



# NFV Release 3 Definition

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## Foreword

The adoption by the ETSI ISG NFV of specific Features shall follow the ISG working procedures, in particular, with the formal approval of an ISG Work Item.

The NFV Release 3 Definition will be updated according to the Work Items and deliverables that are approved by the ETSI ISG NFV.

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## 1 Scope

The purpose of the Release Definition is to identify the normative work that ETSI ISG NFV plans to develop as part of Release 3 with the objective to specify a stable and internally aligned set of functionalities.

Release 3 is expected to finalize in the first half of 2019.

The present document describes the specification objectives of Release 3 and lists the Features which are part of the Release.

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## 2 References

For the purposes of the present document, the following references apply:

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

- [1] ETSI, ETSI Directives, Dec. 2014. [Online]. Available at [http://docbox.etsi.org/Board/ETSI\\_Directives/34\\_directives\\_dec\\_2014.pdf](http://docbox.etsi.org/Board/ETSI_Directives/34_directives_dec_2014.pdf)
- [2] ETSI ISG NFV, “NFV Release 2016 Planning Process,” NFV(15)000173r2.
- [3] ETSI, “Work Programme”, [Online]. Available at <http://webapp.etsi.org/WorkProgram/>
- [4] ETSI GS NFV 002, “Network Functions Virtualisation (NFV); Architectural Framework”.
- [5] ETSI GS NFV-IFA010, “Network Functions Virtualisation (NFV) Release 2; Management and Orchestration; Functional Requirements Specification”.
- [6] ETSI GS NFV-IFA005, “Network Functions Virtualisation (NFV) Release 2; Management and Orchestration; Or-Vi reference point - Interface and Information Model Specification”.
- [7] ETSI GS NFV-IFA006, “Network Functions Virtualisation (NFV) Release 2; Management and Orchestration; Vi-Vnfm reference point - Interface and Information Model Specification”.
- [8] ETSI GS NFV-IFA007, “Network Functions Virtualisation (NFV) Release 2; Management and Orchestration; Or-Vnfm reference point - Interface and Information Model Specification”.
- [9] ETSI GS NFV-IFA008, “Network Functions Virtualisation (NFV) Release 2; Management and Orchestration; Ve-Vnfm reference point - Interface and Information Model Specification”.
- [10] ETSI GS NFV-IFA013, “Network Functions Virtualisation (NFV) Release 2; Management and Orchestration; Os-Ma-nfvo reference point - Interface and Information Model Specification”.
- [11] ETSI ISG NFV, “2016 Feature collection and recommendation”, NFV(15)000259r1.

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## 3 Definitions and abbreviations

### 3.1 Definitions

For the purposes of the present document, the terms and definitions in [1] and [2], and the following apply:

**Feature:** functionality which represents added value to the system for a defined set of users (from [2]).

NOTE: A user could be a network operator, service provider, VNF provider, or some other defined actor.

### 3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

EM	Element Management
ISG	Industry Specification Group
NS	Network Service
NFV	Network Functions Virtualisation
NFVI	Network Functions Virtualisation Infrastructure
NFVO	Networks Functions Virtualisation Orchestrator
NFV-MANO	NFV Management and Orchestration
OSS	Operations Support System
VIM	Virtualised Infrastructure Manager
VNF	Virtualised Network Function
VNFD	VNF Descriptor
VNFM	VNF Manager
WIM	Wide-Area Infrastructure Manager

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## 4 Release Definition

### 4.1 Introduction

ETSI ISG NFV Release 3 (hereinafter referred also as NFV Rel-3) will build on top of already published Group Specification deliverables [3] and cover additional Features identified by the ISG [11]. The complete set of Features, capabilities and functions supported by NFV Rel-3 will be described in the Release Description, once the work in NFV Rel-3 is finalized.

NFV Rel-3 Definition is composed of 23 Features, including 20 new Features and 3 additional features carried over from functionality identified in the NFV Rel-2 Definition.

NOTE: The NFV Rel-3 Definition lists all the features that have been developed or are currently under development at a certain point in time. The final set of features, capabilities and functions supported by NFV Rel-3 will be described in the Release 3 Description document, to be available at a later time.

The main objectives of NFV Rel-3 are described in clause 4.2. Clause 4.3 describes the new and extended Features that are defined for NFV Rel-3. Clause 4.4 lists the Work Items of the present Release linking to the Features they derive from. Finally, clause 4.5 lists the work items that have been completed and the published specifications and reports.

## 4.2 Objectives

NFV Rel-3 work is defined in the present document to address the following main objectives:

- To specify core information model for NFV, including further development of related NS and VNF descriptors.
- To specify requirements and interfaces to support charging, billing and accounting in NFV.
- To specify requirements and framework applicable to policy distribution and general policy description in VNF and NS Descriptors.
- To specify requirements and enhancements on (existing) interfaces and information models to enable automated deployment of element management and other OSS functions.
- To specify requirements, procedures and enhancements on (existing) interfaces and information models to support management of NFV-MANO functions.
- To specify functional requirements for WIM, and requirements on associated reference points, including enhancements to relevant information models and interfaces.
- To specify information model and interfaces to support network acceleration to be transparent to VNF.
- To specify the requirements and interface information models for the support of hardware-independent acceleration.
- To specify requirements for security sensitive components in the NFV framework.
- To specify requirements and enhancements on (existing) functional blocks, reference points and interfaces for security monitoring management.
- To specify requirements of update/upgrade controlling functions to support the update and upgrade of NFV software components in an NFV context (or environment), e.g., a VNF.
- To specify requirements, procedures and enhancements on interfaces and information models to support VNF snapshots.
- To develop interoperability test descriptions to support NFV Plugtests.
- To specify requirements to enable interoperability of equipment in the telecommunications environment to support NFV deployment.
- To specify requirement to support lawful interception and critical national infrastructures in an NFV environment.
- To specify requirements related to orchestration and lifecycle management of application and service with and end-to-end view on top of NS.
- To specify the requirements for the usage of Hypervisor based virtualisation and stand-alone vSwitch.
- To specify requirements and enhancements to NFV Architectural Framework to support NFV license management.
- To specify requirements and enhancements to NFV Architectural Framework to support NFV-MANO services across multiple administrative domains.
- To specify requirements and enhancements to NFV Architectural Framework to support PaaS features.
- To specify non-functional parameters to classify and characterize VNF cloud-native implementations.
- To specify requirements and enhancements to NFV Architectural Framework to support Network Slicing use cases.
- To specify vendor-agnostic definitions of performance metrics and the associated methods of measurement for benchmarking network supported in the NFVI.

- To specify requirements to enable development of necessary architectural mechanisms in support of service reliability and availability.
- To specify requirements to secure VNF identity management and trust relationships.

## 4.3 Release content

### 4.3.1 NFV Release 3 Features

The Features that comprise the NFV Rel-3 Definition are listed in Table 4.3.1-1.

**Table 4.3.1-1: Description of Release capabilities.**

Feature Title (and Acronym)	NFV Release 3 Id	Description and Scope	Mapping to Architectural Framework ([4] and [5-10])	Traceability
NFV Information Model (IM- NFV)	R03.F01	Consolidation and extension of current information model with a top-down approach independently for the various GS(s).  The feature scope encompasses: - Specification of a VNF and NS logical model, with VNFD and NSD being deployment views of them.  NOTE: May changes be introduced in current NFV Information Model, the goal is to keep backward compatibility.	Descriptors: Service, VNF and Infrastructure Description	Feature proposal: FTR001  Extension of GS IFA015.
Charging, billing and accounting for NFV (CHRG)	R03.F02	Framework for charging, billing and accounting for NFV.  The feature scope encompasses: - Identification of use cases to determine support of charging and billing. - Specification of requirements from the set of use cases. - Identification of possible solutions to determine what type of usage information needs to be collected and various interaction points in between existing or new functional blocks. - Specification of interfaces to support the agreed identified solution(s). This will include the definition of new interfaces or update of existing interfaces.	Functional blocks: <b>TBD</b> .  Reference points: <b>TBD</b> .	Feature proposal: FTR002.
Automated deployment of element management and other OSS functions (VEMOSS)	R03.F03	Automated deployment of element management functions and other OSS functions.  The feature scope encompasses: - Study and clarification of the concept of element management functions and service-dependent OSS functions. - Report on deployment options and recommendations on preferred options. - Specification of requirements and enhancements on (existing) interfaces and information models to	Functional blocks: EM, OSS/BSS.  Reference points: Os-Manfvo, Ve-Vnfm-em	Feature proposal: FTR013.

