Title*: **ISG NFV work programme details** as of 2018.09.13
from **Source***: ETSI
Contact: Laurent Vreck
input for **Committee***: NFV
Submission date*: 2018.09.13

Introduction

This contribution provides a snapshot of ISG NFV ongoing and published work. It includes the changes that occurred <u>at</u> and <u>since</u> the NFV#22 plenary.

There are as of today **55 drafts in development** in ISG NFV Workprogramme.

150 Group Reports or Specifications have been **published** since ISG NFV creation (**77 DISTINCT** documents when not counting revisions).

Active WIs / WG
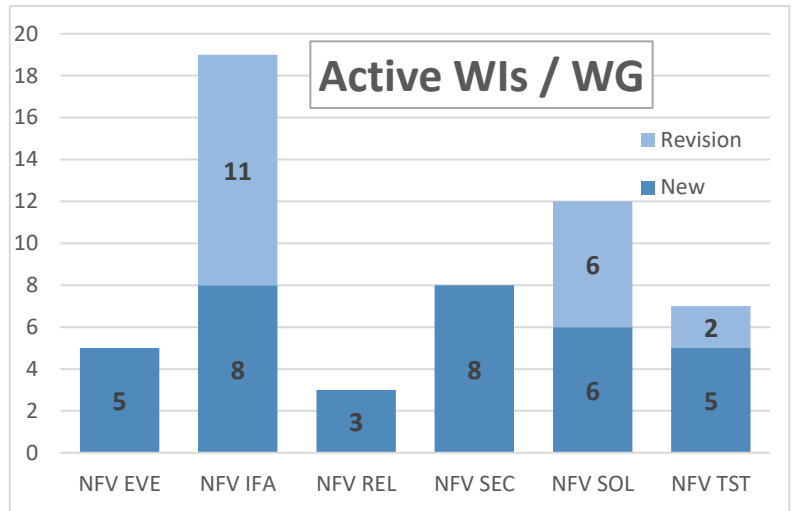
CHANGES SINCE NFV#22

3 WIs STOPPED

- IFA002 ed251, 003 ed251, 004ed251 --> decision by Remote Consensus following the proposal in NFV(18)000166 to not republish the unchanged IFA Rel 2 specifications

1 WI scope changed

- IFA029 Scope changed --> decision by Remote Consensus in NFV(18)000155r1 "IFA029 Change of WI scope"

25 NEW Work Items created

- DGS/NFV-IFA033 "SEC-MANO reference points - Interface Specification"-Leslie WILLIS
  --> Approval by Remote Consensus of NFV(18)000134r1 "Security management: Sc-Or, Sc-Vnfm, Sc-Vi reference points" ratified 2018.05.30

- DGR/NFV-**IFA034** "Licence Management support"-Abinash VISHWAKARMA
  --> Approval by Remote Consensus of NFV(18)000161r2 "VNF License Management Architectural requirements and extensions to NFV-MANO" ratified 2018.07.25.

- DMI/NFV-SOL008 "OpenAPI Work Programme"- Vlademir Brusse
  --> Approval by Remote Consensus of NFV(18)000208r1 ratified 2018.09.12

22 NEW Work Items created following the Remote Consensus approval of the Super WIDs for 2018H2 Release 2 maintenance (**NFV(18)000189r1** download) and 2018H2 Release 3 work continuation (**NFV(18)000190r1** download):

- RGS/NFV-IFA005ed321 - "Or-Vi_ref point - Spec"-Andy BENNETT
- RGS/NFV-IFA006ed321 - "Vi-Vnfm ref point - Spec"-Zarrar YOUSAF
- RGS/NFV-IFA007ed321 - "Or-Vnfm ref point - Spec"-Vlademir BRUSSE
- RGS/NFV-IFA008ed321 - "Ve-Vnfm ref point - Spec"-Xu YANG
- RGS/NFV-IFA010ed321 - "MANO Functional Rqmts - Spec"-Ulrich KLEBER
- RGS/NFV-IFA011ed261 - "VNF Packaging - Spec"-Rajavarma BHYRRAJU
- RGS/NFV-IFA011ed321 - "VNF Packaging - Spec"-Rajavarma BHYRRAJU
- RGS/NFV-IFA013ed321 - "Os-Ma-Nfvo ref point Spec - info model"-Ulrich KLEBER
- RGS/NFV-IFA014ed261 - "Network Service Templates - Spec"-Janusz PIECZERAK
- RGS/NFV-IFA014ed321 - "Network Service Templates - Spec"-Janusz PIECZERAK
- DGS/NFV-IFA030ed321 - "Multi Domain MANO - spec"-Haitao XIA
- DGS/NFV-IFA031ed321 - "NFV-MANO mgmt - spec"-Yusuke OKAZAKI
- RGS/NFV-SOL002ed261 - "Ve-Vnfm RESTful protocols - spec"-Jong-Hwa YI
- RGS/NFV-SOL002ed311 - "Ve-Vnfm RESTful protocols - spec"-Yuya KUNO
- RGS/NFV-SOL003ed261 - "Or-Vnfm RESTful_protocols - spec"-Uwe RAUSCHENBACH

