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Network Functions Virtualisation (NFV) Release 3; Management and Orchestration; Report on Os-Ma-Nfvo reference point - application and service management use cases and recommendations

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Contents

Intellectual Property Rights 7

Foreword 7

Modal verbs terminology 7

1 Scope 8

2 References 8
2.1 Normative references 8
2.2 Informative references 8

3 Definition of terms and abbreviations 8
3.1 Terms 8
3.2 Abbreviations 9

4 Application & service management in NFV context 10
4.1 Introduction 10
4.2 Relation to other NFV group specifications 10

5 General use cases 10
5.1 Introduction 10
5.2 NS lifecycle management in Broadband Network 10
5.2.1 Use case description 10
5.2.2 Trigger 11
5.2.3 Actors and roles 11
5.2.4 Pre-conditions 12
5.2.5 Post-conditions 12
5.2.6 Flow description 12
5.3 NS monitoring in Broadband Network 13
5.3.1 Use case description 13
5.3.2 Trigger 14
5.3.3 Actors and roles 14
5.3.4 Pre-conditions 14
5.3.5 Post-conditions 15
5.3.6 Flow description 15
5.4 Notification about a lack of capacity during NS LCM operation 16
5.4.1 Use case description 16
5.4.2 Trigger 16
5.4.3 Actors and roles 16
5.4.4 Pre-conditions 17
5.4.5 Post-conditions 17
5.4.6 Flow description 17
5.5 Virtual Converged IP Messaging NS deployment 17
5.5.1 Use case description 17
5.5.2 Actors and roles 18
5.5.3 Pre-conditions 18
5.5.4 Post-conditions 18
5.5.5 Flow description 19
5.6 OSS requests an NS instance update from the NFVO 19
5.6.1 Use case description 19
5.6.2 Actors and roles 19
5.6.3 Pre-conditions 20
5.6.4 Post-conditions 20
5.6.5 Flow description 20
5.7 On-board NSD from OSS/BSS 21
5.7.1 Use case description 21
5.7.2 Actors and roles 23
5.7.3 Pre-conditions 23
5.7.4 Post-conditions 23
5.7.5 Flow description 23

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5.8 BSS/OSS Queries VNFs 24
5.8.1 Use case Description 24
5.8.2 Actors and roles 24
5.8.3 Pre-conditions 25
5.8.4 Post-conditions 25
5.8.5 Flow description 25
5.9 BSS/OSS is notified of VNF Package on-boarding 25
5.9.1 Use case Description 25
5.9.2 Actors and roles 25
5.9.3 Pre-conditions 26
5.9.4 Post-conditions 26
5.9.5 Flow description 26
5.10 BSS/OSS Queries NSDs 27
5.10.1 Use case Description 27
5.10.2 Actors and roles 27
5.10.3 Pre-conditions 27
5.10.4 Post-conditions 27
5.10.5 Flow description 28
5.11 NFVO updates BSS/OSS with NSD information after NSD on-boarding 28
5.11.1 Use case Description 28
5.11.2 Actors and roles 28
5.11.3 Pre-conditions 28
5.11.4 Post-conditions 29
5.11.5 Flow description 29
5.12 OSS requests a QoS update in connection with an NSD 29
5.12.1 Use case Description 29
5.12.2 Trigger 30
5.12.3 Actors and roles 30
5.12.4 Pre-conditions 30
5.12.5 Post-conditions 30
5.12.6 Flow description 30
5.13 Instantiate Multiple Concatenated NSs 31
5.13.1 Use case Description 31
5.13.1.1 Introduction 31
5.13.1.2 Parallel vs Sequential NS Instantiation requests 32
5.13.1.3 NS instantiation requests to different NFVOs 32
5.13.1.4 Utilizing an existing NS instantiation 33
5.13.2 Actors and roles 33
5.13.3 Pre-conditions 33
5.13.4 Post-conditions 34
5.13.5 Flow description 34
5.14 Use Case for OSS/BSS instantiation of hybrid PNF/VNF NS 35
5.14.1 Use case Description 35
5.14.2 Actors and roles 37
5.14.3 Pre-conditions 37
5.14.4 Post-conditions 37
5.14.5 Flow description 37
5.15 VNF Configuration from OSS/BSS 38
5.15.1 Use case Description 38
5.15.2 Trigger 40
5.15.3 Actors and roles 40
5.15.4 Pre-conditions 40
5.15.5 Post-conditions 40
5.15.6 Flow description 41
5.16 E2E service healing 41
5.16.1 Use case Description 41
5.16.2 Trigger 42
5.16.3 Actors and roles 42
5.16.4 Pre-conditions 42
5.16.5 Post-conditions 43
5.16.6 Flow description 43
5.17 End to End Service Termination from the OSS/BSS 44