Feature Title (and Acronym)	NFV Release 3 Id	Description and Scope	Mapping to Architectural Framework ([4] and [5-10])	Traceability
		enable automated deployment of element management functions and other OSS functions.		
Management of NFV-MANO (NFV_M&Ms)	R03.F04	<p>Enable the management of the NFV Management and Orchestration functional blocks identified by the NFV Architectural Framework, including: update of NFV-MANO functions, configuration of NFV-MANO functions, automate the deployment and decommission of NFV-MANO functions, and manage aspects of reliability for NFV-MANO functions.</p> <p>The feature scope encompasses:</p> <ul style="list-style-type: none"> <li>- Definition of use case(s) to determine the scope of management tasks to support.</li> <li>- Specification of requirements to support the determined use cases.</li> <li>- Definition of end-to-end management and orchestration procedures.</li> <li>- Specification of enhancements on existing interfaces or new interfaces and information models to support the required management tasks.</li> </ul>	<p>Functional blocks: NFVO, VNFM, VIM.</p> <p>Reference points: none new.</p>	Feature proposal: FTR017.
Management of Network Services and connectivity (NFVWAN)	R03.F05	<p>NFVWAN encompasses the deployment and management of network services that require connectivity across one or more WANs, and the implications for the NFVI to provide required network service endpoints.</p> <p>The feature scope encompasses:</p> <ul style="list-style-type: none"> <li>- Identification of use cases and scenarios for network services distributed across one or more WAN(s), and the constraints and context to be considered when deploying these network services. Evaluate the implications for NFV of running on WAN legacy, SDN and hybrid infrastructures.</li> <li>- Description of architectural options for the management and operations of services across WAN(s), and identifying the roles and responsibilities of the management functional blocks. Describe how Network Services and their components (e.g. VNFG, virtual links, etc.) map to the underlying PoP and WAN infrastructures, including VNF, PNF and PoP/WAN gateways, overlays, etc. .</li> <li>- Specification of requirements for WIM and associated reference points.</li> <li>- Specification of enhancements to relevant information models and interfaces.</li> </ul>	<p>Functional blocks: NFVO, VIM, WIM (network).</p> <p>Reference points: Os-Manfvo, Or-Vi, Or-Vnfm.</p>	Feature proposal: FTR030.
Service Orchestration and Network Service Orchestration	R03.F06	Void	Void	Feature proposal: FTR010. Extension of GS IFA009.

Feature Title (and Acronym)	NFV Release 3 Id	Description and Scope	Mapping to Architectural Framework ([4] and [5-10])	Traceability
(NFVO_ARC H)				Feature voided due to stopping the DGR/NFV- IFA020 work item approval at NFV#19.
Network Acceleration for VNF (FASTSWITC H)	R03.F07	Interaction (e.g., API(s)) between the virtualization layer and switching accelerator drivers, to enable network acceleration to be transparent VNF (independent of accelerator vendor and type). The feature scope encompasses: - Definition of the problem statement for the support of API and analysis of placement in the NFVI. - Identification of function types of APIs, e.g., switch, route, VLAN, VXLAN, etc. - Specification of the information model and interfaces.	Functional blocks: NFVI, VIM.  Reference points: Vn-Nf, Nf-Vi.	Feature proposal: FTR035. Extension of GS IFA003.
Security management and monitoring for NFV (NFV_SEC)	R03.F08	Security management and monitoring for NFV for establishment of holistic security policies, coherent enforcement of the policies, and security monitoring across the lifecycle of the end-to-end network service in both virtualized and legacy networks. The feature scope encompasses: - Definition of use cases for NFV Security Management across planning, enforcement and monitoring targeting at holistic security policies and functions. - Specification of requirements and workflows for NFV Security Management. - Specification of enhancements to current NFV Architectural Framework (functional blocks and reference points) based on derived requirements and workflows.	Functional blocks: NFVO, VNF, VIM, and SM (new).  Reference points: Or-Vnfm, Vi-Vnfm, Or-Vi, and new Sc-Vi, Sc-Vnfm, and Sc-Or.	Feature proposal: FTR003. Extension of GS SEC009.
Secure sensitive components in NFV Framework (SEC4SNC)	R03.F09	Secure sensitive components in the NFV framework. The feature scope encompasses: - Providing guidance on: + Securing hosts on which sensitive components will be hosted. + Securing the broader context in which sensitive components will be hosted. + Physical, logical and operational measures related to securing sensitive components. + Provisioning and de-provisioning sensitive components. - Specification of requirements for sensitive components.	Functional blocks: NFVI, VNF.  Reference points: Vn-Nf	Feature proposal: FTR003.  NWI NFV(17)000 245r4



Feature Title (and Acronym)	NFV Release 3 Id	Description and Scope	Mapping to Architectural Framework ([4] and [5-10])	Traceability
Updated and upgrade of NFV software (SWUP)	R03.F10	<p>Update and upgrade of NFV software components in an NFV context (or environment), e.g., a VNF.</p> <p>The feature scope encompasses:</p> <ul style="list-style-type: none"> <li>- Identification of the required set of update/upgradecontrolling functions to facilitate software updates/upgrades.</li> <li>- Specification of requirements for software update/upgrade controlling functions.</li> </ul>	<p>Functional blocks: VNF, NFVO, VNFM, VIM, NFVI.</p> <p>Reference points: Os-Manfvo, Or-Vnfm, Ve-Vnfm-em/vnf.</p>	Feature proposal: FTR019.
VNF snapshotting (VNF_PHOTO)	R03.F11	<p>Creation and use of VNF snapshots.</p> <p>The feature scope encompasses:</p> <ul style="list-style-type: none"> <li>- Definition of use case(s) to determine the usage of VNF snapshots, and study under what conditions the capture of VNFC snapshots and VNF data can be performed.</li> <li>- Specification of requirements for the support of VNF/VNFC snapshots.</li> <li>- Definition of end-to-end orchestration procedures for VNF snapshot, providing an overall framework supporting the capture of VNF information and VNFC snapshots.</li> <li>- Specification of enhancements on interfaces and information models to support VNF snapshots.</li> </ul>	<p>Functional blocks: VNF, VNFM, VIM.</p> <p>Reference points: Ve-Vnfm-em/vnf, Or-Vnfm, Vi-Vnfm.</p>	Feature proposal: FTR016.
Interoperability , conformance testing, and benchmarking (CONF&IOP)	R03.F12	<p>The feature scope encompasses:</p> <ul style="list-style-type: none"> <li>- Development of Interoperability Test Descriptions to support NFV Plugtests.</li> <li>- Study and report on Conformance Testing Methodology for NFV.</li> <li>- Specification of vendor-agnostic definitions of performance metrics and the associated methods of measurement for benchmarking networks supported in the NFVI</li> </ul>	<p>Functional blocks: NFVO, VNFM, VIM, NFVI, VNF.</p> <p>Reference points: Os-Manfvo, Or-Vnfm, Vi-Vnfm, Or-Vi, Ve-Vnfm, Nf-Vi.</p>	<p>Feature proposal: FTR031.</p> <p>NWI NFV(17)000 123r1.</p>
Hardware Environment for NFV (HWENV)	R03.F13	<p>Interoperable hardware ecosystem and telecommunications physical environment to support NFV deployment.</p> <p>The feature scope encompasses:</p> <ul style="list-style-type: none"> <li>- Identification of situations where de-facto standard data centre equipment is not suitable for deployment in the telecommunications environment to support NFV deployment.</li> <li>- Specification of requirements to enable interoperability of equipment in the telecommunications environment to support NFV deployment. Focus areas in: operating environmental, mechanical, baseline reliability, cabling and maintenance.</li> </ul>	<p>Functional blocks: VIM, NFVI.</p> <p>Reference points: none.</p>	<p>Feature proposal: FTR026.</p> <p>Extension of EVE003.</p>