- RGS/NFV-SOL003ed311 - "Or-Vnfm RESTful_protocols - spec"-Uwe RAUSCHENBACH
- RGS/NFV-SOL004ed261 - "VNF Package Stage 3 - spec"-Andrei KOJUKHOV
- RGS/NFV-SOL004ed311 - "VNF Package Stage 3 - spec"-Andrei KOJUKHOV
- DGS/NFV-SOL005ed261 - "Os-Ma-nfvo APIs - spec"-Vlademir BRUSSE
- DGS/NFV-SOL005ed311 - "Os-Ma-nfvo APIs - spec"-Vlademir BRUSSE
- RGR/NFV-TST007ed261 - "MANO Iop Testing Guidelines"-Carsten ROSSENHOEVEL
- RGS/NFV-TST008ed321 - "NFVI Compute & Nwk Metrics - Spec"-Al MORTON

31 deliverables PUBLISHED:

Summer 2018 Batch#1 : 25 GRs and GSs published on the 10th of August.

Summer 2018 Batch#2 : 6 GRs and GSs published early September.

- GS NFV 003 v1.4.1 Terminology-Julien MAISONNEUVE
- GS NFV-IFA 005 v2.5.1 Or-Vi_ref point Spec-Andy BENNETT
- GS NFV-IFA 005 v3.1.1 Or-Vi_ref point Spec-Andy BENNETT
- GS NFV-IFA 006 v3.1.1 Vi-Vnfm ref point Spec-Zarrar YOUSAF
- GS NFV-IFA 006 v2.5.1 Vi-Vnfm ref point Spec-Zarrar YOUSAF
- GS NFV-IFA 007 v2.5.1 Or-Vnfm ref point Spec-Ernest BAYHA
- GS NFV-IFA 007 v3.1.1 Or-Vnfm ref point Spec-Ernest BAYHA
- GS NFV-IFA 008 v2.5.1 Ve-Vnfm ref point Spec-Xu YANG
- GS NFV-IFA 008 v3.1.1 Ve-Vnfm ref point Spec-Xu YANG
- GS NFV-IFA 010 v3.1.1 MANO Functional Rqmts Spec-Ulrich KLEBER
- GS NFV-IFA 010 v2.5.1 MANO Functional Rqmts Spec-Ulrich KLEBER
- GS NFV-IFA 011 v3.1.1 VNF Packaging Spec-Haibin CHU
- GS NFV-IFA 011 v2.5.1 VNF Packaging Spec-Haibin CHU
- GS NFV-IFA 013 v2.5.1 Os-Ma-Nfvo ref_point Spec - info model-Marc FLAUW
- GS NFV-IFA 013 v3.1.1 Os-Ma-Nfvo ref_point Spec - info model-Marc FLAUW
- GS NFV-IFA 014 v3.1.1 Network Service Templates Spec-Janusz PIECZERAK
- GS NFV-IFA 014 v2.5.1 Network Service Templates Spec-Janusz PIECZERAK
- GR NFV-IFA 015 v3.1.1 Info Model Report-Marc FLAUW
- GR NFV-IFA 015 v2.5.1 Info Model Report-Marc FLAUW
- GR NFV-IFA 016 v2.5.1 Papyrus Guidelines-Marc FLAUW
- GR NFV-IFA 016 v3.1.1 Papyrus Guidelines-Marc FLAUW
- GR NFV-IFA 017 v3.1.1 UML Modeling Guidelines-Marc FLAUW
- GR NFV-IFA 017 v2.5.1 UML Modeling Guidelines-Marc FLAUW
- GS NFV-IFA 030 v3.1.1 Multi Domain MANO spec-Haitao XIA
- GS NFV-IFA 031 v3.1.1 NFV-MANO_mgmt_spec-Yusuke OKAZAKI
- GS NFV-SOL 002 v2.5.1 Ve-Vnfm RESTful protocols spec-Jong-Hwa YI
- GS NFV-SOL 003 v2.5.1 Or-Vnfm RESTful_protocols spec-Uwe RAUSCHENBACH
- GS NFV-SOL 004 v2.5.1 VNF Package Stage 3 spec-Andrei KOJUKHOV
- GR NFV-TST 007 v2.5.1 MANO Iop Testing Guidelines-Carsten ROSSENHOEVEL
- GS NFV-TST 008 v2.5.1 NFVI Compute and Nwk Metrics - Spec-Al MORTON
- GS NFV-TST 008 v3.1.1 NFVI Compute and Nwk Metrics - Spec-Al MORTON

CHANGES @ NFV#22

1 Final Daft APPROVED for publication:

- **DGS/NFV-IFA027** "Performance Measurements Specification" ==> **PUBLISHED** (25 May)

1 NEW Work Items APPROVED:

- **DGR/NFV-TST011** "Test Domain and Description Language Recommendations"

1 NEW Work Items sent to Remove Consensus for Approval:

- NFV(18)000134r1 **APPROVED** (30 May) as **DGS/NFV-IFA033** "SEC-MANO ref points - Interface Spec"

1 Work Item STOPPED:

- **DGS/NFV-SEC015** "Security Specification for other MANO reference points"

Other changes:

3 Work Item Rapporteurs changed

- IFA026: was Anatoly Andrianov (Nokia) –changed-to--> Alex Leadbeater (BT).
- SOL006: was Bruce THOMPSON (Cisco) –changed-to--> to Mahesh Jethanandani (Cisco).

