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Celebrating the 10th Anniversary of ETSI NFV

SA5 Study on Management of Cloud-Native Virtualized Network Functions

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FS_MCVNF



07/03/2023



Content



01 Past collaborations

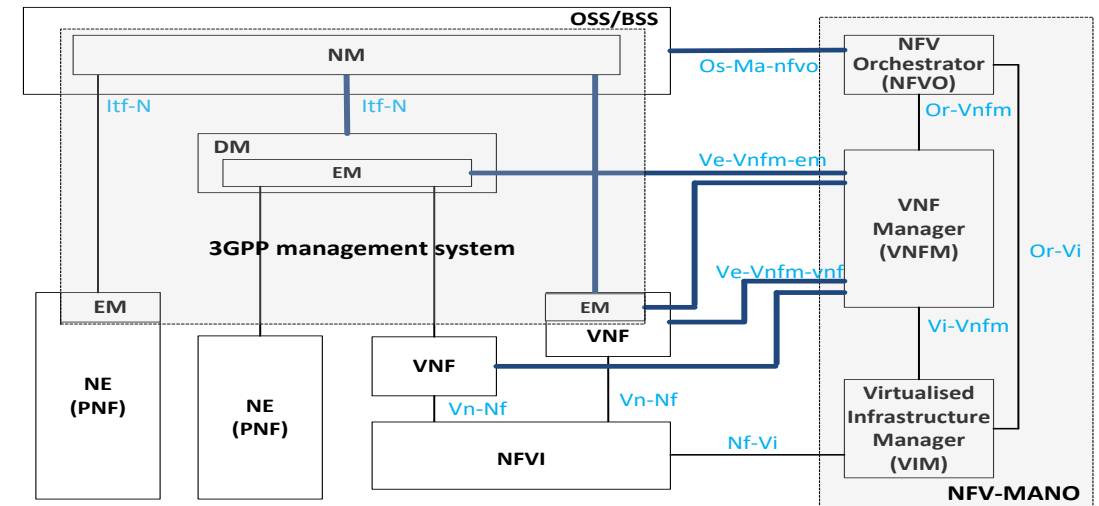
02 SA5 Study on Management of Cloud-Native VNFs

03 Follow-up Plans

Cooperation in the initial phase

- In January 2013, ETSI created the Network Functions Virtualisation (NFV) ISG.
- In October 2013, ETSI NFV ISG published a first package of Group Specifications including Use Cases, Requirements, Architectural Framework and Terminology.

- ✓ In March 2014 : TSG SA#63 concluded the it is now time to study the management aspects of NFV in 3GPP.
- ✓ In June 2014: China Mobile and Huawei jointly initiated the first NFV work item of 3GPP TR28.842.
- ✓ In May 2015: TS 28.500 started specifying the concepts, requirements, use cases and management architecture for mobile networks that include VNFs



The mobile network management architecture mapping relationship between 3GPP and NFV-MANO architectural framework

Achievements of past cooperation



3GPP TS 28.511 V16.0.0 (2020-07)
Technical Specification

3rd Generation Partnership Project;
Technical Specification Group Services and System Aspects;
Telecommunication Management;
Configuration Management (CM) for mobile networks that
include virtualized network functions;
Procedures
(Release 16)

3GPP TS 28.516 V16.0.0 (2020-07)
Technical Specification

3rd Generation Partnership Project;
Technical Specification Group Services and System Aspects;
Telecommunication management;
Fault Management (FM) for mobile networks that include
virtualized network functions;
Procedures
(Release 16)

3GPP TS 28.521 V16.0.0 (2020-07)
Technical Specification

3rd Generation Partnership Project;
Technical Specification Group Services and System Aspects;
Telecommunication management;
Performance Management (PM) for mobile networks that
include virtualized network functions;
Procedures
(Release 16)

TS 28.510-28.513 Configuration Management

TS 28.515-28.518 Fault Management

TS 28.520-28.523 Performance Management

TS28.500

3GPP TS 28.526 V16.0.0 (2020-07)
Technical Specification

3rd Generation Partnership Project;
Technical Specification Group Services and System Aspects;
Telecommunication management;
Life Cycle Management (LCM) for mobile networks that include
virtualized network functions;
Procedures
(Release 16)