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Full standard:
https://standards.iteh.ai/catalog/standards/sist/e0096053-cea6-46cf-b2b0-a35d1d1f2929/etsi-gr-nfv-ifa-012-v3.1.1-2018-10

5.17.1 Use case Description 44
5.17.1.1 Introduction 44
5.17.1.2 Parallel vs Sequential NS Termination requests 45
5.17.1.3 Network Service Termination requests to different NFVOs 45
5.17.2 Trigger 46
5.17.3 Actors and roles 46
5.17.4 Pre-conditions 47
5.17.5 Post-conditions 47
5.17.6 Flow description 47
5.18 Switching from several active Nsa instances to new NSb instances 48
5.18.1 Use case Description 48
5.18.2 Trigger 48
5.18.3 Actors and roles 48
5.18.4 Pre-conditions 48
5.18.5 Post-conditions 48
5.18.6 Flow description 49
5.19 Deletion of NSD by the OSS 50
5.19.1 Use case Description 50
5.19.2 Trigger 50
5.19.3 Actors and Roles 50
5.19.4 Pre-conditions 50
5.19.5 Post-conditions 50
5.19.6 Flow Description 50
5.20 Deletion of a specific version of NSD by the OSS 51
5.20.1 Use case Description 51
5.20.2 Trigger 51
5.20.3 Actors and Roles 51
5.20.4 Pre-conditions 51
5.20.5 Post-conditions 52
5.20.6 Flow Description 52
5.21 Partial failure of concatenated service instantiation from OSS/BSS 52
5.21.1 Use case Description 52
5.21.2 Trigger 53
5.21.3 Actors and Roles 53
5.21.4 Pre-conditions 53
5.21.5 Post-conditions 53
5.21.6 Base Flow 53
5.22 OSS Requests a NS Scale In 54
5.22.1 Use case Description 54
5.22.2 Trigger 55
5.22.3 Actors and Roles 55
5.22.4 Pre-conditions 55
5.22.5 Post-conditions 55
5.22.6 Flow Description 55
5.23 OSS Copies VNF Package from one NFVO to another NFVO 56
5.23.1 Use case Description 56
5.23.2 Trigger 56
5.23.3 Actors and Roles 56
5.23.4 Pre-conditions 57
5.23.5 Post-conditions 57
5.23.6 Flow Description 57
5.24 Use Case for an Application Function overlaying the NFV Ecosystem 57
5.24.1 Use case Description 57
5.24.2 Trigger 59
5.24.3 Actors and Roles 59
5.24.4 Pre-conditions 59
5.24.5 Post-conditions 60
5.24.6 Flow Description 60

6 Reference point and interface recommendations 60
6.1 Introduction 60
6.2 Recommendations 61

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6.2.1 Test recommendations 61
6.2.2 Notification recommendations 61
6.2.3 Heartbeat recommendations 62
6.2.4 PM Job recommendations 62
6.2.5 Threshold recommendations related to NS Performance Management 62
6.2.6 General interface recommendations for the Os-Ma-Nfvo reference point 63

Annex A (informative): NS Nesting 64

A.1 Overview of Nested NSs 64

A.2 Principles concerning Nested NS 66

A.3 Composite vCDN Example 66

A.4 Virtual Customer Premises Equipment (vCPE) NS Example with Connectivity 67

A.5 Geographically Distributed virtual Content Delivery Network (vCDN) Example 68

Annex B (informative): Authors & contributors 70

Annex C: Bibliography 71

Annex D: Change History 72

History 78

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Full standard:
https://standards.iteh.ai/catalog/standards/sist/09096053-ceab-46ef-b2b0-423bd2d12829/etsi-gr-nfv-ifa-012-v3.1.1-2018-10

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Foreword

This Group Report (GR) has been produced by ETSI Industry Specification Group (ISG) Network Functions Virtualisation (NFV).

Modal verbs terminology

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1 Scope

The present document provides the use cases and recommendations associated with the Os-Ma-nfvo reference point from the perspective of application and service management on top of Network Services (NSs).

2 References

2.1 Normative references

Normative references are not applicable in the present document.

2.2 Informative 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.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

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] ETSI GS NFV 003: "Network Functions Virtualisation (NFV); Terminology for Main Concepts in NFV".

[i.2] ETSI GS NFV-IFA 009: "Network Functions Virtualisation (NFV); Management and Orchestration; Report on Architectural Options".

