**3GPP TSG-SA5 Meeting #157S5-245415**

**14 - 18 October 2024, Hyderabad, India**

**Source: Nokia, Ericsson,**

**Title:** **pCR 28.915 Conclusions and Recommendations**

**Document for: Approval**

**Agenda Item: 6.19.4**

# 1 Decision/action requested

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

# 2 References

[1] 3GPP TR 28.915 -101 “Study on management aspects of Network Digital Twin”.

# 3 Rationale

TR28.915 has studied several use cases on Network Digital Twin. The study observed that a Network Digital Twin (NDT) is a virtual replica of mobile network or part of one, that captures its attributes, behaviour and interactions. Given the many existing automation capabilities, the study identified that the unaddressed gap in network automation is the capability to model the behavior of the network, a role to be fulfilled by NDTs.

The use cases and corresponding potential requirements and possible solutions included scenarios on where NDTs may be used which is scope of network automation functionality like Management data analytics, SON, closed loops etc. This pCR is to adjust conclusions and recommendations for normative work to describe that normative work should focus on scenarios where the NDTs model network behavior in a way that fulfils the studied NDT utilization use cases among others.

# 4 Detailed proposal

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| **Start of modification** |

# 6 Conclusions and Recommendations

The present document conducted a study on NDT in the present document, which describes the terms and concepts of NDT. The study observed that a Network Digital Twin (NDT) is a virtual replica of mobile network or part of one, that captures its attributes, behaviour and interactions. Given the many existing automation capabilities, the study identified that the unaddressed gap in network automation is the capability to model the behavior of the network, a role to be fulfilled by NDTs.

The present document also identified and documented the use cases and corresponding potential requirements, possible solutions for scenarios on modelling NDTs and where NDTs many be used. These correspond to 4 use cases related to NDTs as means for modelling the behavior of networks, i.e., :

* Generic capabilities and information modelling of NDTs, including Nested NDTs and aspects on NDT support to network automation
* NDT as means for historical analysis, focusing on checking for what happened in a given network scope and how. This includes the use cases on: Visualization of network topology and traffic; measuring customer satisfaction with the network services and some aspects of NDT support to network automation.
* NDT as means for configuration analysis, focusing on checking how a given configuration would impact a network scope. This includes the use cases on Configuration verification; checking if a given solution resolves the Signaling storm; checking the impact of a proposed configuration in support to network automation; Using NDT to generate ML training data.
* NDT as means for Verification, focusing on checking for how a network scope would respond to events within that scope. This includeschecking a scenario, traffic condition, etc, including RAN energy saving policy verification, signaling storm analysis by replicating signaling storm, evaluating emergency preparedness, network failure and risk prediction, network issue inducement, etc.

There are multiple valid and valuable use cases which may benefit from NDT. Solutions are proposed which are based on a new Management Service and associated network resource modelling.

It is recommended for the normative work to:

- Specify the terms, concepts and framework of Network Digital Twin in 3GPP management system

- Specify the use cases, requirements and information elements for NDTs a means for modelling the behavior of networks as derived from the present document to include:

1) Generic capabilities and information modelling of NDTs:

2) NDT as means for historical analysis, focusing on checking for what happened in a given network scope and how.

3) NDT as means for configuration analysis, focusing on checking how a given configuration would impact a network scope.

4) NDT as means for Verification, focusing on checking for how a network scope would respond to events within that scope.

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| **Next modifications** |

Annex A:
PlantUML Code for figures

# A.1 Figure 5.6.3.1-2

@startuml

skinparam ClassStereotypeFontStyle normal

skinparam ClassBackgroundColor White

skinparam shadowing false

skinparam monochrome true

hide members

hide circle

class ManagedEntity <<ProxyClass>>

class CoordinationCCL <<InformationObjectClass>>

class CoordinationProfile <<dataType>>

ManagedEntity "1" \*-- "1" CoordinationCCL: <<names>>

CoordinationCCL "1" -- "\*" CoordinationProfile

note left of ManagedEntity

 Represents the following IOCs:

 Subnetwork or

 ManagedFunction

 end note

note right of CoordinationProfile

 Represents the following capabilities:

 GoalTargetCoordination

 ScopeAssignmentsCoordination

 DirectActionsCoordination

 IndirectTargetsCoordination

 executionTimeCoordination

end note

@enduml

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| **End of modifications** |