3GPP TS 28.311 V0.1.0 (2018-10)
Technical Specification

3rd Generation Partnership Project;
Technical Specification Group Services and System Aspects;
Management and orchestration;
Network policy management for mobile networks based on
Network Function Virtualization (NFV) scenarios
(Release 16)

3GPP TR 32.864 V1.0.0 (2017-09)
Technical Report

3rd Generation Partnership Project;
Technical Specification Group Services and System Aspects;
Telecommunication management;
Study on management aspects of virtualized network
functions that are part of the New Radio (NR)
(Release 15)

TS 28.525-28.528 Life Cycle Management

TS 28.311 policy management

TR 32.864 VNF related NR



20+ 3GPP WI/SI

Realized the coordination and unification of 3GPP network management system and ETSI NFV MANO.

Background of FS_MCVNF

cloud-native virtualized network functions :

- VNF with a full adherence to cloud native principles, or a VNF that is transitioning to cloud native principles in ETSI GS NFV-EVE 011



ETSI GR NFV-EVE019: "Report on VNF generic OAM functions;
ETSI GR NFV-IFA029: "Report on the Enhancements of the NFV architecture towards cloud-native and Paas
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ITU SG13-TD765/WP2: Draft Recommendation ITU-T Y.ccnp-reqts: "Cloud Computing – Functional requirements of Platform as a Service for Cloud Native Applications
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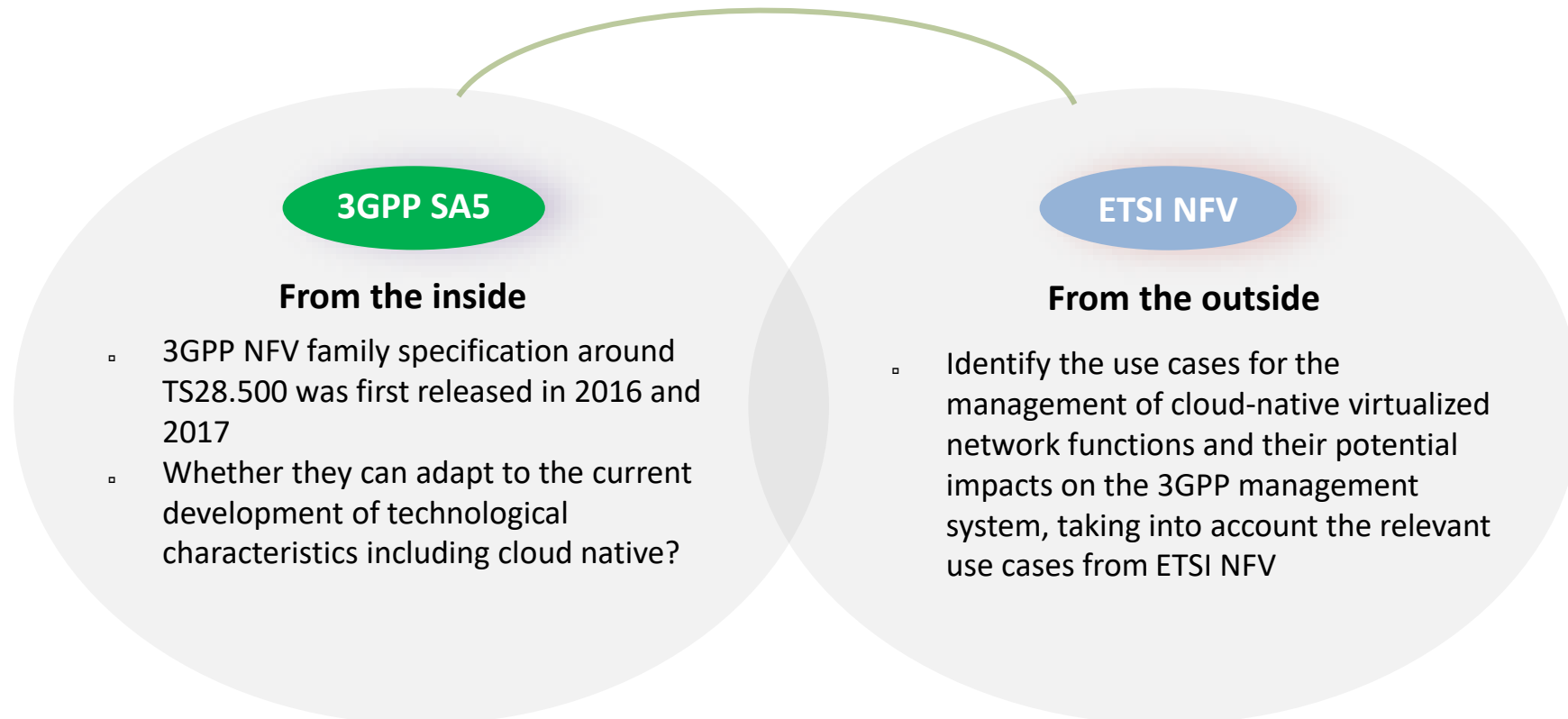
CCSA Cloud Native PaaS Platform Technology Specifications for Telecom Network;
Telecom cloudnative platform architecture and technologyspecifications
.....