Feature Title (and Acronym)	NFV Release 3 Id	Description and Scope	Mapping to Architectural Framework ([4] and [5-10])	Traceability
		<ul style="list-style-type: none"> <li>- Specification of requirements for the support of lawful intercept and/or critical national infrastructures.</li> <li>- Analysis of gaps with existing industry reference guidelines and standards.</li> </ul>		
Hardware-independent acceleration (ACCEL)	R02.CAP12	NFV related management and orchestration operations to flexibly allocate VNFs to available NFVI and acceleration components by exposing acceleration capabilities instead of specific acceleration resource characteristics.	Functional blocks: NFVI, VIM, VNFM, NFVO.  Reference points: Nf-Vi, Vi-Vnfm, Or-Vi.	Extension of GS IFA002 and IFA004
Policy management framework (POLICY)	R03.F14	Policy management framework for NFV-MANO, including distribution of policy, policy conflict detection and resolution, and federation of policy domains.  The feature scope encompasses: <ul style="list-style-type: none"> <li>- Study use cases related to applying policy framework in NFV-MANO.</li> <li>- Study of the impacts on NFV-MANO for applicable policy components at referred functional blocks and reference points.</li> <li>- Specification of requirements applicable to NFV-MANO functional blocks, interfaces and information models applicable to policy distribution and general policy description in VNF and NS descriptors.</li> </ul> NOTE: Developing the detail policy content / data model / information for specific operations, such as developing detailed policies for VNF/NS LCM will not be in the scope of the work derived from this Feature.	Functional blocks: NFVO, VNFM, VIM.  Reference points: Os-Manfvo, Or-Vnfm, Vi-Vnfm, Or-Vi.	Feature proposal: FTR007.
Application and Service Management (APPSM)	R03.F15	Application and Service Management enables the orchestration and lifecycle management of services with an end-to-end view on top of the capabilities and interfaces already introduced for the management of NSs. OSS uses the interfaces provided on the reference point Os-Ma-nfvo for the interaction with the NFVO.  The feature covers service management related functionalities e.g. service fulfillment and assurance, monitoring, inventory and order management. Furthermore the feature addresses the definition of descriptors and information model required for the management of services.	Functional blocks: OSS, NFVO  Reference points: Os-Ma-Nfvo	Release 2 Definition: R02.CAP13  Addressed in IFA012.

Feature Title (and Acronym)	NFV Release 3 Id	Description and Scope	Mapping to Architectural Framework ([4] and [5-10])	Traceability
Hypervisor-based virtualisation (HYPER)	R03.F16	<p>A hypervisor mediates the resources of the compute domain to the virtual machines of the software appliances and offers one of the virtualization environment solutions for the instantiation of VNFs.. The hypervisor itself is a software environment which abstracts hardware to enable the portability of software appliances.</p> <p>The present feature covers hypervisor-related functions including allocating the compute resources to the software appliance virtual machines, and services through management interfaces which allow for loading and monitoring of VMs, VM, terminating a VM, scaling a VM, and live migrating a VM. The release also supports hypervisor networking functionality to enable the intercommunication for hosted VMs by integrating vSwitch.</p>	<p>Functional blocks: NFVI (Virtualisation Layer).</p> <p>Reference points: V1-Ha, Nf-Vi.</p>	<p>Release 2 Definition: R02.CAP14</p> <p>Addressed in EVE001.</p>
License management (LIC)	R03.F17	<p>NFV license management framework aspects to ensure Service Providers can deploy VNFs quickly without customizing the licensing mechanisms for each VNF and each VNF Provider.</p> <p>The feature scope encompasses:</p> <ul style="list-style-type: none"> <li>- Develop use cases related to license management.</li> <li>- Derive requirements from license management use cases.</li> <li>- Identify what NFV Architectural Framework support and enhancements are needed to cover license management requirements.</li> </ul>	<p>Functional blocks: VNF, NFVO, VNFM, OSS.</p> <p>Reference points: Or-Vnfm, Or-Vi, Os-Ma-nfvo, Ve-Vnfm.</p>	NFVEVE(16)000160r1
NFV-MANO admin domains (MANOMD)	R03.F18	<p>NFV-MANO services across multiple administrative domains.</p> <p>The feature scope encompasses:</p> <ul style="list-style-type: none"> <li>- Develop use cases related to offering NFV MANO services across multiple administrative domains, including NFVIaaS and NS over multiple administrative domains.</li> <li>- Examine interactions between functional blocks belonging to different administrative domains.</li> <li>- Derive requirements from use cases.</li> <li>- Identify what NFV Architectural Framework support and enhancements are needed to cover support of NFV MANO services across multiple administrative domains.</li> </ul>	<p>Functional blocks: VNF, NFVO, VNFM, OSS.</p> <p>Reference points: Or-Vnfm, Or-Vi, Os-Ma-nfvo, Ve-Vnfm.</p>	NWI NFV(16)000363r1
NFV Architecture PaaS (NFVPAAS)	R03.F19	<p>NFV Architecture support for providing “PaaS”-type capabilities and supporting VNFs which follow “cloud-native” design principles.</p> <p>The feature scope encompasses:</p>	<p>Functional blocks: VNF, NFVO, VNFM.</p>	NWI NFV(16)000361r10

Feature Title (and Acronym)	NFV Release 3 Id	Description and Scope	Mapping to Architectural Framework ([4] and [5-10])	Traceability
		<ul style="list-style-type: none"> <li>- Develop use cases related to supporting on the NFV Architecture flexible choices for the designers of VNFs.</li> <li>- Identify and provide recommendations on what NFV Architectural Framework support and enhancements are needed to cover support PaaS-type capabilities.</li> </ul>	Reference points: Or-Vnfm, Or-Vi, Vi-Vnfm, Nf-Vi.	
Cloud-Native VNF (VNF CLOUD)	R03.F20	<p>Classification and characterization of VNF cloud-native implementations.</p> <p>The feature scope encompasses:</p> <ul style="list-style-type: none"> <li>- Specification of a set of non-functional parameters to classify and characterize VNF cloud-native implementation.</li> </ul>	<p>Functional blocks: VNF.</p> <p>Reference points: N/A</p>	NWI NFV(16)000 404r10
Network Slicing in NFV (NFV SLICE)	R03.F21	<p>Analysis of Use Cases related to Network Slicing as defined in SDOs and industry for a.</p> <p>The feature scope encompasses:</p> <ul style="list-style-type: none"> <li>- Documentation of the use cases and mapping to current NFV concepts and support by the ETSI NFV Architectural Framework.</li> <li>- Specification of requirements and enhancements to the NFV Architectural Framework to support Network Slicing use cases.</li> <li>- Guiding principles of NFV resiliency assurance for the support of network slicing based on an NFV infrastructure and covering all resiliency related operational facets supporting network slicing.</li> </ul>	<p>Functional blocks: NFVO.</p> <p>Reference points: Os-Manfvo.</p>	<p>NWI NFV(17)000 057r1</p> <p>NWI NFV(17)000 278r2</p>
NFV Reliability and Availability (RELAV)	R03.F22	<p>Support for configuration and deployment of VNFs from multiple vendors onto a common platform such that service reliability and availability expectations are satisfactorily met, including reliability and availability of NFVI components, and Management and Orchestration components and their support for ensure the reliability and availability of the VNFs.</p> <p>The feature scope encompasses:</p> <ul style="list-style-type: none"> <li>- Specification of requirements to enable development of necessary architectural mechanisms in support of service reliability and availability.</li> </ul>	<p>Functional blocks: NFVI, VIM, VNFM, NFVO.</p> <p>Reference points: TBD</p>	NWI NFV(17)000 099r3
Identity management (IDENTITY)	R03.F23	<p>Secure VNF identity management and trust relationships in NFV.</p> <p>The feature scope encompasses:</p>	<p>Functions blocks: TBD.</p> <p>Reference points: TBD.</p>	NWI NFV(17)000 246r5

