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650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - APE 7112B
Association à but non lucratif enregistrée à la
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Contents

Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

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Introduction

The management of the 3GPP network is provided by management services. The service based architecture and interfaces support various management services of vastly different requirements on network configuration, network performance, and network fault supervision. The 3GPP network management architecture evolves supporting operators' design and management of their service oriented networks.

1 Scope

The present document defines the network management and orchestration architecture SBMA for 3GPP networks including network slicing. The use cases and requirements are specified in TS 28.530 [3].
SBMA applies to 5G.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document.*

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] Void

[3] 3GPP TS 28.530: "Management and orchestration of networks and network slicing; Concepts, use cases and requirements".

[4] 3GPP TS 28.541: "Management and orchestration of 5G networks; Network Resource Model (NRM); Stage 2 and stage 3".

[5] 3GPP TS 28.552: "Management and orchestration of 5G networks; Performance measurements and assurance data".

[6] 3GPP TS 28.554: "Management and orchestration of 5G networks; 5G End to end Key Performance Indicators (KPI)".

[7] 3GPP TS 32.425: "Telecommunication management; Performance Management (PM); Performance measurements Evolved Universal Terrestrial Radio Access Network (E-UTRAN)".

[8] 3GPP TS 28.531: "Management and orchestration of 5G networks; Provisioning; Stage 1".

[9] 3GPP TS 28.532: "Management and orchestration; Management services".

[10] 3GPP TS 28.500: "Telecommunication management; Management concept, architecture and requirements for mobile networks that include virtualized network functions"

[11] 3GPP TS 28.510; "Telecommunication management; Configuration Management (CM) for mobile networks that include virtualized network functions; Requirements".

[12] 3GPP TS 28.511; "Telecommunication management; Configuration Management (CM) for mobile networks that include virtualized network functions; Procedures".

[13] 3GPP TS 28.512; "Telecommunication management; Configuration Management (CM) for mobile networks that include virtualized network functions; Stage 2".

[14] 3GPP TS 28.513: "Telecommunication management; Configuration Management (CM) for mobile networks that include virtualized network functions; Stage 3".

[15] 3GPP TS 28.515; "Telecommunication management; Fault Management (FM) for mobile networks that include virtualized network functions; Requirements".

[16] 3GPP TS 28.516: "Telecommunication management; Fault Management (FM) for mobile networks that include virtualized network functions; Procedures".

[17] 3GPP TS 28.517: "Telecommunication management; Fault Management (FM) for mobile networks that include virtualized network functions; Stage 2".

[18] 3GPP TS 28.518: "Telecommunication management; Fault Management (FM) for mobile networks that include virtualized network functions; Stage 3".

[19] 3GPP TS 28.520: "Telecommunication management; Performance Management (PM) for mobile networks that include virtualized network functions; Requirements".

[20] 3GPP TS 28.521: "Telecommunication management; Performance Management (PM) for mobile networks that include virtualized network functions; Procedures".

[21] 3GPP TS 28.522: "Telecommunication management; Performance Management (PM) for mobile networks that include virtualized network functions; Stage 2".

[22] 3GPP TS 28.523: "Telecommunication management; Performance Management (PM) for mobile networks that include virtualized network functions; Stage 3".

[23] 3GPP TS 28.525: "Telecommunication management; Life Cycle Management (LCM) for mobile networks that include virtualized network functions; Requirements".

[24] 3GPP TS 28.526: "Telecommunication management; Life Cycle Management (LCM) for mobile networks that include virtualized network functions; Procedures".

[25] 3GPP TS 28.527: "Telecommunication management; Life Cycle Management (LCM) for mobile networks that include virtualized network functions; Stage 2".

[26] 3GPP TS 28.528: "Telecommunication management; Life Cycle Management (LCM) for mobile networks that include virtualized network functions; Stage 3".

[27] ETSI GS NFV 003: "Network Functions Virtualisation (NFV); Terminology for Main Concepts in NFV V1.3.1 (2018-01)".

[28] Void

[29] ETSI GS ZSM 002: "Zero-touch Network and Service Management (ZSM); Reference Architecture V.1.1 (2019-08)".

[30] 3GPP TS 23.288: "Architecture enhancements for 5G System (5GS) to support network data analytics services".

[31] 3GPP TS 23.501: "System Architecture for the 5G system".

[32] 3GPP TS 28.622: "Telecommunication management; Generic Network Resource Model (NRM) Integration Reference Point (IRP); Information Service (IS)".

[33] IETF RFC 8446: "The Transport Layer Security (TLS) Protocol Version 1.3".

[34] IETF RFC 4253: "The Secure Shell (SSH) Transport Layer Protocol".

[35] 3GPP TS 28.100: "Management and orchestration; Levels of autonomous network".

[36] 3GPP TS 28.533: "Management and orchestration; Architecture framework".

[37] 3GPP TS 28.535: "Management services for communication service assurance; Requirements ".

[38] 3GPP TS 28.536: "Management services for communication service assurance; Stage 2 and stage 3".

[39] 3GPP TS 28.537: "Management and orchestration; Management capabilities".