- <u>TST007ed251</u>: was Akram AL SAWAF (EANC) –changed-to--> Carsten ROSSENHOEVEL (EANTC)

1 Work Item Scope changed

- o <u>IFA026</u>. See scope change in contribution NFV(18)000127

1 Work Item MOVED from WG IFA to WG EVE

"Real-time/ultra-low latency aspects report": was **IFA025** –moved-to-WG-EVE--> now **<u>EVE017</u>**

Table of Contents

SUMMARY views of work in development

Note: hyperlinks under WI References link to detailed Work Item information on ETSI portal, the current Ver hyperlinks link to the latest draft file (at snapshot time).

Reference	Rapporteur	Current status	Current Ver	Early Draft	Stable Draft	Final draft	WG App	TB App	PUB as v
DMI/NFV-EVE006 "NFV Industry Roadmap"	Tony SABOORIAN	Early draft	0.0.9	**Feb 2018**	Jul 2018	Aug 2018	Aug 2018	Sep 2018	
DGS/NFV-EVE011 "Cloud Native VNF Classification Spec"	Marcus BRUNNER	Stable draft	0.0.19		**Sep 2018**	Aug 2018	Aug 2018	Sep 2018	3.1.1
DMI/NFV-EVE015 "Measuring Adoption"	Cecilia CORBI	Early draft	0.0.1	**Aug 2018**	Jun 2018	Nov 2018	Nov 2018		
DGR/NFV-EVE016 "Report on Connection-based Virtual Services"	Mehmet TOY	Early draft	0.0.1	**Dec 2017**	Dec 2018	Jan 2019	Jan 2019	Feb 2019	1.1.1
DGR/NFV-EVE017 "Real-time/ultra-low latency aspects report"	Zarrar YOUSAF	Early draft	0.0.3	**Jun 2018**	Dec 2018	Jan 2019	Jan 2019	Feb 2019	1.1.1
RGS/NFV-IFA002ed321 "Acceleration - VNF Intface Spec"	Abdel Hafiz RABI	Start of work		Feb 2018	Mar 2018	May 2018	May 2018	Jun 2018	3.1.1
DGS/NFV-IFA033 "SEC-MANO ref points - Intface Spec"	Leslie WILLIS	Early draft	0.0.1	**Sep 2018**	Nov 2018	Nov 2018		Dec 2018	3.1.1
DGR/NFV-IFA034 "Licence Management support"	Abinash VISHWAKARMA	Adoption of WI		Sep 2018	Oct 2018	Nov 2018		Dec 2018	3.1.1
RGS/NFV-IFA005ed321 "Or-Vi ref point - Spec"	Andy BENNETT	Adoption of WI				Dec 2018	Dec 2018	Jan 2019	3.2.1
RGS/NFV-IFA006ed321 "Vi-Vnfm ref point - Spec"	Zarrar YOUSAF	Adoption of WI				Dec 2018	Dec 2018	Jan 2019	3.2.1
RGS/NFV-IFA007ed321 "Or-Vnfm ref point - Spec"	Vlademir BRUSSE	Adoption of WI				Dec 2018	Dec 2018	Jan 2019	3.2.1
RGS/NFV-IFA008ed321 "Ve-Vnfm ref point - Spec"	Xu YANG	Adoption of WI				Dec 2018	Dec 2018	Jan 2019	3.2.1
RGS/NFV-IFA010ed321 "MANO Functional Rqmts - Spec"	Ulrich KLEBER	Adoption of WI				Dec 2018	Dec 2018	Jan 2019	3.2.1
DGR/NFV-IFA012 "Os-Ma-Nfvo ref point Spec - svc mgmt & info model"	Michael KLOTZ	Stable draft	0.12.0		**Aug 2018**	Dec 2018	Dec 2018	Jan 2019	3.1.1
RGS/NFV-IFA011ed261 "VNF Packaging - Spec"	Rajavarma BHYRRAJU	Adoption of WI	_			Dec 2018	Dec 2018	Jan 2019	2.6.1
RGS/NFV-IFA011ed321 "VNF Packaging - Spec"	Rajavarma BHYRRAJU	Adoption of WI				Dec 2018	Dec 2018	Jan 2019	3.2.1
RGS/NFV-IFA013ed321 "Os-Ma-Nfvo ref point Spec - info model"	Ulrich KLEBER	Early draft	3.1.2	**Aug 2018**		Dec 2018	Dec 2018	Jan 2019	3.2.1
DGS/NFV-IFA026 "Architecture enhancement for Sec Mgmt Spec"	Alex LEADBEATER	Early draft	0.3.0	**Aug 2017**	Mar 2019	Apr 2019	Apr 2019	May 2019	3.1.1
DGR/NFV-IFA029 "Arch. enhancement for Cloud-native & PaaS"	Marcus BRUNNER	Early draft	0.9.0	**Aug 2018**	Nov 2018	Dec 2018	Dec 2018	Jan 2019	3.1.1
RGS/NFV-IFA014ed261 "Network Service Templates Spec"	Janusz PIECZERAK	Adoption of WI				Dec 2018	Dec 2018	Jan 2019	2.6.1
RGS/NFV-IFA014ed321 "Network Service Templates Spec"	Janusz PIECZERAK	Adoption of WI				Dec 2018	Dec 2018	Jan 2019	3.2.1
DGS/NFV-IFA032 "Multi-site Intfaces & InfoModel spec"	Zarrar YOUSAF	Early draft	0.4.0	**Jul 2018**	Dec 2018	Jan 2019	Jan 2019	Feb 2019	3.1.1
DGS/NFV-IFA030ed321 "Multi Domain MANO - spec"	Haitao XIA	Early draft	3.1.1	**Sep 2018**		Dec 2018	Dec 2018	Jan 2019	3.2.1
DGS/NFV-IFA031ed321 "NFV-MANO mgmt - spec"	Yusuke OKAZAKI	Adoption of WI				Dec 2018	Dec 2018	Jan 2019	3.2.1
DGR/NFV-REL008 "Error Handling report"	Stefan ARNTZEN	Early draft	0.0.6	**Sep 2018**	Jul 2018	Aug 2018	Sep 2018	Oct 2018	1.1.1
DGS/NFV-REL009 "NFV Reliability Requirements"	Percy TARAPORE	Early draft	0.0.4	**Jun 2018**	Sep 2018	Nov 2018	Nov 2018	Dec 2018	1.1.1
DGR/NFV-REL010 "Resiliency for Network Slicing report"	Chidung LAC	Early draft	0.0.4	**Sep 2018**	Sep 2018	Oct 2018	Nov 2018	Dec 2018	1.1.1