Feature Title (and Acronym)	NFV Release 3 Id	Description and Scope	Mapping to Architectural Framework ([4] and [5-10])	Traceability
		<ul style="list-style-type: none"> <li>- Specification of requirements to secure VNF identity management and trust relationships.</li> <li>- Specify how identities are securely lifecycle managed, verified and trusted.</li> <li>- Considering horizontal and vertical relationships.</li> </ul>		

## 4.4 NFV Release 3 active Work Items

### 4.4.1 Introduction

The present clause 4.4 lists the active Work Items associated to the NFV Rel-3.

Clause 4.4.2 lists the Work Items that will produce new specifications and reports (i.e., complete new deliverables). Clause 4.4.1 lists the Work Items that will produce a new version of a specification or report that has been published in a previous Release and which is evolved/propagated in order to document the needed Release 3 features.

### 4.4.2 Work Items producing new specifications or reports

The current Work Items associated to the NFV Rel-3 and that will produce new specification or reports are listed in Table 4.4.2-1.

NOTE: For tracking purposes, Work Items listed in Table 4.4.2-1 include both informative and normative work. The final list of Release-dependent deliverables will be listed within the Release Description upon publication of the deliverables..

**Table 4.4.2-1: NFV Release 3 Work Items producing new specification or reports.**

Work Item	Full Title	Type	Related Feature(s)
<a href="#">DGS/NFV-IFA026</a>	Network Functions Virtualisation (NFV) Release 3; Management and Orchestration; Architecture enhancement for Security Management Specification	Specification	R03.F08: Security management and monitoring for NFV (NFV_SEC) R03.F09: Secure sensitive components in NFV Framework (SEC4SNC)
<a href="#">DGR/NFV-IFA029</a>	Network Functions Virtualisation (NFV) Release 3; Software Architecture; Report on the Enhancements of the NFV Architecture towards “Cloud-native” and “PaaS	Report	R03.F19: NFV Architecture PaaS (NFVPASS)
<a href="#">DGS/NFV-IFA033</a>	Network Functions Virtualisation (NFV) Release 3; Management and Orchestration; Sc-Or, Sc-Vnm, Sc-Vi reference points – Interface and Information Model Specification	Specification	R03.F08: Security management and monitoring for NFV (NFV_SEC)
<a href="#">DGR/NFV-IFA034</a>	Network Functions Virtualisation (NFV) Release 3; Management and Orchestration;	Report	R03.F17: License management (LIC)

Work Item	Full Title	Type	Related Feature(s)
	Report on architectural enhancements for VNF License Management support and use of VNF licenses		
<a href="#">DGS/NFV-REL009</a>	Network Functions Virtualisation (NFV); Reliability; Specification of Requirements to Support NFV Reliability and Availability	Specification	R03.F22: NFV Reliability and Availability (RELAV)
<a href="#">DGR/NFV-REL010</a>	Network Functions Virtualisation (NFV); Reliability; Report on NFV Resiliency for the Support of Network Slicing	Report	R03.F21: Network Slicing in NFV (NFVSLICE)
<a href="#">DGS/NFV-SEC019</a>	Network Functions Virtualisation (NFV) Release 3; Security; System Architecture Specification for NFV Security Enhancements	Specification	R03.F09: Secure sensitive components in NFV Framework (SEC4SNC)
<a href="#">DGS/NFV-SEC020</a>	Network Functions Virtualisation (NFV) Release 3; Security; Identity Management and Security Specification	Specification	R03.F23: Identity management (IDENTITY)
<a href="#">DGS/NFV-SOL009</a>	Network Functions Virtualisation (NFV) Release 3; Protocols and Data Models; RESTful protocols specification for the management of NFV-MANO	Specification	R03.F04: Management of NFV-MANO (NFV_M&Ms)
<a href="#">DGS/NFV-SOL010</a>	Network Functions Virtualisation (NFV) Release 3; Protocols and Data Models; VNF Snapshot Package specification	Specification	R03.F11: VNF snapshotting (VNF_PHOTO)
<a href="#">DGS/NFV-SOL011</a>	Network Functions Virtualisation (NFV) Release 3; Protocols and Data Models; RESTful protocols specification for the Or-Or Reference Point	Specification	R03.F18: NFV-MANO admin domains (MANOMD)
<a href="#">DGS/NFV-SOL012</a>	Network Functions Virtualisation (NFV) Release 3; Protocols and Data Models; RESTful protocols specification for the Policy Management Interface	Specification	R03.F14: Policy management framework (POLICY)

#### 4.4.3 Work Items evolving/propagating NFV Rel-2 specifications and reports

A set of deliverables of NFV Rel-2 are evolved/propagated into the NFV Rel-3. The corresponding Work Items are listed in Table 4.4.3-1. These Work Items will produce a new version of a previously published specification or report.

**Table 4.4.3-1: NFV Release 3 Work Items of propagated/evolved NFV Rel-2 deliverables.**

Work Item	Full Title	Type	Related Feature(s)
<a href="#">DGS/NFV-IFA002ed321</a>	Network Functions Virtualisation (NFV) Release 3; Acceleration Technologies; VNF Interfaces Specification	Specification	R02.CAP12: Hardware independent acceleration (ACCEL)

Work Item	Full Title	Type	Related Feature(s)
<a href="#">DGS/NFV-SOL002ed311</a>	Network Functions Virtualisation (NFV) Release 3; Protocols and Data Models; RESTful protocols specification for the Ve-Vnfm Reference Point	Specification	[refer to Annex B for the relationship of features with tentatively impacted specifications]
<a href="#">DGS/NFV-SOL003ed311</a>	Network Functions Virtualisation (NFV) Release 3; Protocols and Data Models; RESTful protocols specification for the Or-Vnfm Reference Point	Specification	[refer to Annex B for the relationship of features with tentatively impacted specifications]
<a href="#">DGS/NFV-SOL004ed311</a>	Network Functions Virtualisation (NFV) Release 3; Protocols and Data Models; VNF Package specification	Specification	N/A (only propagating to this point).
<a href="#">DGS/NFV-SOL005ed311</a>	Network Functions Virtualisation (NFV) Release 3; Protocols and Data Models; RESTful protocols specification for the Os-Manfvo Reference Point	Specification	[refer to Annex B for the relationship of features with tentatively impacted specifications]
<a href="#">DGS/NFV-SOL013ed311</a>	Network Functions Virtualisation (NFV) Release 3; Protocols and Data Models; Specification of common aspects for RESTful NFV MANO APIs	Specification	N/A (specifies common API matters applicable to all API specs).

## 4.5 NFV Release 3 published deliverables

### 4.5.1 Introduction

The present clause 4.5 lists the published deliverables associated to the NFV Rel-3.

Clause 4.5.2 lists the specifications and reports that have been newly produced (i.e., complete new deliverables). Clause 4.5.3 lists the specifications and reports that have been published as a result of evolving or propagating a deliverable published in a previous Release.