[40] 3GPP TS 28.538: "Management and orchestration; Edge Computing Management".

[41] 3GPP TS 28.540: "Management and orchestration; 5G Network Resource Model (NRM); Stage 1".

[42] 3GPP TS 28.550: "Management and orchestration; Performance assurance".

[43] 3GPP TS 32.421: "Telecommunication management; Subscriber and equipment trace; Trace concepts and requirements".

[44] 3GPP TS 32.422: "Telecommunication management; Subscriber and equipment trace; Trace control and configuration management ".

[45] 3GPP TS 32.423: "Telecommunication management; Subscriber and equipment trace;Trace data definition and management".

[46] 3GPP TS 28.312: "Management and orchestration; Intent driven management services for mobile networks".

[47] 3GPP TS 28.557: "Management and orchestration; Management of Non-Public Networks (NPN); Stage 1 and stage 2".

[48] 3GPP TS 28.404: "Telecommunication management; Quality of Experience (QoE) measurement collection; Concepts, use cases and requirements".

[49] 3GPP TS 28.405: "Telecommunication management; Quality of Experience (QoE) measurement collection; Control and configuration".

[50] 3GPP TS 28.406: "Telecommunication management; Quality of Experience (QoE) measurement collection; Information definition and transport".

[51] 3GPP TS 28.631: "Telecommunication management; Inventory Management (IM) Network Resource Model (NRM) Integration Reference Point (IRP); Requirements".

[52] 3GPP TS 28.632: "Telecommunication management; Inventory Management (IM) Network Resource Model (NRM) Integration Reference Point (IRP); Information Service (IS)".

[53] 3GPP TS 28.633: "Telecommunication management; Inventory Management (IM) Network Resource Model (NRM) Integration Reference Point (IRP); Solution Set (SS) definitions".

[54] 3GPP TS 28.623: "Telecommunication management; Generic Network Resource Model (NRM) Integration Reference Point (IRP); Solution Set (SS) definitions".

[55] 3GPP TS 32.130: "Telecommunication management; Network sharing; Concepts and requirements".

[56] 3GPP TS 28.310: "Management and orchestration; Energy efficiency of 5G".

[57] 3GPP TS 28.104: "Management and orchestration; Management Data Analytics".

[58] 3GPP TS 28.313: "Self-Organizing Networks (SON) for 5G networks".

[59] 3GPP TS 28.314: "Management and orchestration; Plug and Connect; Concepts and requirements".

[60] 3GPP TS 28.315: "Management and orchestration; Plug and Connect; Procedure flows".

[61] 3GPP TS 28.316: "Management and orchestration; Plug and Connect; Data formats".

[62] 3GPP TS 28.555: "Management and orchestration; Network policy management for 5G mobile networks; Stage 1".

[63] 3GPP TS 28.556: "Management and orchestration; Network policy management for 5G mobile networks; Stage 2 and stage 3".

[64] ETSI GS NFV-IFA008 (V4.3.1): "Network Functions Virtualisation (NFV) Release 4; Management and Orchestration; Ve-Vnfm reference point - Interface and Information Model Specification".

[65] ETSI GS NFV-IFA013 (V4.3.1): "Network Function Virtualisation (NFV); Release 4; Management and Orchestration; Os-Ma-nfvo reference point - Interface and Information Model Specification".

[66] 3GPP TS 28.105: " Management and orchestration; Artificial Intelligence / Machine Learning (AI/ML) management "

[67] 3GPP TS 28.317: "Management and orchestration;Self-configuration of Radio Access Network Entities (RAN NEs) "

[68] 3GPP TS 28.111: "Management and orchestration;Fault management"

[69] 3GPP TS 28.318 "Management and Orchestration; Network and services operations for energy utilities"

[70] 3GPP TS 28.319 "Management and orchestration; Access Control for Management services"

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions 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] or NFV-MANO [27].

Exposure governance management function: Management Function entity with the role of management service exposure governance.

Management Service (MnS): set of offered management capabilities.

Management Function (MnF): logical entity playing the roles of Management Service consumer and/or Management Service producer.

Network Function (NF): defined in TS 23.501[31].

NOTE: In 3GPP NRM, the Network Functions are modeled using ManagedFunction IOCs (e.g. AMFFunction) and its sub-classes.

3.2 Abbreviations

For the purposes of the present document, the abbreviations given in 3GPP TR 21.905 [1], TS 28.530 [3], in NFV-MANO [27] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in 3GPP TR 21.905 [1].

CM	Configuration Management
LCM	Lifecycle Management
MDAS	Management Data Analytics Service
MnF	Management Function
MnS	Management Service
NF	Network Function
NFV-MANO	Network Functions Virtualisation Management and Orchestration
PM	Performance Management
SBMA	Service Based Management Architecture

4 Service Based Management Architecture (SBMA)

4.1 Management Services (MnS)

The fundamental building block of the Service Based Management Architecture (SBMA) is the Management Service (MnS). A MnS is a set of offered capabilities for management and orchestration of network and services. The entity

producing an MnS is called MnS producer. The entity consuming an MnS is called MnS consumer. An MnS provided by an MnS producer can be consumed by any entity with appropriate authorisation and authentication.