- The issue of cloud-native design rules being applied to the solution of communication technology has been extensively studied.
- It is necessary to study the management of virtualized network functions which follow "cloud-native" design principles and the potential impact on the existing 3GPP Management system.

Study direction of FS_MCVNF

At TSG SA#95 in 2022, SID Study on Management of Cloud Native Virtualized Network Functions (FS_MCVNF) was approved

How to work on the FS_MCVNF



Use case overview

The FS_MCVNF (TR 28.834) presents use cases related to the management of cloud-native virtualized network functions, in terms of life cycle management, PM, FM and CM, and some of these use cases are related to VNF generic OAM functions

One type of use cases:

- NF creation as a cloud native VNF
- Scaling of cloud-native VNF
- VNF package update of the cloud-native VNF
- VNF package management of the cloud-native VNF
- Failure of VNFC within cloud-native VNF
- Healing of cloud-native VNF

Another type of use cases :

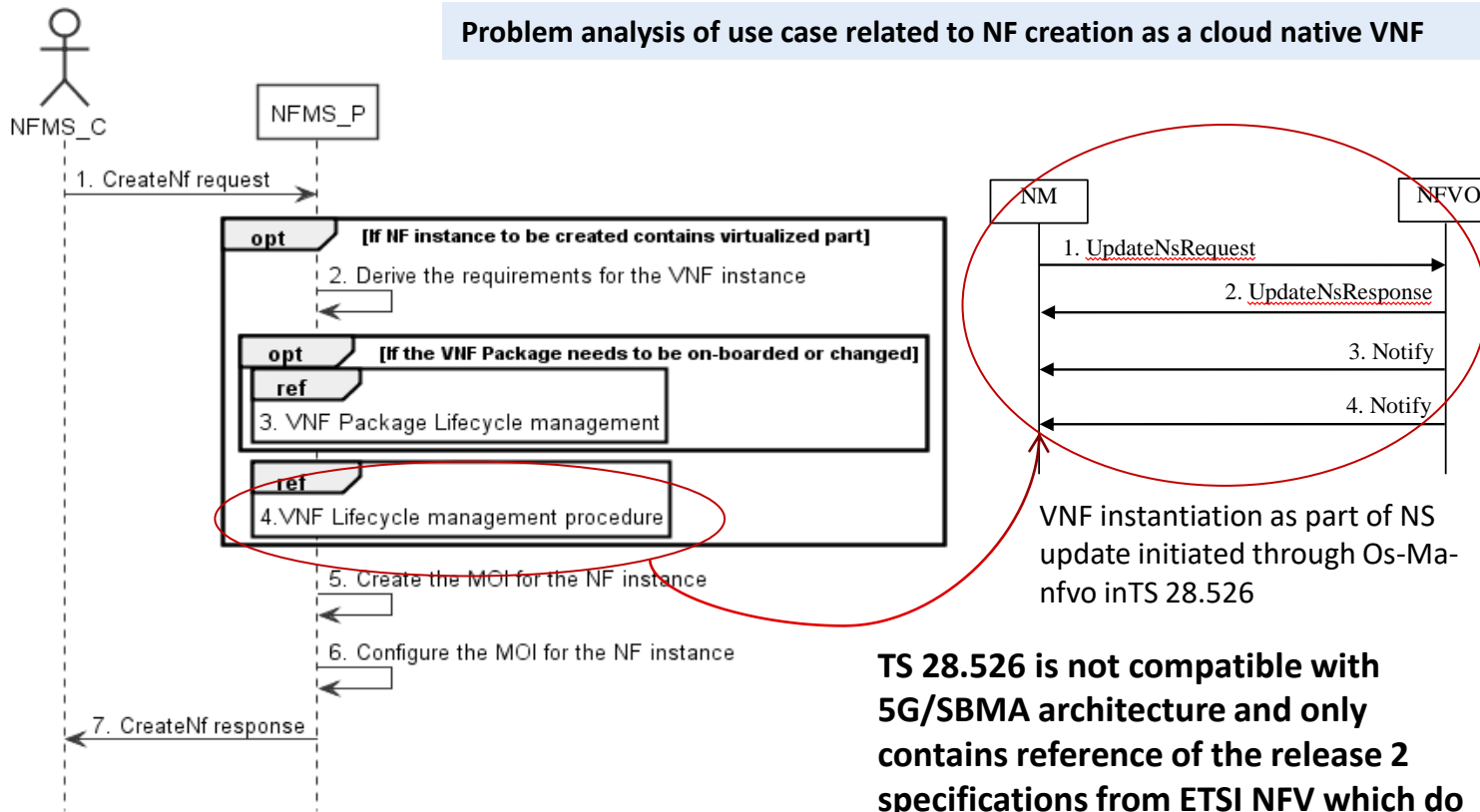
- Configuration of the cloud-native VNF using generic OAM functions
- Traffic management of the cloud-native VNF using generic OAM functions
- Performance monitoring of the cloud-native VNF using generic OAM functions