### 4.5.2 NFV Release 3 newly published specification and reports

The published deliverables associated to the NFV Rel-3 and that have produced new specifications or reports are listed in Table 4.5.2-1.

NOTE: For tracking purposes, published deliverables listed in Table 4.5.2-1 include both informative Group Reports (GR) and normative Group Specifications (GS). The final list of Release-dependent deliverables will be made available as part of the Release Description document.

**Table 4.5.2-1: NFV Release 3 dependent published deliverables.**

GS/GR Id.	Previous versions	Full Title	Type	Related Feature(s)
<a href="#">ETSI GS NFV-EVE 001 v3.1.1</a>	N/A	Network Functions Virtualisation (NFV) Release 3; Virtualisation Technologies; Hypervisor Domain Requirements specification	Specification (GS)	R03.F16: Hypervisor-based virtualisation (HYPER)
<a href="#">ETSI GS NFV-EVE 007 v3.1.1</a> Revised in: <a href="#">v3.1.2</a>	N/A	Network Functions Virtualisation (NFV) Release 3; NFV Evolution and Ecosystem; Hardware Interoperability Requirements Specification	Specification (GS)	R03.F13: Hardware Environment for NFV (HWENV)

GS/GR Id.	Previous versions	Full Title	Type	Related Feature(s)
<a href="#">ETSI GR NFV-EVE 008 v3.1.1</a>	N/A	Network Functions Virtualisation (NFV) Release 3; Charging; Report on Usage Metering and Charging Use Cases and Architectural Study	Report (GR)	R03.F02: Charging, billing and accounting for NFV (CHRG)
<a href="#">ETSI GR NFV-EVE 010 v3.1.1</a>	N/A	Network Functions Virtualisation (NFV) Release 3; License Management; Report on License Management for NFV	Report (GR)	R03.F17: License management (LIC)
<a href="#">ETSI GS NFV-EVE 011 v3.1.1</a>	N/A	Network Functions Virtualisation (NFV) Release 3; Virtualised Network Function; Specification of the Classification of Cloud Native VNF implementations	Specification (GS)	R03.F20: Cloud-Native VNF (VNF CLOUD)
<a href="#">ETSI GR NFV-EVE 012 v3.1.1</a>	N/A	Network Functions Virtualisation (NFV) Release 3; Evolution and Ecosystem; Report on Network Slicing Support with ETSI NFV Architecture Framework	Report (GR)	R03.F21: Network Slicing in NFV (NFV SLICE)
<a href="#">ETSI GR NFV-IFA 012 v3.1.1</a>	N/A	Network Functions Virtualisation (NFV) Release 3; Management and Orchestration; Report on Os-Ma-Nfvo reference point - application and service management use cases and recommendations	Report (GR)	R03.F15: Application and Service Management (APPSM)
<a href="#">ETSI GS NFV-IFA 018 v3.1.1</a>	N/A	Network Functions Virtualisation (NFV); Acceleration Technologies; Network Acceleration Interface Specification; Release 3	Specification (GS)	R03.F07: Network Acceleration for VNF (FASTSWITCH)
<a href="#">ETSI GS NFV-IFA 019 v3.1.1</a>	N/A	Network Functions Virtualisation (NFV); Acceleration Technologies; Acceleration Resource Management Interface Specification; Release 3	Specification (GS)	R02.CAP12: Hardware independent acceleration (ACCEL)
<a href="#">ETSI GR NFV-IFA 021 v3.1.1</a>	N/A	Network Functions Virtualisation (NFV) Release 3; Management and Orchestration; Report on management of NFV-MANO and automated deployment of EM and other OSS functions	Report (GR)	R03.F03: Automated deployment of element management and other OSS functions (VEMOSS) R03.F04: Management of NFV-MANO (NFV_M&Ms)
<a href="#">ETSI GR NFV-IFA 022 v3.1.1</a>	N/A	Network Functions Virtualisation (NFV) Release 3; Management and Orchestration;	Report (GR)	R03.F05: Management of Network Services and



GS/GR Id.	Previous versions	Full Title	Type	Related Feature(s)
		Report on Management and Connectivity for Multi-Site Services		connectivity (NFVWAN)
<a href="#">ETSI GR NFV-IFA 023 v3.1.1</a>	N/A	Network Functions Virtualisation (NFV); Management and Orchestration; Report on Policy Management in MANO; Release 3	Report (GR)	R03.F14: Policy management framework (POLICY)
<a href="#">ETSI GR NFV-IFA 028 v3.1.1</a>	N/A	Network Functions Virtualisation (NFV) Release 3; Management and Orchestration; Report on architecture options to support multiple administrative domains	Report (GR)	R03.F18: NFV-MANO admin domains (MANOMD)
<a href="#">ETSI GS NFV-IFA 030 v3.1.1</a>	N/A	Network Functions Virtualisation (NFV) Release 3; Management and Orchestration; Multiple Administrative Domain Aspect Interfaces Specification	Specification (GS)	R03.F18: NFV-MANO admin domains (MANOMD)
<a href="#">ETSI GS NFV-IFA 031 v3.2.1</a>	<a href="#">v3.1.1</a>	Network Functions Virtualisation (NFV) Release 3; Management and Orchestration; Requirements and interfaces specification for management of NFV-MANO	Specification (GS)	R03.F04: Management of NFV-MANO (NFV_M&Ms)
<a href="#">ETSI GS NFV-IFA 032 v3.2.1</a>	N/A	Network Functions Virtualisation (NFV) Release 3; Management and Orchestration; Interface and Information Model Specification for Multi-Site Connectivity Services	Specification (GS)	R03.F05: Management of Network Services and connectivity (NFVWAN)
<a href="#">ETSI GS NFV-REL 006 v3.1.1</a>	N/A	Network Functions Virtualisation (NFV) Release 3; Reliability; Maintaining Service Availability and Continuity Upon Software Modification	Specification (GS)	R03.F10: Updated and upgrade of NFV software (SWUP)
<a href="#">ETSI GS NFV-SEC 012 v3.1.1</a>	N/A	Network Functions Virtualisation (NFV) Release 3; Security; System architecture specification for execution of sensitive NFV components	Specification (GS)	R03.F09: Secure sensitive components in NFV Framework (SEC4SNC)
<a href="#">ETSI GS NFV-SEC 013 v3.1.1</a>	N/A	Network Functions Virtualisation (NFV) Release 3; Security; Security Management and Monitoring Specification	Specification (GS)	R03.F08: Security management and monitoring for NFV (NFV_SEC)
<a href="#">ETSI GS NFV-SEC 014 v3.1.1</a>	N/A	Network Functions Virtualisation (NFV) Release 3; NFV Security; Security Specification for MANO Components and Reference points	Specification (GS)	R03.F08: Security management and monitoring for NFV (NFV_SEC)

GS/GR Id.	Previous versions	Full Title	Type	Related Feature(s)
<a href="#">ETSI GR NFV-TST 005 v3.1.1</a>	N/A	Network Functions Virtualisation (NFV); Continuous Development and Integration; Report on use cases and recommendations for VNF Snapshot	Report (GR)	R03.F11: VNF snapshotting (VNF_PHOTO)
<a href="#">ETSI GS NFV-TST 009 v3.1.1</a>	N/A	Network Functions Virtualisation (NFV) Release 3; Testing; Specification of Networking Benchmarks and Measurement Methods for NFVI	Specification (GS)	R03.F12: Interoperability and conformance testing (CONF&IOP)

### 4.5.3 NFV Release 3 related published deliverables evolved/propagated from a previous Release

The published deliverables associated to the NFV Rel-3 and that represent an evolved/propagated specification from a previous Release are listed in Table 4.5.3-1.

Details about the specified features in the evolved/propagated version are available in the Release 3 Description document.