Reference	Rapporteur	Current status	Current Ver	Early Draft	Stable Draft	Final draft	WG App	TB App	PUB as v
DGR/NFV-SEC005 "Certificate mgmt report"	Li FENG	Early draft	0.0.12	**Jun 2018**	Mar 2018	Jun 2018	Jun 2018	Sep 2018	1.1.1
DGR/NFV-SEC016 "Location, locstamp and timestamp"	Pierre COURBON	Early draft	0.0.2	**Feb 2018**	Sep 2018	Nov 2018	Jan 2019	Feb 2019	1.1.1
DGR/NFV-SEC017 "Sec Pol Guidelines Report"	Fei LI	Early draft	0.0.3	**May 2018**	Sep 2018	Dec 2018	Jan 2019	Feb 2019	1.1.1
DGR/NFV-SEC018 "Remote Attestation Architecture report"	Andre REIN	Early draft	0.0.6	**Dec 2017**	May 2018	Dec 2018	Jan 2019	Feb 2019	1.1.1
DGS/NFV-SEC019 "Architecture for Sec enhancement Spec"	Alex LEADBEATER	Start of work		May 2018	Jul 2018	Dec 2018	Jan 2019	Feb 2019	3.1.1
DGS/NFV-SEC020 "Id Mgmt & Security spec"	Leslie WILLIS	Start of work		May 2018	Nov 2018	Dec 2018	Dec 2018	Jan 2019	3.1.1
DGS/NFV-SEC021 "VNF Package Security Spec"	Pradheep SINGARAVELU	Stable draft	0.0.2		**Jun 2018**	Dec 2017	Dec 2017	Jan 2019	2.4.1
DGS/NFV-SEC022 "API Access Token Spec"	Anne-Marie PRADEN	Early draft	0.0.5	**Sep 2018**	May 2018	Nov 2018	Nov 2018	Dec 2018	2.1.1
DGS/NFV-SOL001 "TOSCA-based NFV descriptors spec"	Shitao LI	Early draft	0.10.0	**Aug 2018**	Jul 2018	Aug 2018	Aug 2018	Sep 2018	2.4.1
RGS/NFV-SOL002ed261 "Ve-Vnfm RESTful protocols - spec"	Jong-Hwa YI	Adoption of WI				Dec 2018	Dec 2018	Jan 2019	2.6.1
RGS/NFV-SOL002ed311 "Ve-Vnfm RESTful protocols - spec"	Yuya KUNO	Adoption of WI				Dec 2018	Dec 2018	Jan 2019	3.1.1
RGS/NFV-SOL003ed261 "Or-Vnfm RESTful protocols - spec"	Uwe RAUSCHENBACH	Adoption of WI				Dec 2018	Dec 2018	Jan 2019	2.6.1
RGS/NFV-SOL003ed311 "Or-Vnfm RESTful protocols - spec"	Uwe RAUSCHENBACH	Adoption of WI				Dec 2018	Dec 2018	Jan 2019	3.1.1
RGS/NFV-SOL004ed261 "VNF Package Stage 3 - spec"	Andrei KOJUKHOV	Adoption of WI				Dec 2018	Dec 2018	Jan 2019	2.6.1
RGS/NFV-SOL004ed311 "VNF Package Stage 3 - spec"	Andrei KOJUKHOV	Adoption of WI				Dec 2018	Dec 2018	Jan 2019	3.1.1
DGS/NFV-SOL005ed251 "Os-Ma-nfvo APIs"	Ernest BAYHA	Draft receipt by ETSI Secretariat	2.4.8					Sep 2018	2.5.1
DGS/NFV-SOL005ed261 "Os-Ma-nfvo APIs - spec"	Vlademir BRUSSE	Adoption of WI				Dec 2018	Dec 2018	Jan 2019	2.6.1
DGS/NFV-SOL005ed311 "Os-Ma-nfvo APIs - spec"	Vlademir BRUSSE	Adoption of WI				Dec 2018	Dec 2018	Jan 2019	3.1.1
DGS/NFV-SOL006 "YANG based NFV Descriptors spec"	Mahesh JETHANANDANI	Early draft	0.0.2	**Oct 2017**	Dec 2018	Feb 2019	Feb 2019	Mar 2019	2.4.1
DGS/NFV-SOL007 "NSD file structure spec"	Manchang JU	Early draft	0.0.3	**Aug 2018**	Sep 2018	Oct 2018	Oct 2018	Nov 2018	2.6.1
RGR/NFV-TST007ed261 "MANO Iop Testing Guidelines"	Carsten ROSSENHOEVEL	Adoption of WI				Dec 2018	Dec 2018	Jan 2018	2.6.1
DMI/NFV-TST003 "Open Source Components for NFV"	Gergely CSATARI	Final draft				**Sep 2017**	Nov 2017	Dec 2017	
DGR/NFV-TST006 "CICD & Devops report"	Pierre LYNCH	Stable draft	0.0.9		**May 2018**	Oct 2018	Nov 2018	Dec 2018	1.1.1
RGS/NFV-TST008ed321 "NFVI Compute & Nwk Metrics - Spec"	Al MORTON	Adoption of WI				Dec 2018	Dec 2018	Jan 2019	3.2.1
DMI/NFV-SOL008 "OpenAPI Work Programme"	Vlademir BRUSSE	Adoption of WI							
DGS/NFV-TST009 "NFVI_Benchmarks"	Al MORTON	Final draft	0.0.15			**Aug 2018**	Aug 2018	Sep 2018	1.1.1
DGS/NFV-TST010 "API Conformance Testing"	Pierre LYNCH	Early draft	0.0.3	**Aug 2018**	Dec 2018	Apr 2019	Apr 2019	May 2019	2.1.1
DGR/NFV-TST011 "Tst Domain & Description Lang."	Frank MASSOUDIAN	Early draft	0.0.3	**Aug 2018**		Nov 2018		Dec 2018	1.1.1