Generic OAM function in GR NFV-EVE 019 : A function that provides in a generic form OAM capabilities applicable to any kind of VNFs

Typical use case description

Container as a Service is widely applied in the industry and it has the characteristics of both PaaS and cloud-native.
 While 3GPP SA5 specifications do not support cloud native VNF LCM

Problem analysis of use case related to NF creation as a cloud native VNF



Network Function Instance Creation procedure in TS 28.531

VNF instantiation as part of NS update initiated through Os-Ma-nfvo in TS 28.526

TS 28.526 is not compatible with 5G/SBMA architecture and only contains reference of the release 2 specifications from ETSI NFV which do not support containerized VNF LCM.

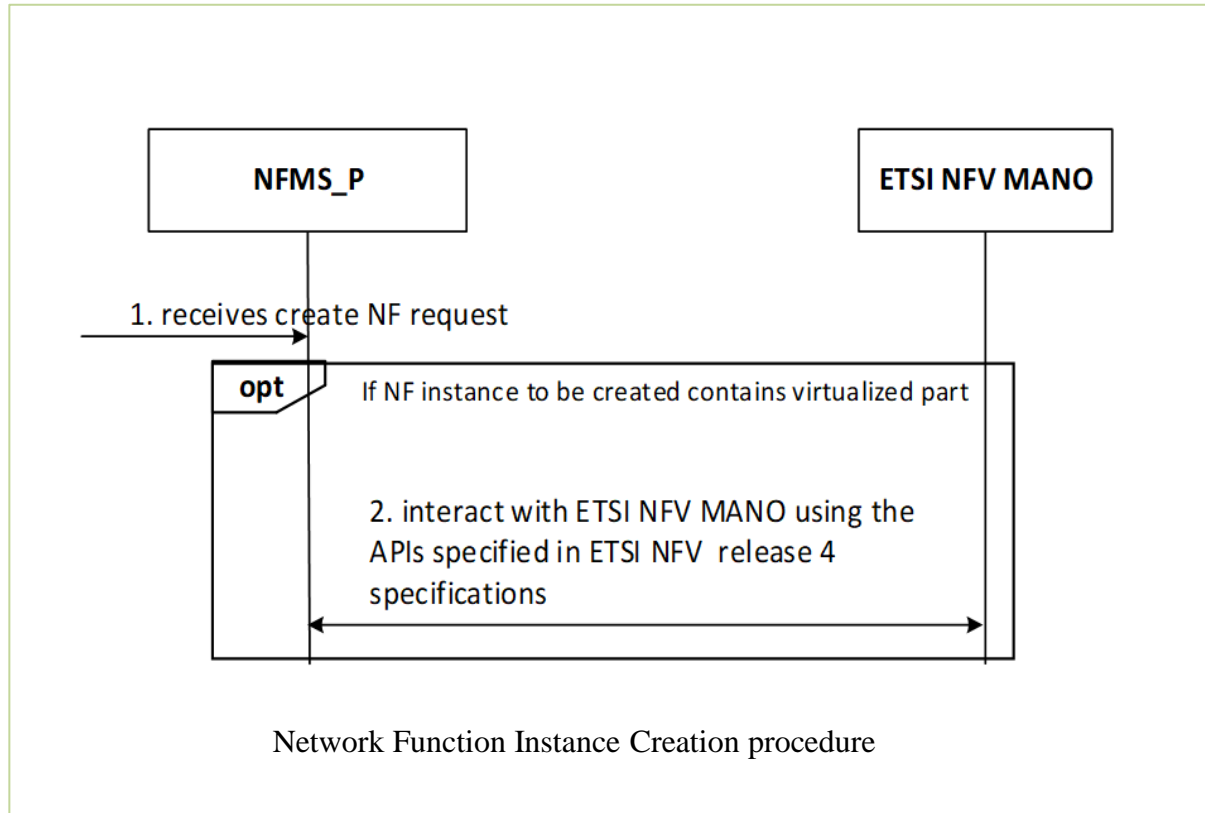
Use cases:

