**3GPP TSG-SA5 Meeting #154 *S5-242017d1***

Changsha, China, 15 - 19 April 2024

**Source: China Mobile, Huawei,TIM, ZTE, Ericsson**

**Title: pCR Add terms of NDT for TR 28.915**

**Document for: Approval**

**Agenda Item: 6.19.5**

# 1 Decision/action requested

***The group is asked to discuss and approval.***

# 2 References

[1] 3GPP draft TR 28.915: “Management and orchestration; Study on management aspects of Network Digital Twin v0.1.0”.

[2] SP-231727 "New Study on management aspects of Network Digital Twin"

[3] ITU-T Y.3090: "Digital twin network - Requirements and architecture"

[4] ETSI GS ZSM 015: “Network Digital Twin”

[5] C. Zhou, H. Yang, D. Lopez, A. Pastor, Q. Wu, M. Boucadair, C. Jacquenet, “Digital Twin Network: Concepts and Architecture,” draft-irtf-nmrg-network-digital-twin-arch.

[6] 3GPP draft TS 22.156: “Mobile Metaverse Services; Stage 1”

[7] Thomas Bergs, Sascha Gierlings, Thomas Auerbach, Andreas Klink, Daniel Schraknepper, Thorsten Augspurger, “The Concept of Digital Twin and Digital Shadow in Manufacturing,” Procedia CIRP, Volume 101, 2021, Pages 81-84, ISSN 2212-8271,

# 3 Rationale

Some standardization organizations have also started the digital twin related study and defined the related terms.

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| standardization organizations | definitions |
| ITU-T Y.3090 [3] | digital twin network: A virtual representation of a physical network. It is useful for analysing, diagnosing, emulating and controlling the physical network based on data, model and interface, to achieve the real-time interactive mapping between the physical network and virtual twin network. |
| ETSI GS ZSM 015 [4] | This is not a formal definition, but used in the document.  Network Digital Twin (NDT): a virtual replica of a communications network or part of one.  NOTE 1: Communications network can for example include objects, systems, processes, software or environments of physical network elements and components, virtualized network functions, services and traffic. |
| IETF [5] | Digital Twin: Digital counterpart of a physical system (twin) that captures its attributes, behavior, and interactions and is (continually) updated with the latter's performance, maintenance, and health status data throughout the physical system's life cycle.  Network digital twin: A digital representation that is used in the context of Networking and whose physical counterpart is a data network or enterprise network. This is also called, digital twin for networks. |
| 3GPP draft TS 22.156 [6] | digital asset: digitally stored information that is uniquely identifiable and can be used to realize value according to their licensing conditions and applicable regulations. Examples of digital assets include digital representation (avatar), software licenses, gift certificates, tokens and files (e.g., music files) that have been purchased. This is not an exhaustive list of examples.  digital twin: A real-time representation of physical assets in a digital world.  NOTE 3: This definition was taken from ITU-T Recommendation Y.3090 [3]. |
| Related research paper[7] | Some research institutions have also studied the concepts related to digital twin. The terms given in the research paper [7] are as follows:  - Digital shadow: A digital representation of a physical asset instance.  - Digital twin: An enhancement of a digital shadow to add extra aspects. |

According to the investigation and analysis of the above terms related to network digital twin, there are three options for the definitions in the 3GPP management system.

Option 1: the term given in ZSM is used.

Network Digital Twin (NDT): a virtual replica of a communications network or part of one.

Option 2: Minor changes used in 3GPP system.

Network Digital Twin (NDT): a virtual replica of a communications network or part of one in 3GPP system.

Option 3: a new definition is used.

Network digital twin (NDT): a virtual representation of mobile network or part of one, captures its attributes, behaviour and interactions.

This contribution proposes to choose option 3, adding the new NDT term for TR 28.915 based on SP-231727 [2], which is align with ZSM definition.

# 4 Detailed proposal

It proposes to make the following changes to TR 28.915[1].

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| **1st Change** |

# 3 Definitions of terms, symbols and abbreviations

## 3.1 Terms

For the purposes of the present document, the terms given in 3GPP TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in 3GPP TR 21.905 [1].

**Network digital twin (NDT):** a virtual replica of mobile network or part of one, that captures its attributes, behaviour and interactions.

NOTE: Mobile network includes both RAN and Core.

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| **End of Changes** |