DETAILED view of active Work Items

EVE: 5 active Work Items

DMI/NFV-EVE006 **NFV Industry Roadmap**	Rapporteur: Tony SABOORIAN Huawei

Title: Network Functions Virtualisation (NFV); Ecosystem Report on NFV Industry Roadmap

Working title: *NFV Industry Roadmap*

Current status: Early draft since 2018.02.27   version 0.0.9 | **Next** status TB approval by 2018.09.15

Current draft: http://docbox.etsi.org/ISG/NFV/EVE/70-DRAFT/EVE006/NFV-EVE006v009.zip as of 2018.09.26

Early draft plan: 2018.02.27	**WG** Approval plan: 2018.08.10	**Pub** Plan: as v
Stable draft plan: 2018.07.13	**TB** Approval plan: 2018.09.15	
Final draft plan: 2018.08.10		

Scope: *This Miscellaneous Item proposes the development of an industry roadmap for NFV. This Miscellaneous Item is expected to include information on the current planned activities of the ISG in terms of its deliverables, as well as information from other industry bodies (both specification development bodies as well as open source communities) on their expected deliverables which are either (i) dependent on NFV activities, or where (ii) NFV ISG activities are dependent on activities in those other bodies.*
From the ISG mission statement: "The NFV ISG's mission is to facilitate the industry transformation and development of an open, interoperable, ecosystem through specification, implementation and deployment experience. As the focal-point for the NFV ecosystem, the ISG maintains core NFV documentation, including an architectural framework and associated technical requirements, as well as liaison relationships with other specialist SDOs and industry alliances contributing technology or applying NFV concepts within their specializations…As the focal point for the NFV ecosystem, the ISG provides direction for NFV related messaging, conferences and events as well as proactively fostering continuing innovation in the NFV concept in academic research communities."
The roadmap should include identification of other industry bodies with relevant NFV work programs, their deliverable milestones and the dependencies with the ETSI NFV ISG work program.
The information in this MI is recognized as being subject to change as the work unfolds in various industry bodies. As a Miscellaneous Item, the results of this work item will not lead to any type of ETSI deliverable. Instead, outputs of this MI will include (among others): status reports, presentations, etc., delivered in a continuous manner. Results of this WI, approved by the ISG, can be made available in the NFV Open Area on a roughly quarterly basis.