[i.3] ETSI GS NFV-IFA 010: "Network Functions Virtualisation (NFV) Release 3; Management and Orchestration; Functional requirements specification".

[i.4] ETSI GS NFV-IFA 013: "Network Functions Virtualisation (NFV) Release 3; Management and Orchestration; Os-Ma-Nfvo reference point - Interface and Information Model Specification".

[i.5] ETSI GS NFV-IFA 008: "Network Functions Virtualisation (NFV) Release 3; Management and Orchestration; Ve-Vnfm reference point - Interface and Information Model Specification".

[i.6] ETSI GS NFV-IFA 011: "Network Functions Virtualisation (NFV) Release 3; Management and Orchestration; VNF Descriptor and Packaging Specification".

[i.7] ETSI GS NFV-IFA 014: "Network Functions Virtualisation (NFV) Release 3; Management and Orchestration; Network Service Templates Specification".

3 Definition of terms and abbreviations

3.1 Terms

For the purposes of the present document, the terms given in ETSI GS NFV 003 [i.1] and the following apply:

end-to-end service: service spanning at least two end points which contains one or more Network Services

NOTE 1: End points can be user devices or network functions, virtualised or non-virtualised.

NOTE 2: This definition applies to the NFV context only.

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NS Adjacency: ability for NSs to directly communicate with each other

NOTE 1: A set of NSs that can directly communicate with each other are said to be "adjacent."

NOTE 2: Two NSs are said to directly communicate with each other if there is no intervening NS between the two NSs.

NOTE 3: It is possible to further qualify NS adjacency, e.g. "NS adjacency among the nested NSs within a composite".

NOTE 4: By extension, a composite NS is said to be adjacent to a nested NS if at least one of its constituent NFs communicate with at least one of the constituent NFs of the nested NS.

NS Adjacency Graph: graph that shows adjacency relationships among a set of NSs

NOTE: NS adjacency graphs can be constructed for different purposes such as an adjacency graph for the nested NSs within a composite NS, or the adjacency graph for an NS that is shared by several composite NSs.

3.2 Abbreviations

For the purposes of the present document, the abbreviations given in ETSI GS NFV 003 [i.1] and the following apply:

BSS	Business Support Systems
CFS	Customer Facing Service
CP	Connection Point
CPE	Customer Premises Equipment
CPM	Converged IP Messaging
CSP	Communication Service Provider
DB	DataBase
E2E	End-to-End
EvCPE	Enterprise virtual Customer Premises Equipment
IaaS	Infrastructure as a Service
KPI	Key Performance Indicator
KQI	Key Quality Indicator
LCM	LifeCycle Management
MVNO	Mobile Virtual Network Operator
NID	Network Interface Device
NSD	Network Service Descriptor
OSS	Operational Support Systems
PaaS	Platform as a Service
PE	Provider Edge
PNFD	Physical Network Function Descriptor
QoS	Quality of Service
RFS	Resource Facing Service
SAP	Service Access Point
SLA	Service Level Agreement
SQM	Service Quality Management
vBRAS	virtual Broadband Remote Access Server
vCDN	virtual Content Delivery Network
vCPE	virtual Customer Premises Equipment
vCS	virtual Content Server
VIM	Virtual Infrastructure Manager
vIMS	virtual IP Multimedia Subsystem
VL	Virtual Link
VLD	Virtual Link Descriptor
VNFFGD	VNF Forwarding Graph Descriptor
VRF	Virtual Routing and Forwarding
vVAS	virtual Value Added Service
WIM	Wide area network Infrastructure Manager

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4 Application & service management in NFV context

4.1 Introduction

The present document provides a set of use cases that describe scenarios relating to application and service management associated with an OSS/BSS interacting with the NFVO over the Os-Ma-Nfvo reference point. When an OSS/BSS is managing an application or service that depends on a Network Service or Network Services that are provided by an NFVO, the OSS/BSS will use a combination of operations within the interfaces provided by the NFVO over the Os-Ma-Nfvo reference point to manage those Network Services.

The use cases described in the present document cover scenarios related to NS Creation, NS Monitoring, NS Updating, NS Querying, NS Healing, and NS Scaling in the context of a higher level service. Some of the use cases provide examples of specific application scenarios, such as vIMS, or a virtualised Home Network. Some use cases describe scenarios that attempt to clarify potentially ambiguous uses of the operations defined by the various interfaces provided by the Os-Ma-Nfvo reference point.

The present document also includes recommendations that have been created where a functionality has been identified in the use case that is not presently covered by the interfaces or information models defined in the Os-Ma-Nfvo reference point document ETSI GS NFV-IFA 013 [i.4].