1. The 3GPP management system requests to interact with ETSI NFV MANO for instantiation the VNF.
2. NFV MANO inspects the relevant VNF Descriptor to get the required containerised resource information; NFV MANO will request CISM for containerised resource creation.
3. When the VNF instance has been created, NFV MANO sends a notification to the 3GPP management system to notify the VNF has been instantiated.

Requirements

- The 3GPP management system shall have a capability to interact with ETSI NFV MANO for creation of NF as a containerised VNF

Typical Solution Introduction



Potential solution

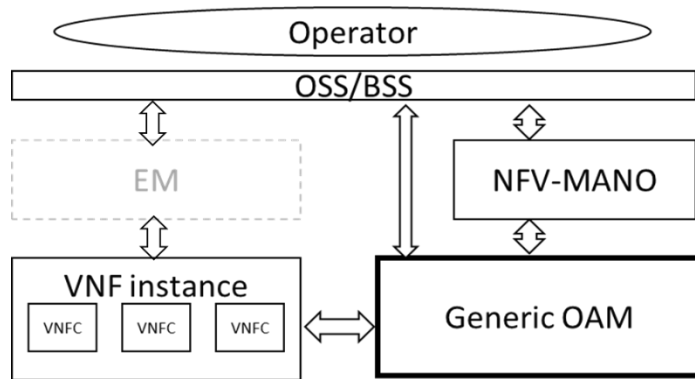
It is proposed that the existing procedure in clause 7.10 in TS 28.531 can be re-used, however the latest Release 4 specifications from ETSI NFV should be used.

1. Network Function Management Service Provider (NFMS_P) receives a create network function request (createMOI) from a consumer.
2. If NF instance to be created contains virtualized part and containerized resource needs to be allocated, NFMS_P interacts with ETSI NFV MANO for VNF instance creation by using the operation produced by ETSI NFV MANO as specified in ETSI NFV release 4 specification.

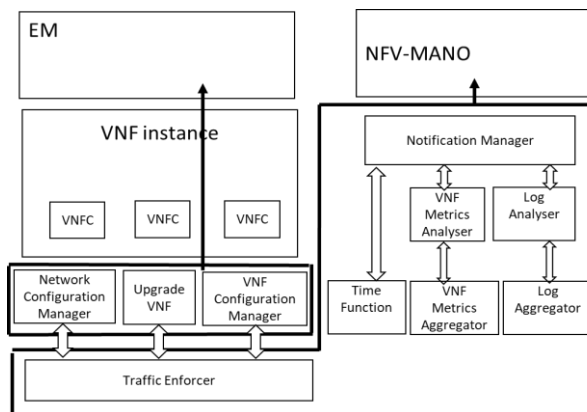
The 3GPP management system shall collaborate with the latest Release 4 specifications from ETSI NFV to support the capability of cloud native VNF management