Adoption: 2015.02.24   Support Companies: *ORANGE, Nokia, Ericsson, TELEFONICA, DT, CableLabs, DOCOMO, AT&T, Huawei (UK)*

DGS/NFV-EVE011 **Cloud Native VNF Classification Spec**	Rapporteur: Marcus BRUNNER SWISSCOM

Title: Network Functions Virtualisation (NFV) Release 3; Virtualised Network Function; Specification of the Classification of Cloud Native VNF implementations

Working title: *Cloud Native VNF Classification Spec*

Current status: Stable draft since 2018.09.10   version 0.0.19 | **Next** status Final draft for approval by 2018.08.23 late!

Current draft: http://docbox.etsi.org/ISG/NFV/Open/Drafts/EVE011_Cloud_Native_VNF_Classification_Spec/NFV-EVE011v0019.docx as of 2018.09.26

Early draft plan:	**WG** Approval plan: 2018.08.30	**Pub** Plan: 2018.11.07 as v3.1.1
Stable draft plan: 2018.09.10	**TB** Approval plan: 2018.09.26	
Final draft plan: 2018.08.23		

Scope: *In an NFV environment, network operators are expected to configure and deploy VNFs from multiple vendors onto a common platform.*
This document will specify a set of non-functional parameters to classify and characterize any VNF implementation including, for example, level of separation of logic and state, degree of scale-out, memory footprint, use of accelerators, and more.This specification will contain normative provisions in order to classify the VNF implementations as cloud native.

Adoption: 2017.02.24   Support Companies: *SWISSCOM, TELEFONICA, Telecom Italia, VODAFONE Group Plc, DT, CableLabs, Amdocs Software Systems Ltd, ZTE, AT&T, Huawei, Canonical Group Limited*

DMI/NFV-EVE015	**Measuring Adoption**	Rapporteur:	Cecilia CORBI Telecom Italia

Title:	Network Functions Virtualisation (NFV) Ecosystem Measuring Adoption of NFV specifications

Working title:	*Measuring Adoption*

Current status: Early draft since 2018.08.27   version 0.0.1   **Next** status Stable draft by 2018.06.15 late!

Current draft: http://docbox.etsi.org/ISG/NFV/Open/Drafts/EVE015_Measuring_Adoption/NFV-EVE015v001.rar as of 2018.09.26

Early draft plan:	2018.08.27	**WG** Approval plan:	2018.11.30	**Pub** Plan: 2018.12.31 as v
Stable draft plan:	2018.06.15	**TB** Approval plan:		
Final draft plan:	2018.11.30			

Scope: *This work item aims at gathering information from standardization bodies, open source communities, collaborative research projects and other industry players on the level of adoption of ETSI NFV specifications, with emphasis on*
- solutions
- specifications (i.e. protocols, APIs and data models). This information will help the ISG define corrective measures to overcome identified adoption issues.
The outcome of this work item will include a report, in the form of a PowerPoint presentation along with a narrative document on the level of industry adoption of ISG NFV specifications and recommendations on actions, if any, needing to be taken to encourage more adoption. Parts of this deliverable might be published on the ETSI NFV Web page or Wiki page.

Adoption: 2017.08.18   Support Companies: *ORANGE, PT PORTUGAL, TELEFONICA, Telecom Italia, CableLabs, DOCOMO*

DGR/NFV-EVE016	**Report on Connection-based Virtual Services**	Rapporteur:	Mehmet TOY Verizon

Title:	Network Functions Virtualisation (NFV); Evolution and Ecosystem; Report on Connection-based Virtual Services

Working title:	*Report on Connection-based Virtual Services*

Current status: Early draft since 2017.12.21   version 0.0.1   **Next** status Stable draft by 2018.12.06

Current draft: http://docbox.etsi.org/ISG/NFV/Open/Drafts/EVE016_Connection-based_Virtual_Services_Report/NFV-EVE016v001.docx as of 2018.09.26

Early draft plan:	2017.12.21	**WG** Approval plan:	2019.01.28	**Pub** Plan: 2019.04.11 as v1.1.1
Stable draft plan:	2018.12.06	**TB** Approval plan:	2019.02.28	
Final draft plan:	2019.01.28			

Scope: *Connection based Virtual Services are provided over connections between a service user and applications hosted by a data center in the cloud (e.g. Virtual Services defined by MEF).*
This Work Item will:
- Describe use cases and identify gaps within the NFV Architecture Framework to support connection-based Virtual Services;
- Identify recommendations for interfaces of service user and virtual resources (e.g. VM, Containers), and interfaces between Cloud Service Providers(cSPs) , including the interface between Telco and cSP, to support the virtual services ;
- Identify recommendations for connection and connection end points to support the virtual services.
Note that the NFV Charging capabilities within EVE-008 and NFV Security capabilities within IFA 026, NFV Multi Domain within IFA-028 and NFV Multisite within IFA-022 may be applied to work of this Work Item.