**Table 4.5.3-1: NFV Release 3 dependent published deliverables evolved/propagated from previous a Release.**

GS/GR Id.	Previous versions	Full Title	Type
<a href="#">ETSI GS NFV-IFA 005 v3.2.1</a>	<a href="#">v3.1.1</a>	Network Functions Virtualisation (NFV) Release 3; Management and Orchestration; Or-Vi reference point - Interface and Information Model Specification	Specification (GS)
<a href="#">ETSI GS NFV-IFA 006 v3.2.1</a>	<a href="#">v3.1.1</a>	Network Functions Virtualisation (NFV) Release 3; Management and Orchestration; Vi-Vnfm reference point - Interface and Information Model Specification	Specification (GS)
<a href="#">ETSI GS NFV-IFA 007 v3.2.1</a>	<a href="#">v3.1.1</a>	Network Functions Virtualisation (NFV) Release 3; Management and Orchestration; Or-Vnfm reference point - Interface and Information Model Specification	Specification (GS)
<a href="#">ETSI GS NFV-IFA 008 v3.2.1</a>	<a href="#">v3.1.1</a>	Network Functions Virtualisation (NFV) Release 3; Management and Orchestration; Ve-Vnfm reference point - Interface and Information Model Specification	Specification (GS)
<a href="#">ETSI GS NFV-IFA 010 v3.2.1</a>	<a href="#">v3.1.1</a>	Network Functions Virtualisation (NFV) Release 3; Management and Orchestration; Functional requirements specification	Specification (GS)
<a href="#">ETSI GS NFV-IFA 011 v3.2.1</a>	<a href="#">v3.1.1</a>	Network Functions Virtualisation (NFV) Release 3; Management and Orchestration; VNF Descriptor and Packaging Specification	Specification (GS)
<a href="#">ETSI GS NFV-IFA 013 v3.2.1</a>	<a href="#">v3.1.1</a>	Network Functions Virtualisation (NFV) Release 3; Management and Orchestration;	Specification (GS)

GS/GR Id.	Previous versions	Full Title	Type
		Os-Ma-Nfvo reference point - Interface and Information Model Specification	
<a href="#">ETSI GS NFV-IFA 014 v3.2.1</a>	<a href="#">v3.1.1</a>	Network Functions Virtualisation (NFV) Release 3; Management and Orchestration Network Service Templates Specification	Specification (GS)
<a href="#">ETSI GR NFV-IFA 015 v3.1.1</a>	N/A	Network Functions Virtualisation (NFV) Release 3; Management and Orchestration; Report on NFV Information Model	Report (GR)
<a href="#">ETSI GR NFV-IFA 016 v3.1.1</a>	N/A	Network Functions Virtualisation (NFV) Release 3; Information Modeling; Papyrus Guidelines	Report (GR)
<a href="#">ETSI GR NFV-IFA 017 v3.1.1</a>	N/A	Network Functions Virtualisation (NFV) Release 3; Information Modeling; UML Modeling Guidelines	Report (GR)
<a href="#">ETSI GR NFV-IFA 024 v3.2.1</a>	N/A	Network Functions Virtualisation (NFV) Release 3; Information Modeling; Report on External Touchpoints related to NFV Information Model	Report (GR)
<a href="#">ETSI GS NFV-TST 008 v3.2.1</a>	<a href="#">v3.1.1</a>	Network Functions Virtualisation (NFV) Release 3; Testing; NFVI Compute and Network Metrics Specification	Specification (GS)

## Annex A (Informative): Work Program composition

The ETSI ISG NFV Work Program is composed of:

- Reports (Informative).
- Release (Normative): including Group Specifications that handle:
  - Work Items for new features that require normative work and deliver new Group Specification deliverables.
  - Work items for maintenance of previous Release(s) published deliverables.
  - Work items for update (e.g., addition of feature related capabilities) of published Release-associated Group Specification published in previous Release(s).

Work Items can cover diverse stages of specification (e.g., Stage 1, 2, 3), as needed by the ISG.

Figure A.1 illustrates the high-level work item composition of the Work Program for 2016 as described above.

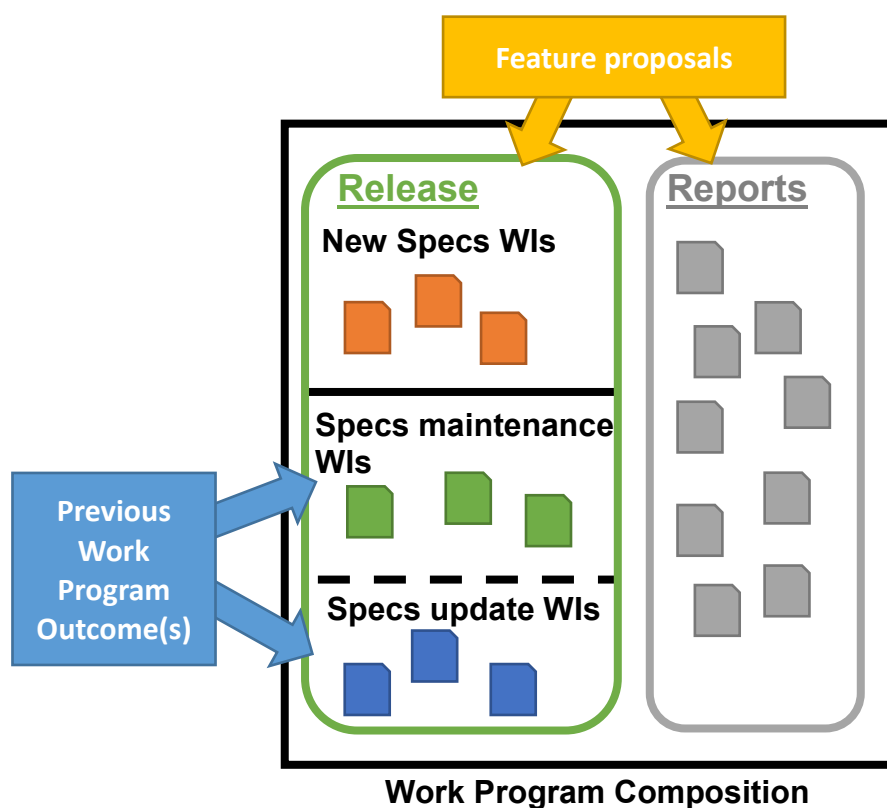


Figure A.1: ETSI ISG NFV Work Program high-level work item composition.

## Annex B: NFV Release 3 candidate features for additional normative work

The ETSI ISG NFV assessed at NFV#19 the input of Release 3 features that required additional normative work, considering the two cases as listed below:

- evolving/propagating NFV Release 2 deliverables (refer to NFV Release 2 Description) into NFV Release 3, and
- creating new deliverables.

Table B-1 lists the set of candidate features that are considered for the Work Item Descriptions (WID).

NOTE: The table B-1 will be updated reflecting the status and specification progress of the features.

**Table B-1: NFV Release 3 candidate features for additional normative work.**

Candidate feature # (NFV Release 3 Id)	Title	Related Feature(s) in the present Definition	New normative specifications? (or current ones impacted). See note 1.	Status (candidate/completed) and additional notes. See note 2.
FEAT01	REL to IFA Feature MANOMOD REL006 MANO software modification	R03.F10: Updated and upgrade of NFV software (SWUP)	<b>New GS: Yes,</b> could be combined in normative spec for new normative IFA021 spec	Candidate
FEAT02	REL to IFA Feature VNFMOD REL006 VNF software modification	R03.F10: Updated and upgrade of NFV software (SWUP)	<b>New GS: No Impacted GS:</b> could be addressed in IFA010, IFA013.	Stage 2 completed.
FEAT03	REL to IFA Feature NFVIMOD REL006 NFVI software modification	R03.F10: Updated and upgrade of NFV software (SWUP)	<b>New GS: No Impacted GS:</b> could be included in IFA005, IFA006, IFA010.	Candidate
FEAT04	Other to IFA Enhancement Host Reservation	N/A	<b>New GS: No Impacted GS:</b> could be included in IFA005, IFA010.	Stage 2 completed. Stage 3 ongoing.
FEAT05	EVE to IFA REL SEC Feature NFVSLICE EVE012 network slicing	R03.F21: Network Slicing in NFV (NFVSLICE)	<b>New GS: No Impacted GS:</b> could be included in IFA013, IFA014.	Stage 2 completed.
FEAT06	IFA to IFA Enhancement NS Package	N/A	<b>New GS: No Impacted GS:</b> could be included in IFA010, IFA013, IFA014.	Closed. See note 3.
FEAT07	IFA to IFA Feature MANOPLC IFA023 MANO Policy Mgt	R03.F14: Policy management framework (POLICY)	<b>New GS: No Impacted GS:</b> could be included in IFA005, IFA006, IFA007, IFA008, IFA010, IFA013.	Stage 2 completed. Stage 3 ongoing.