4.2 Relation to other NFV group specifications

The present document is referencing information from the following NFV Group Specifications:

- Management and Orchestration - Report on Architectural Options ETSI GS NFV-IFA 009 [i.2].

The present document provides architectural options that can influence the way some of the Os-Ma-nfvo interfaces are used or might even suggest the need for extension.

- Management and Orchestration - Functional requirements specification ETSI GS NFV-IFA 010 [i.3].

The key functional recommendations from the present document will provide the guidance that might influence the functional requirements defined in ETSI GS NFV-IFA 010 [i.3].

- Management and Orchestration - Os-Ma-Nfvo reference point - Interface and Information Model Specification ETSI GS NFV-IFA 013 [i.4].

The ETSI GS NFV-IFA 013 [i.4] covers the Os-Ma-nfvo reference point, specifying interfaces related to NSs and VNFs. Work on application and end-to-end services done in the present document might directly impact requirements defined for the interfaces and information models within the ETSI GS NFV-IFA 013 [i.4] specification.

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5 General use cases

5.1 Introduction

Some few general use cases will be described. These are a help concerning explorations, descriptions, recommendations and definitions regarding the Os-Ma-nfvo reference point.

5.2 NS lifecycle management in Broadband Network

5.2.1 Use case description

The main goal of this use case is to illustrate how NS lifecycle management related to the Os-Ma-nfvo reference point are used in the context of E2E Service Management.

Based on an order from the order management, OSS sends a request to NFVO to instantiate a NS "Internet" consisting of the following three NSs to establish an E2E service called "Home Internet":

- NS "Internet (Data)" which includes VNF virtual Broadband Remote Access Server (vBRAS), VNF vRouter (Internet Gateway Router)
- NS "Secure Internet Connection" which includes VNF "vFirewall", VNF "vParentControl"
- NS "Video Performance Optimization" which includes VNF "vVideoOptimizer"