Adoption: 2017.09.16   Support Companies: *IBM EUROPE, DT, ZTE, Gemalto N.V., Verizon*

DGR/NFV-EVE017	Real-time/ultra-low latency aspects report	Rapporteur:	Zarrar YOUSAF NEC

Title: Network Functions Virtualisation (NFV);
Management and Orchestration;
Report on the support of real-time/ultra-low latency aspects in NFV related to service and network handling

Working title: *Real-time/ultra-low latency aspects report*

Current status: Early draft since 2018.06.01   version 0.0.3 | **Next** status Stable draft by 2018.12.06

Current draft: http://docbox.etsi.org/ISG/NFV/Open/Drafts/EVE017_RT_ultra-low_latency_report/NFV-EVE017v003.zip as of 2018.09.26

Early draft plan: 2018.06.01	**WG** Approval plan: 2019.01.28	**Pub** Plan: 2019.04.11 as v1.1.1
Stable draft plan: 2018.12.06	**TB** Approval plan: 2019.02.28	
Final draft plan: 2019.01.28		

Scope: *The work item will encompass activities related to real-time management and orchestration of ultra low latency services. This work item covers*

    - Definition of relevant use cases (potentially from any of the following areas: Automotive industry, health care, entertainment and gaming)

    - Analysis of the NFV MANO architectural framework including interfaces regarding gaps to support the real-time realisation of such use cases

    - Provision of recommendations concerning adaption of the NFV architecture, if necessary

    - Provision of recommendations for the update of existing interfaces and/or the creation of new interface(s), if necessary. The work and the deliverable will be informative.

Adoption: 2016.09.23   Support Companies: *NEC, TeliaSonera AB, DT, NetCracker, CENX Inc., iconectiv*

IFA: 19 active Work Items

RGS/NFV-IFA002ed321 **Acceleration - VNF Intface Spec**	Rapporteur:	Abdel Hafiz RABI
		VODAFONE Group Plc

Title:	Network Functions Virtualisation (NFV) Release 3; Acceleration Technologies; VNF Interfaces Specification

Working title: *Acceleration - VNF Intface Spec*

Current status: Start of work since 2017.12.08	**Next** status Early draft by 2018.02.01 late!

No draft available as of 2018.09.26

Early draft plan: 2018.02.01	**WG** Approval plan: 2018.05.24	
Stable draft plan: 2018.03.01		**Pub** Plan: 2018.07.26 as v3.1.1
Final draft plan: 2018.05.24	**TB** Approval plan: 2018.06.21	

Scope: *This revision of NFV-IFA 002 propagates the deliverable into NFV Release 3.*

This edition will add requirements and specification of interfaces to support the Release 3 features, and it will extend the scope of the former Release 2 edition summarized hereafter:

The scope of this work item is to specify:

1) Requirements for a set of abstract interfaces, enabling a VNF to leverage acceleration services from the infrastructure, regardless of their implementation.

2) A deployment model of the above interfaces.

The list of abstract interfaces to be specified will be derived from the use cases described in IFA 001 (Overview and Use Cases) of the multi-part GS on NFV Acceleration. Results will be a normative specification .

Adoption: 2017.12.08   Support Companies: *Vodafone Group Plc, PT Portugal, Orange, TELEFONICA*

RGS/NFV-IFA005ed321 **Or-Vi ref point - Spec**	Rapporteur:	Andy BENNETT
		Samsung R&D Institute UK

Title:	Network Functions Virtualisation (NFV) Release 3; Management and Orchestration; Or-Vi reference point - Interface and Information Model Specification

Working title: *Or-Vi ref point - Spec*

Current status: TB adoption of WI since 2018.08.24	**Next** status Start of work by 2018.08.24 late!

No draft available as of 2018.09.26

Early draft plan:	**WG** Approval plan: 2018.12.31	
Stable draft plan:		**Pub** Plan: 2019.02.18 as v3.2.1
Final draft plan: 2018.12.31	**TB** Approval plan: 2019.01.31	

Scope: *This revision of NFV-IFA 005 continues the development of the specification as part of the NFV Release 3.*

This edition will add requirements and specification of interfaces and associated information model to support the Release 3 features, and it will extend the scope of the former Release 2 edition summarized hereafter:

This Work Item describe the complete functional requirements for interfaces on the Or-Vi reference point between the NFVO and the VIM(s), to address the functions specified in GS NFV MAN 001.

The work will include:

1) Detailed description of interfaces and its operations functionality, and

2) Information elements of:

   a) Virtualized resource management interfaces, for:

     i) Lifecycle management of virtualized resources, including instantiation, modification, configuration and termination of such virtualized resources.

     ii) Fault management of virtualized resources.

     iii) Performance management of virtualized resources.

   b) Resource orchestration interfaces, for:

     i) Virtualized resources/NFVI capacity management.

     ii) Resources reservation management.

     iii) Virtualized resources information management.

     iv) Software image management,

     v) NFP management.

The resulting deliverable will contain normative provisions.

This revision of NFV-IFA 005 will address the Release 3 candidate features listed in Annex B of the Release 3 Definition (v0.10.0).

