**3GPP TSG-SA5 Meeting #162 *S5-253880***

Goteborg, Sweden, 25 - 29 August 2025

**Source: Ericsson Korea Partners Co Ltd**

**Title: Clarify simulation and emulation in 4.1**

**Document for: Approval**

**Agenda item: 6.19.5.1**

**Spec: TS 28.561**

**Version: 1.0.0**

**Work Item: NDT**

**Comments**

The specification frequently refers to the task performed by the NDT as a simulation/emulation task. However, various other techniques can also be used to carry out the required modeling, as listed in clause 4.1.1. We add a NOTE that clarifies that, for simplicity, the document uses the terms "simulation" and "emulation" as generic references to the different techniques that may be employed by the NDT.

Additional editorial improvements have also been made throughout the text.

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Rev1: According to comments received during SA#162, removed the NOTE and added the content as part of clause 4.1.1.

**Proposed Changes**

\* \* \* First Change \* \* \* \*

4.1.1 Digital Twins and Network Digital Twins

**A digital twin** is a software representation of an object or a set of objects for the purpose of modelling some of the characteristics and behaviours of such real-world object(s) or system(s). The digital twin provides support to network management and operations by creating a virtual representation of the corresponding physical network process(es). A digital twin can be created for any physical object, including any objects in communication networks. The digital twin may also be created for a group of objects, e.g. for the sets of network objects that form the RAN segment or the NFs in the Core network.

Accordingly, a digital twin modelling an object, or a set of objects, of a communication network is called **Network Digital Twin.**

Network Digital Twin (NDT) is used as a replica of a mobile network, in order to learn how an actual mobile network would behave in certain scenarios, without causing any changes to the actual mobile network. To provide meaningful results, an NDT needs to model the behaviour of the mobile network, so that the result of the operations on the virtual replica is a good approximatio to the result of similar operations on the actual network. The implementation of an NDT can rely on simulation, emulation, AI-based modelling, or any other technique that enables the NDT to mimic the behaviour of the network. The present document uses the term “simulation/emulation” to refer to any combination of the techniques previously listed.

Thus, the NDT contributes to efficient management of mobile networks, helps to build resilient networks, enables the early deployment of new services, and enhances network quality. For example, with NDT, network operators can verify network behaviour before they apply changes to the real network to prevent unintended behaviour, which contributes to resilient networks and enhancement of network quality. Additionally, network automation function can use NDT to analyze network behaviour, which can contribute to reducing operator’s manual operation and improve management efficiency. NDT may also utilize network automation functions to deliver NDT reports.

4.1.2 Utilizing emulation and/or simulation

The implementation of NDT modelling relies on simulation, emulation or other modelling technologies that enables the NDT to mimic the behaviour of the network.

Simulation implies that the NDT uses a mathematical model to characterize the behaviour of the system. This is used e.g. to model the traffic generated by users in the RAN to model the movement of users, or to model simplified behaviour of a NF. Emulation implies that the NDT uses a realizable object such as software that replaces the live object to characterize the behaviour of at least one aspect of the system. This is used e.g. to replicate or mimic the functionalities of core network functions which are implemented using the real software of NFs.

It is possible to combine emulation and simulation to create an integrated solution. The choice depends on implementation and deployment considerations, and is thus out of scope of this specification.

\* \* \* End of Changes \* \* \* \*