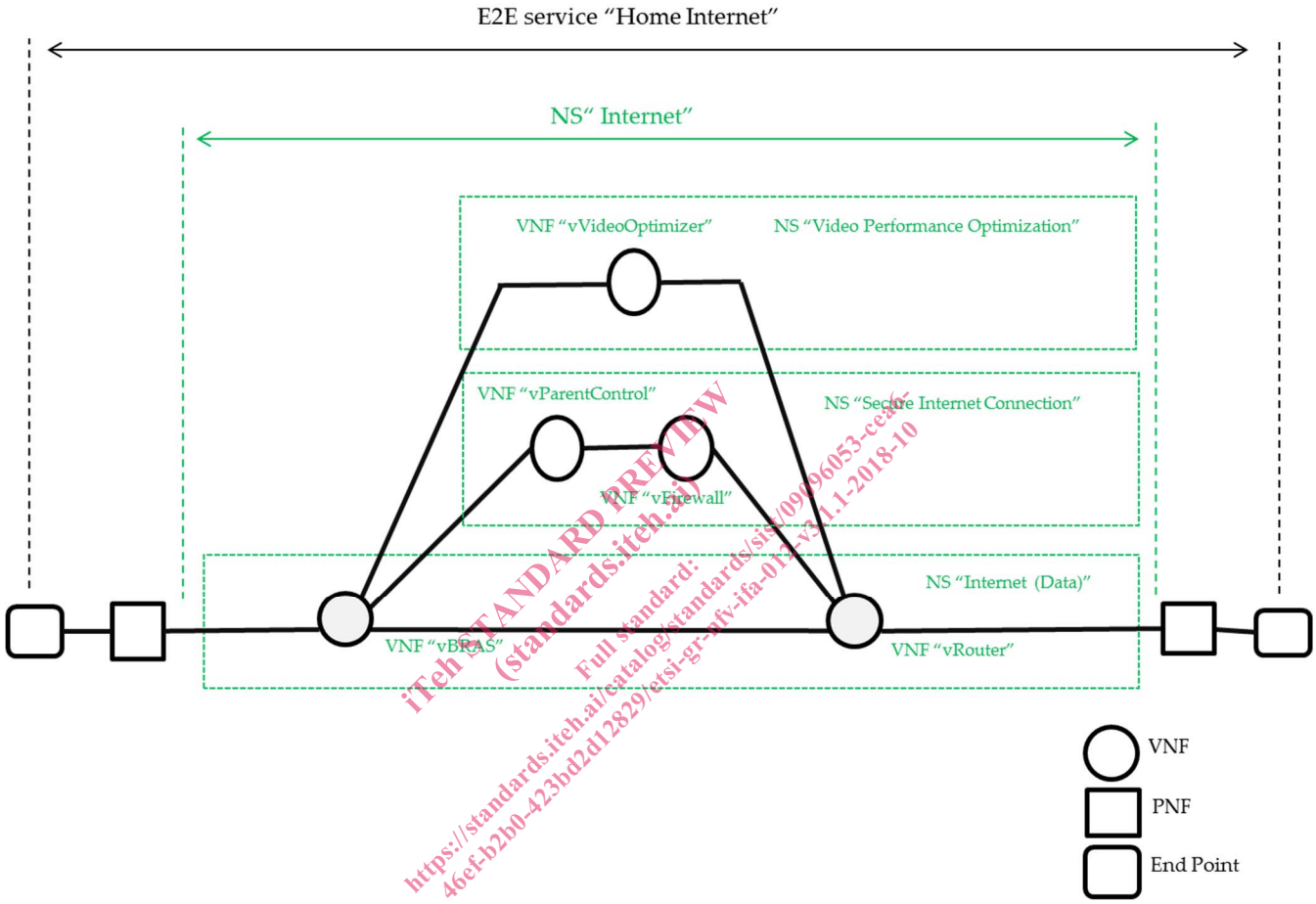

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Figure 5.2.1-1

5.2.2 Trigger

The order management orders an E2E service "Home Internet" with a NS "Internet" consisting of the following three NSs:

- NS "Internet (Data)"
- NS "Secure Internet Connection"
- NS "Video Performance Optimization"

5.2.3 Actors and roles

Table 5.2.3-1 describes the use case actors.

Table 5.2.3-1: Actors and roles

#	Actors and roles
1	Operational Support Systems (OSS) E2E Service Fulfillment
2	NFVO

5.2.4 Pre-conditions

Table 5.2.4-1 describes the use case pre-conditions.

Table 5.2.4-1: Pre-conditions

#	Pre-conditions	Comment
1	Network Service Descriptor (NSD) for NS "Internet" is onboarded.	

5.2.5 Post-conditions

Table 5.2.5-1 describes the use case post-conditions.

Table 5.2.5-1: Post-conditions

#	Post-conditions	Comment
1	The NS "Internet" has been successfully instantiated by NFVO. Afterwards OSS concatenated them with existing access service and Customer Premises Equipment (CPE) in legacy domain (it is out of scope of this use case).	
2	The CSP provides an E2E service "Home Internet" which connects CPE, access service and NS "Internet" consisting of the following three NSs: • NS "Internet (Data)". • NS "Secure Internet Connection". • NS "Video Performance Optimization".	

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5.2.6 Flow description

Table 5.2.6-1 describes the use case flow.

Table 5.2.6-1: Base Flow

#	Actor	Action/Description
1	OSS E2E Service Fulfillment	OSS derives from the service order the appropriate request concerning the NSs, ready to send to the NFVO for fulfillment.
2	OSS E2E Service Fulfillment -> NFVO	The OSS sends an NS "Internet" instantiation request to the NFVO. *Interface - Os-Ma-nfvo*
3	NFVO	Validate the NS instantiation request against the onboarded NSD. This activity verifies the NS request in relation to the corresponding NSD for consistency.
4	NFVO -> Virtual Network Function Manager (VNF Manager)	Request to instantiate the VNFs involved concerning the NS "Internet", and based on the following internal NSs in parallel: • NS "Internet (Data)". • NS "Secure Internet Connection". • NS "Video Performance Optimization". See note. *Interface - Or-Vnfm*
5	NFVO -> VIM	Request to instantiate Virtual Links (VLs), which connect VNFs instances according to the NS "Internet" VNF-FG. *Interface - Or-Vi*
6	NFVO -> OSS E2E Service Fulfilment	The NFVO will send a positive acknowledgment concerning the instantiation request for the NS "Internet" including the three nested NSs, if this was successful. Otherwise the NFVO will send a failure indication to the OSS. *Interface - Os-Ma-nfvo / NS lifecycle management*
NOTE: The sequential instantiation is another use case in this context.		

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5.3 NS monitoring in Broadband Network

5.3.1 Use case description

The main goal of this use case is to illustrate how NS lifecycle management and NS performance management related to the Os-Ma-nfvo reference point are used in the context of E2E Service Management.

The OSS provides an E2E service monitoring and detects a SLA threshold violation concerning the E2E service "Home Internet".

Afterwards the OSS initiates immediately a scale out procedure for the NS "Internet" especially for the nested NS "Secure Internet Connection" to eliminate or minimize the performance degradation.