An MnS producer offers its services via a standardized service interface composed of individually specified MnS components.

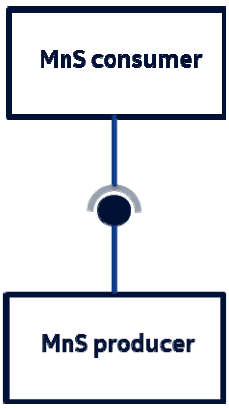

Figure 4.1.1: MnS producer and MnS consumer

4.2 MnS components

4.2.1 Introduction

A MnS is specified using different independent components. A concrete MnS is composed of at least two of these components. Three different component types are defined, called MnS component type A, MnS component type B and MnS component type C. These components are defined in the following clauses.

4.2.2 MnS component type A

The MnS component type A is a group of management operations and/or notifications that is agnostic with regard to the entities managed. The operations and notifications as such are hence not involving any information related to the managed network. These operations and notifications are called generic or network agnostic.

For example, operations for creating, reading, updating and deleting managed object instances, where the managed object instance to be manipulated is specified only in the signature of the operation, are generic.

4.2.3 Management information

4.2.3.1 MnS component type B

MnS component type B refers to management information represented by information models representing the managed entities. A MnS component type B is also called Network Resource Model (NRM).

MnS component type B examples are:

1) Network resource models as defined in TS 28.622 [32].

2) Network resource models as defined in TS 28.541 [4]

4.2.3.2 MnS component type C

MnS component type C is performance information of the managed entity and fault information of the managed entity.

The following are examples of Management service component type C:

1. Alarm information as defined in TS 28.111 [68].

2. Performance data as defined in TS 28.552 [5], TS 28.554 [6] and TS 32.425 [7].

4.2.4 MnS producer profile

A MnS producer is described by a set of meta data called MnS producer profile. The profile holds information about the supported MnS components and their version numbers. This may include also information about support of optional features. For example, a read operation on a complete subtree of managed object instances may support applying filters on the scoped set of objects as optional feature. In this case the MnS profile should include the information if filtering is supported.

4.3 Combination of MnS components

A MnS is composed by a MnS component type A and

- a MnS component type B, or
- a MnS component type B and a MnS component type C.

The instances of management services carry information about specified management service components in the metadata attributes. Figure 4.3.1.illustrates examples of management service instances with various management service components of type A, type B and type C:

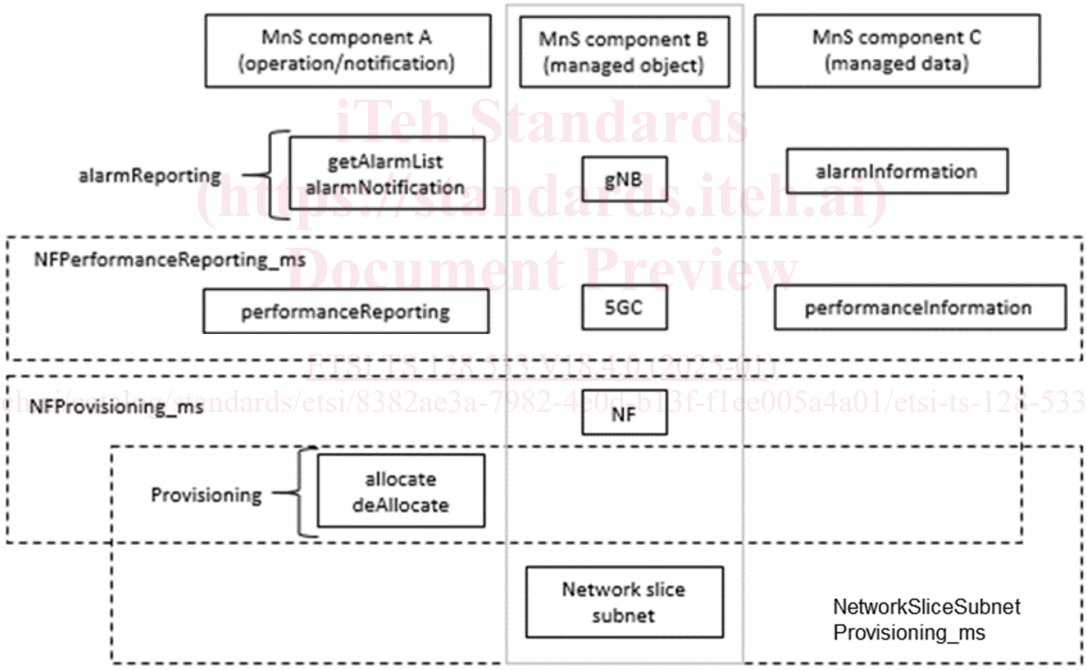

Figure 4.3.1: Example of Management Service and component type A, B and C

4.4 Management capability exposure governance

As precondition for Management Service exposure governance offer, producer of management capability exposure governance should have access to:

An association between information about specified management service components and instances of management services.

NOTE: The detail creation of an association is left for implementation and out of scope of 3GPP standardization.