Background of use case about generic OAM functions

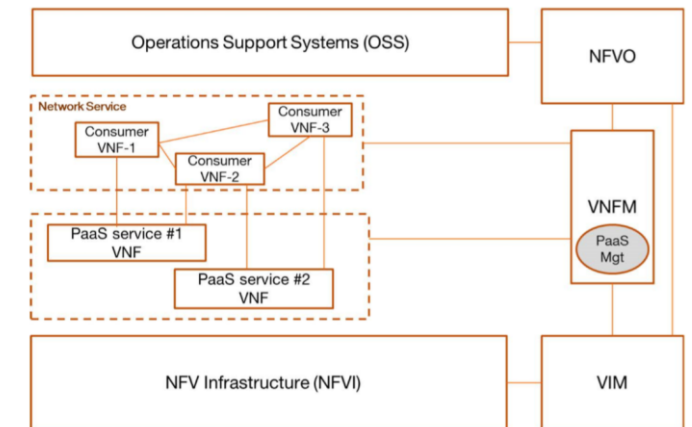
- ETSI GR NFV-EVE019 analyses and defines the type of OAM functions for VNFs that can be generalized and be provided as a “generic function” supporting e.g. the provisioning, connectivity, configuration and monitoring of VNFs on a virtualized platform.
- Three possible solutions to realize such generic OAM functions are described.



Solution A: Introducing generic OAM as a new functional block



Solution B: Extending existing functional blocks for Generic OAM functionality



Solution C: Generic OAM functions as VNF, VNF Common Services are PaaS services hosted by VNFs in IFA029

- Solutions A and C have similar benefits in terms of being independent functional parts and are recommended to be considered for normative work.
- Solutions B does not provide a good separation of concerns between VNF generic OAM functions and existing functional blocks.

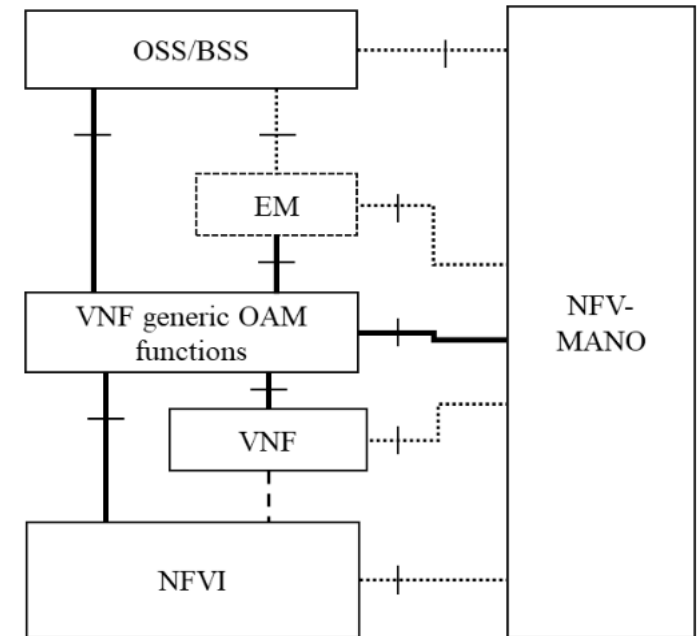
Impacts of use case about generic OAM functions

Potential solution option 1 related to "Solutions A":

- Introducing generic OAM functions of the cloud-native VNF as a new functional block.
- In this scenario, the 3GPP management system shall be able to add related functions for the generic OAM functions life cycle management and have interfaces to interact with them.
- There will be a new touchpoint from OSS/BSS to the Generic OAM functional block.

Potential solution option 2 related to "Solutions C":

- The generic OAM functions of the cloud-native VNF are generalized as VNF.
- In this scenario, the lifecycle management of generic OAM functions can be accomplished by network operators using existing management mechanisms.



