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**Group REPORT**

Zero Touch Network and Service Management (ZSM);

Network Digital Twin

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# Foreword

This Group Specification (GS) has been produced by ETSI Industry Specification Group Zero Touch Network and Service Management (ZSM).

# Modal verbs terminology

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# 1 Scope

This report will describe the Network Digital Twin concept, investigate its applicability for automation of zero-touch network and service management and introduce existing, emerging and future scenarios that can benefit from it.

Principles and functionality needed to support and utilize the Network Digital Twin for zero-touch network and service management will be introduced, considering also state of the art.

The report will outline recommendations of additional capabilities needed in the ZSM framework to support Network Digital Twins.

The report will identify existing specifications and solutions (both ETSI and external ones) that can be leveraged to maximize synergies. Collaboration with other SDOs (e.g. in IRTF NMRG, ITU-T SG13) will be recommended when appropriate.

Editor’s note: TODO: update scope description as document matures.

# 2 References

## 2.1 Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non‑specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

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The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

[i.1] <Standard Organization acronym> <document number><version number/date of publication>: "<Title>".

[i.2] etc.

# 3 Definition of terms, symbols and abbreviations

## 3.1 Terms

For the purposes of the present document, the [following] terms [given in ... and the following] apply:

Editor’s note: TODO: where needed, provide definition of terms aligned with terminology used in industry and literature.

## 3.2 Symbols

For the purposes of the present document, the [following] symbols [given in ... and the following] apply:

## 3.3 Abbreviations

For the purposes of the present document, the [following] abbreviations [given in ... and the following] apply:

# 4 Introduction of Network Digital Twin

Editor’s Note: This clause introduces the concept of Network Digital Twin (NDT).

It describes how the NDT can help with the automation of network and service management and explains the connections to autonomous networks and other related topics.

## 4.1 Concept of Network Digital Twin

Editor’s Note: This clause introduces the concept of network digital twin and show how the definition has evolved over time.

It adds references to other SDOs, which as detailed in Annex A.

It concludes with a definition that fits the scope of ZSM

## 4.2 Benefits of the Network Digital Twin

Editor’s Note: This clause introduces generic benefit that can be obtained by using the NDT.

## 4.3 ZSM Scenarios using the NDT

Editor’s Note: This clause introduces existing, emerging and future scenarios that can benefit from the NDT. References to and more or less detailed description of related work may be part of the sub-clauses of the scenarios, and the principles and functional requirements will be recommended base on existing service or service extensions.

Editor’s note: This clause also introduces new scenarios that can benefit from NDT, may include (not limited to):

Big data playback,

Simulation verification,

Intelligent prediction.

### *4.3.1*  *Predictive analytics*

#### 4.3.1.1 Description

*Describe how the Network Digital Twin is applicable to predictive analytics, such as use real-time and historical data to represent the past and present and simulate predicted futures*.

# 5 NDT for zero-touch Network and Service management

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## 5.1 Principles

Editor’s note: Principles and functionality needed to support and utilize the Network Digital Twin for zero-touch network and service management will be introduced in this section

## 5.2 Recommendations

Editor’s note: This clause describes requirements and recommendations on what/how to use NDT

1. NDT should support the capability to xxx.

# 6 New ZSM Capabilities to support the NDT

Editor’s Note: This clause introduces where the use of network digit twin can be applied in the context of ZSM framework.

The report will outline recommendations of additional capabilities needed in the ZSM framework to support Network Digital Twins.

## 6.1 Introduction

Editor’s Note: This clause explains how the network digit twin can be used in ZSM framework, including NDT in E2E Service Management Domain and NDT in single Management Domain.

## 6.2 Recommendations for additional ZSM capabilities

1. ZSM framework should support the capability to xxx.

# 7 Network Digital Twin enablers

Editor’s Note: In this clause we document enablers that are investigated in this study that may be consider in future normative work….New key technologies

Annex A (informative):
Available output from standard groups or open source programs related to Network Digital Twin

## A.1 IRTF

## A.2 ITU-T

## A.2 IEEE

Annex B (normative):

Annex (informative):
Change History

| Date | Version | Information about changes |
| --- | --- | --- |
| 05-2022 | 0.0.1 | Approval of work item skeleton |
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