done. The validation involves monitoring and evaluating the set of Key Performance Indicators (KPIs) with the help of AI/ML technologies to create analytic results that can be used to predict the success or failure of a software upgrade. If the MDAS analytics indicate the unsuccessful upgrade then a neighbour NF can be decided to take the load of the target NF while it goes into re-upgrade and validation cycle.

#### 5.8.x.2 Potential requirements

REQ-SWA-FUN-01: The MDA MnS producer should enable an authorized consumer to request for an analytics report validating a software upgrade.

NOTE: Validation of a software upgrade involves monitoring and evaluating the set of Key Performance Indicators (KPIs) to create analytic results that can be used to predict the success or failure of a software upgrade.

#### 5.8.x.3 Potential solutions

The solution requires collecting the performance data of the target NF (i.e the NF which got software upgraded) analysing it using time series model by deploying appropriate algorithms; and predict the PM data. If the predicted PM data degrades the software upgrade is considered un-successful.

The solution proposes a new MDA type for software upgrade validation.

The analytics scope of this MDA type would indicate the following:

1. The DNs of the NF (NRCellCU, AMF, SMF etc) for which the upgrade validation analytics is requested.

The enabling data for this MDA type would include the following:

1. Performance Data (performance measurement and KPI) for the entities, provided by the analytics scope, as defined in 3GPP TS 28.552 and TS 28.554.
2. Provisioning Data: This refers to the operation state of a cell. It shows whether the cell is Enabled or Disabled for service as defined in 3GPP TS 28.541.
3. Alarm Information: This refers to the active alarm information (AlarmInformation as defined in 3GPP TS 28.532) in the network.

Note: aforementioned data will be collected for the new software.

The analytics output for this MDA type would include the following:

1. UpgradeStatus: This indicates if the upgrade should be considered successful in future. This will be a Boolean attribute with default value as TRUE. The value FALSE indicate the un-successful upgrade

#### 5.8.x.4 Evaluation of solutions