VNF generic OAM functions framework in ETSI GS NFV-IFA 049

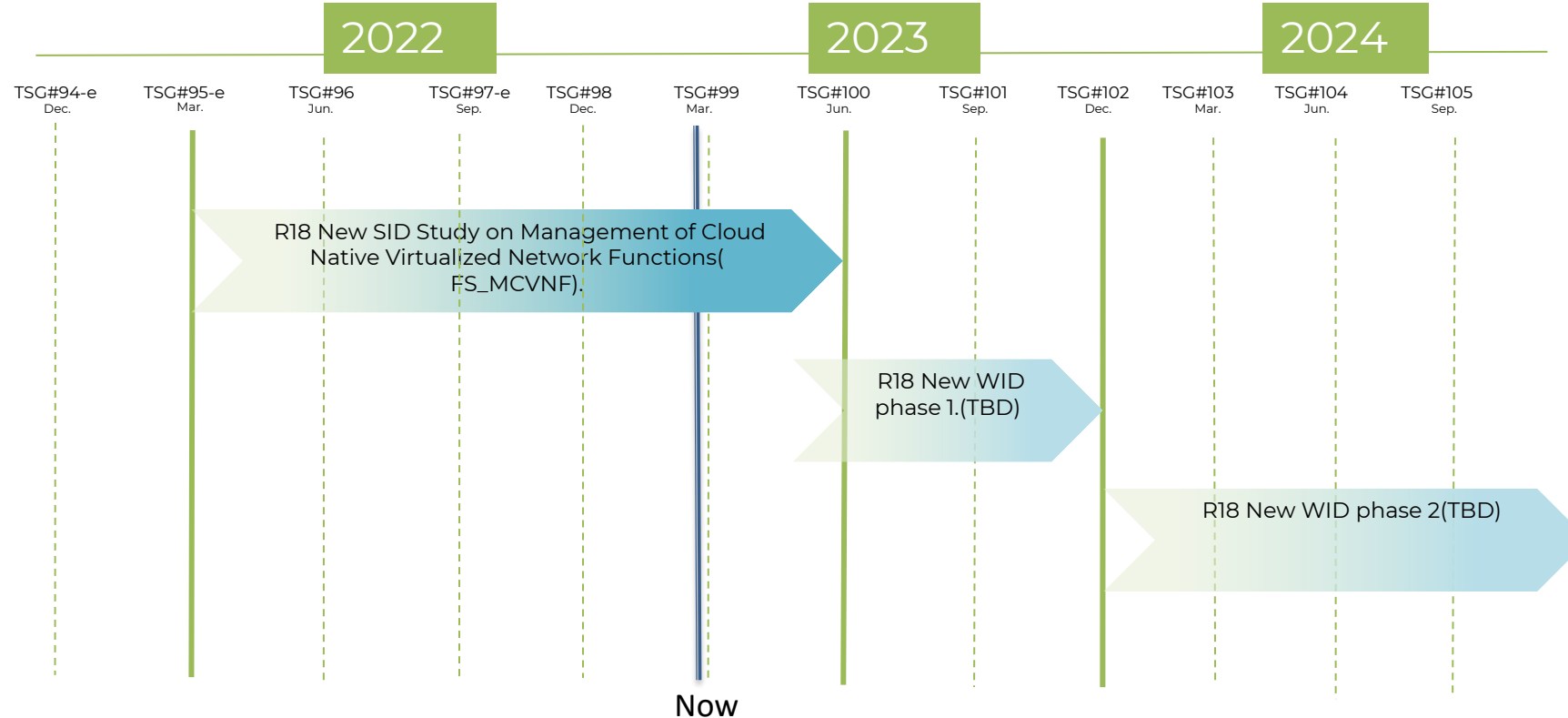
The APIs related to the generic OAM functions have not been published yet as an ETSI NFV solution.

If ETSI NFV publish new APIs as a result of normative work, 3GPP specifications may need to be updated to refer to the new APIs.

Timeline of progress and plans



- TR28.834 studies the use cases, requirements and solutions for the management of cloud-native virtualized network function and the impacts on the 3GPP management system, but the use cases related to generic functions have no definite solution.
- Subsequent normative plan in R18 mainly about specifying management enhancements for the cloud native VNFs by collaborating with the latest Release 4 specifications from ETSI NFV to support the capability of cloud native VNF management.



Thank you!