Candidate feature # (NFV Release 3 Id)	Title	Related Feature(s) in the present Definition	New normative specifications? (or current ones impacted). See note 1.	Status (candidate/completed) and additional notes. See note 2.
			Stage 3: new GS.	
FEAT08	IFA to IFA Feature MANOMD IFA028 NS composite nested multi-domain	R03.F18: NFV-MANO admin domains (MANOMD)	<b>New GS: Yes</b> , new specification for Multi-domain aspects <b>Impacted GS:</b> could be included IFA010.  <b>Stage 3:</b> <b>New GS: Yes.</b>	Stage 2 completed.  Stage 3 ongoing.
FEAT09	IFA to IFA Feature MANOMD IFA028 NFVlaaS multi-domain	R03.F18: NFV-MANO admin domains (MANOMD)	<b>New GS: Yes</b> , new specification for Multi-domain aspects <b>Impacted GS:</b> IFA005, IFA006 IFA010.	Candidate
FEAT10	IFA to IFA Feature NFVWAN IFA022 ManAndConn Multi-Site	R03.F05: Management of Network Services and connectivity (NFVWAN)	<b>New GS: Yes</b> , new specification for WIM <b>Impacted GS:</b> IFA005, IFA007, IFA010, IFA011, IFA014	Stage 2 completed.
FEAT11	IFA to IFA Feature NFV_M&Ms IFA021 management NFV-MANO	R03.F04: Management of NFV-MANO (NFV_M&Ms)	<b>New GS: Yes</b> , new specification for managing MANO <b>Impacted GS:</b> IFA010.  <b>Stage 3:</b> <b>New GS: Yes.</b>	Stage 2 completed.  Stage 3 ongoing.
FEAT12	Ext to IFA SOL Enhancement support for MEC in NFV deployments	N/A	<b>New GS: Yes</b> , new spec(s) <b>Impacted GS:</b> IFA010, IFA013.	Candidate
FEAT13	EVE to IFA Feature LIC EVE010 Licensing Management	R03.F17: License management (LIC)	<b>New GS: Yes</b> , new spec <b>Impacted GS:</b> IFA010.	Candidate
FEAT14	EVE to IFA Feature CHRG EVE008 Charging and Billing	R03.F02: Charging, billing and accounting for NFV (CHRG)	<b>New GS: Yes</b> , new spec <b>Impacted GS:</b> IFA005, IFA006, IFA007, IFA010, IFA013.	Candidate
FEAT15	TST to IFA Feature VNF_PHOTO TST005 VNF_Snapshot	R03.F11: VNF snapshotting (VNF_PHOTO)	<b>New GS: No</b> <b>Impacted GS:</b> IFA005, IFA006, IFA007, IFA008, IFA010, IFA011, IFA013.	Stage 2 completed in first version. See note 4.  Stage 3 ongoing.

Candidate feature # (NFV Release 3 Id)	Title	Related Feature(s) in the present Definition	New normative specifications? (or current ones impacted). See note 1.	Status (candidate/completed) and additional notes. See note 2.
			<b>Stage 3: impacted GS:</b> SOL002, SOL003, SOL005. <b>New GS:</b> yes.	
FEAT16	NFV(17)000209_REL_t o_IFA_Feature_SAL_R EL001_Service_availability_level	N/A	<b>New GS: No</b> <b>Impacted GS:</b> IFA005, IFA006, IFA007, IFA010, IFA011, IFA013.	Candidate
FEAT17	Release 3 Recommended Feature - Cloud Native VNF (EVE011) - NFV Architecture PaaS (IFA029)	R03.F20: Cloud-Native VNF (VNF CLOUD) R03.F19: NFV Architecture PaaS (NFV PaaS)	<b>New GS: Yes</b> <b>Impacted GS:</b> IFA007, IFA008, IFA010, IFA011, IFA013.	Candidate
FEAT18	Security management, monitoring and securing sensitive functions	R03.F08: Security management and monitoring for NFV (NFV_SEC) R03.F09: Secure sensitive components in NFV Framework (SEC4SNC)	<b>New GS: Yes</b> <b>Impacted GS:</b> none identified so far.	Candidate
<p>NOTE 1: Only references to stage 2 impacted specifications is provided. Stage 3 impacts/enhancements will be determined at a later stage.</p> <p>NOTE 2: Features that have been completed may require maintenance. The maintenance will not be tracked in this table.</p> <p>NOTE 3: The specification work was determined to be part of the NFV Release 2 as a continuation of stage 3 work from ETSI GS NFV-IFA 014. The current work item is DGS/NFV-SOL007, and the output deliverable will be ETSI GS NFV-SOL 007.</p> <p>NOTE 4: Additional work is needed for stage 2 to cover aspects of VNF snapshot description for ETSI GS NFV-IFA 011 and gaps in the interface definitions to handle VNF snapshot. This work is envisioned to be handled as "maintenance".</p>				

# History

Document history		
Version	Date	Changes
v0.0.1	2015.11.30	First draft version based on Rel. 3 Feature set from NFV(15)000259r1_2016_Feature_collection_and_recommendation.zip
v0.0.2	2016.05.02	Working draft including change updates to reflect the status of NWI approved at NFV#13 and on April 7 <sup>th</sup> ISG call.
v0.0.3	2016.05.30	Working draft including change updates to reflect the status of NWI approved at NFV#14 and internal TSC review performed at NFV#14.
v0.0.4	2016.06.03	Addressed corrections and enhancements from internal TSC review.
v0.1.0	2016.06.10	First version released to ISG.
v0.1.1	2016.06.27	Correction to "NFV software" usage.
v0.2.0	2016.09.14	Added features R03.F15 and R03.F16 corresponding to capabilities postponed from Release 2 associated to EVE001 and IFA012 work items.
v0.2.1	2016.09.19	Updates: <ul style="list-style-type: none"> <li>- Updated the description and scope of the R03.F12 (CONF&amp;IOP) feature.</li> <li>- Removed the NFV-TST007 work item, which was erroneously added to Release 3 Definition, but it is on work based of Release 2.</li> <li>- Added reference to IFA024 related to R03.F01.</li> </ul>
v0.3.0	2016.10.20	Updates: <ul style="list-style-type: none"> <li>- Added reference to newly approved WI IFA026.</li> <li>- Removed some traceability in NFV_SEC feature, which is no longer needed (List of work items is already provided in the document).</li> <li>- Added new feature from NFVEVE(16)000160r1 and recently approved work item (NFV(16)000322) on NFV License Management. Added corresponding GR work item EVE010.</li> <li>- In addition, some typos corrected.</li> </ul>
v0.4.0	2017.02.20	Updates: <ul style="list-style-type: none"> <li>- Added new feature from approval of NFV(16)000363r1 on NFV-MANO admin domains. Added corresponding GR work item IFA028.</li> <li>- Added new feature from approval of NFV(16)000361r10 on NFV Architecture PaaS corresponding GR work item IFA029.</li> <li>- Removed GR IFA016, IFA017 and IFA024, which had been moved to Rel-2 Description.</li> <li>- Added new GS SEC015 covering feature R03.F08.</li> <li>- Created new clause 4.3.3 to document/list the NFV Release 3 related published deliverables. Moved the TST005 from work item in Table 4.3.2-1 to new Table 4.3.3-1.</li> <li>- Updated the titles of work items already part of Release 3 and added links to the ETSI work program database.</li> <li>- Small description improvements in the Foreword and Scope clauses</li> </ul>
v0.5.0	2017.03.06	Updates after NFV#17: <ul style="list-style-type: none"> <li>- Added new feature from approval of NFV(16)000404r10 on Cloud-Native classification.</li> <li>- Moved the EVE007 and SEC013 from the list of ongoing Release 3 work items (clause 4.3.2) to published deliverables (clause 4.3.3)</li> </ul>



v0.6.0	2017.06.09	<p>Updates after NFV#18 (main changes):</p> <ul style="list-style-type: none"> <li>- Added two new features related to: "Network Slicing" (R03.F21) from approval of NFV(17)000057r1, and "NFV Reliability and Availability" (R03.F22) from approval of NFV(17)000099r3. Added corresponding work items in Table 4.3.2-1.</li> <li>- Updated the feature R03.F12 to include the "specification of benchmarking networks" from approval of NFV(17)000123r1. Added corresponding work item in Table 4.3.2-1.</li> <li>- Clause 4.2: from above points, updated the description/summary in clause 4.2 Objectives.</li> <li>- Clause 4.1: added a NOTE to remind that the Definition document is "a given snapshot" in time. Updated the number of features.</li> <li>- Moved the EVE001 from Table 4.3.2-1 (related work items) to published deliverable Table 4.3.3-1.</li> <li>- 1. Scope: updated timeline of Rel. 3 based on Release 3 timeline presented at NFV#18 Plenary (refer to NFV(17)000138).</li> </ul>
v0.7.0	2017.09.08	<p>Additional updates after NFV#18:</p> <ul style="list-style-type: none"> <li>- Moved the IFA018, IFA019 and IFA023 from Table 4.3.2-1 (related work items) to published deliverables (Table 4.3.3-1).</li> <li>- Corrected the number of features in clause 4.1.</li> <li>- Updated the title of the Release 2 specifications in the references section.</li> </ul>
v0.8.0	2017.11.15	<p>Updates after NFV#19:</p> <ul style="list-style-type: none"> <li>- Feature "Service Orchestration and Network Service Orchestration (NFVO_ARCH)" with ID R03.F06 is voided due to approval of stopping the corresponding work item taken at NFV#19. Updated the list of objectives in clause 4.2.</li> <li>- DGS/NFV-REL010 added to Table 4.3.2-1 with the RC approval of NWI contribution NFV(17)000278r2. In addition, updated the description/scope of NFVSLICE R03.F21 feature.</li> <li>- DGS/NFV-SEC019 added to Table 4.3.2-1 with the approval at NFV#19 of the NWI contribution NFV(17)000245r4.</li> <li>- Added new Annex B to list the candidate features for additional normative work to be used for the WIDs to handle the propagation/evolution of deliverables from Release 2 to Release 3. Table B-1 captures a "snapshot" of the information available in NFV(17)000289r2.</li> <li>- Added new feature R03.F23 (IDENTITY) based on the approval of NWI in contribution NFV(17)000246r5 and creation of NFV-SEC020 work item. Added the NFV-SEC020 to Table 4.3.2-1. Update the list of objectives in clause 4.2.</li> </ul>
v0.9.0	2018.02.26	<p>Updates after NFV#20:</p> <ul style="list-style-type: none"> <li>- Table 4.3.3-1: updated list of completed and published NFV Rel-3 dependent deliverables: NFV-EVE008, NFV-EVE011, NFV-EVE012, NFV-IFA021, NFV-IFA028, NFV-REL006. Deleted the corresponding entries in Table 4.3.2-1.</li> <li>- Table 4.3.2-1: updated list of new work items: DGS/NFV-IFA030 (approval of NFV(17)000293r3), DGS/NFV-IFA031 (approval of NFV(17)000294r1), DGS/NFV-IFA032 (approval of NFV(17)000301r4).</li> <li>- New Table 4.3.2-2 to list the work items of NFV Rel-2 deliverables propagated/evolved into NFV Rel-3 (approval of super-WID contribution in NFV(17)000326r4).</li> </ul>
v0.10.0	2018.05.14	<p>Updates after NFV#21:</p> <ul style="list-style-type: none"> <li>- Restructured the clauses with the NFV Release 3 work items. Changed old 4.3.2 to level-2, and created sub-clauses for the different types of work items. Created introduction sub-clause.</li> <li>- Restructured the clause with the published deliverables. Changed old 4.3.3 to level-2, and created sub-clauses for the different types of deliverables published. Created introduction sub-clause.</li> <li>- Now Table 4.4.2-1: changed type of document of DGS/NFV-IFA012 to Report (according to the approved NFV(18)000067).</li> <li>- Now Table 4.4.2-1: moved the IFA022 into the now Table 4.5.2-1 as the work item has been completed and published.</li> <li>- Now Table 4.4.2-1: moved the published SEC014 into the new Table 4.5.2-1 as the work item has been completed and published.</li> <li>- Clause 4.1: small updates in the description due to the new clause structure.</li> </ul>

v0.11.0	2018.09.17	<p>Updates after NFV#22:</p> <ul style="list-style-type: none"> <li>- Clause 1: update timeline for the completion of Release 3.</li> <li>- Table 4.4.2-1: corrected the reference of IFA012. Delete the IFA030 and IFA031, as these have been completed (in its first version). Added the newly IFA033 and IFA034. Deleted the SEC015, as the work item was stopped.</li> <li>- Table 4.4.3-1: deleted the entries of IFA005 to IFA017 and TST008. First version into release 3 has been completed.</li> <li>- Table 4.5.2-1: added entries for IFA030 and IFA031, which have been completed.</li> <li>- Clause 4.5.3: added content and table with the published first version of deliverables from Rel. 2.</li> <li>- Table B-1: updated the status of features completed at stage 2 level in 1H2018. Added some notes to give additional explanation.</li> </ul>
v0.12.0	2018.11.28	<p>Updates after NFV#23:</p> <ul style="list-style-type: none"> <li>- Clause 4.4.2: deleted entries in clause 4.4.2 and added entries in clause 4.5.2 for TST009, EVE011, IFA012, which have been completed.</li> <li>- Clause 4.4.2: added entries for new work items in Rel. 3: SOL009, SOL010, SOL011 and SOL012.</li> <li>- Clause 4.4.3: added entries for SOL013ed311, SOL002ed311, SOL003ed311, SOL004ed311, and SOL005ed311.</li> <li>- Annex B: added new FEAT18 based on existing R03.F08 and R03.F09 security features. Updated also the status of several features.</li> <li>- Table 4.3.1-1: Updated status of some TBD in several features.</li> </ul>
v0.13.0	2019.04.08	<p>Updates after NFV#25:</p> <ul style="list-style-type: none"> <li>- Annex B, Table B-1: the list of completed features has been updated. FEAT02/05/10 completed from stage 2 pov.</li> <li>- Clause 4.5.3: table has been updated with latest versions of published documents. The IFA024 v3.2.1 has also been added.</li> <li>- Clause 4.5.2: table has been updated with the latest version and addition of the IFA032, which has been published.</li> <li>- Clause 4.4.2: table has been updated removing the IFA032, which has been completed.</li> <li>- Table 4.3.1-1: Entries in the column "Mapping to Architectural Framework ([4] and [5-10])" for the Release 3 features completed at stage 2 in the drop #2 have been updated.</li> </ul>