Where needed, it will continue the previous version to enhance and complete the specified Release 3 features.

This revision will reflect the maintenance performed to NFV Release 2 documentation and of already specified Release 3 features.

Adoption: 2018.08.24   Support Companies: *Samsung, PT Portugal, DOCOMO, Telefonica*

RGS/NFV-IFA006ed321 **Vi-Vnfm ref point - Spec**	Rapporteur:	Zarrar YOUSAF NEC

Title:	Network Functions Virtualisation (NFV) Release 3; Management and Orchestration; Vi-Vnfm reference point - Interface and Information Model Specification

Working title:	*Vi-Vnfm ref point - Spec*

Current status: TB adoption of WI since 2018.08.24	**Next** status Start of work by 2018.08.24 late!

No draft available as of 2018.09.26

Early draft plan:	**WG** Approval plan: 2018.12.31	**Pub** Plan: 2019.02.18 as v3.2.1
Stable draft plan:	**TB** Approval plan: 2019.01.31	
Final draft plan: 2018.12.31		

Scope: *This revision of NFV-IFA 006 continues the development of the specification as part of the NFV Release 3.*
This edition will add requirements and specification of interfaces and associated information model to support the Release 3 features, and it will extend the scope of the former Release 2 edition summarized hereafter:
This Work Item will describe the complete functional requirements for interfaces on the Vi-Vnfm reference point in between the VNFM and the VIM(s), to address the functions specified in GS NFV MAN 001. The results of the work item will include:
1) Detailed description of interfaces and its operations functionality, and
2) Information elements of:
* a) Virtualized resource management interfaces, for:*
*   i) Lifecycle management of virtualized resources, including instantiation, modification, configuration and termination of such virtualized resources.*
*   ii) Fault management of virtualized resources.*
*   iii) Performance management of virtualized resources.*
* b) Resource management interfaces, for:*
*   i) Resources reservation information retrieval.*
*   ii) Virtualized resources information retrieval.*
*   iii) Software image management.*
The resulting deliverable will contain normative provisions.
This revision of NFV-IFA 006 will address the Release 3 candidate features listed in Annex B of the Release 3 Definition (v0.10.0).
Where needed, it will continue the previous version to enhance and complete the specified Release 3 features.
This revision will reflect the maintenance performed to NFV Release 2 documentation and of already specified Release 3 features.

Adoption: 2018.08.24   Support Companies: *NEC, PT Portugal, DOCOMO, Telefonica*

RGS/NFV-IFA007ed321 **Or-Vnfm ref point - Spec**	Rapporteur:	Vlademir BRUSSE Ericsson

Title:	Network Functions Virtualisation (NFV) Release 3; Management and Orchestration; Or-Vnfm reference point - Interface and Information Model Specification

Working title:	*Or-Vnfm ref point - Spec*

Current status: TB adoption of WI since 2018.08.24	**Next** status Start of work by 2018.08.24 late!

No draft available as of 2018.09.26

Early draft plan:	**WG** Approval plan: 2018.12.31	**Pub** Plan: 2019.02.08 as v3.2.1
Stable draft plan:	**TB** Approval plan: 2019.01.31	
Final draft plan: 2018.12.31		

Scope: *This revision of NFV-IFA 007 continues the development of the specification as part of the NFV Release 3.*
This edition will add requirements and specification of interfaces and associated information model to support the Release 3 features, and it will extend the scope of the former Release 2 edition summarized hereafter:
The scope of the Work Item will include the complete functional requirements for interfaces on the Or-Vnfm reference point between the VNFM and the NFVO, to address the functions specified in GS NFV MAN 001.
The results of the work item will include:
1) Detailed description of interfaces and its operations functionality.
2) Information flows and information elements of:
a) VNF lifecycle management interfaces, for:
i) Lifecycle management of VNFs, including the instantiation, modification, update, scaling and termination of VNFs.
ii) Lifecycle change notifications of VNFs.
b) VNF orchestration interfaces, for:
i) Lifecycle operation and resource granting.
c) Other related VNF management interfaces, for:
i) VNF fault information retrieval and management.
ii) VNF performance information retrieval and management.
iii) VNF package management.
iv) Policy management.
The resulting deliverable will contain normative provisions.

RGS/NFV-IFA008ed321 **Ve-Vnfm ref point - Spec**	Rapporteur:	Xu YANG Huawei

Title:	Network Functions Virtualisation (NFV) Release 3; Management and Orchestration; Ve-Vnfm reference point - Interface and Information Model Specification		
Working title:	*Ve-Vnfm ref point - Spec*		

Current status: TB adoption of WI since 2018.08.24	**Next** status Start of work by 2018.08.24 late!
No draft available as of 2018.09.26	

Early draft plan:		**WG** Approval plan: 2018.12.31	**Pub** Plan: 2019.02.18 as v3.2.1
Stable draft plan:		**TB** Approval plan: 2019.01.31	
Final draft plan: 2018.12.31			

Scope: *This revision of NFV-IFA 008 continues the development of the specification as part of the NFV Release 3.*
This edition will add requirements and specification of interfaces and associated information model to support the Release 3 features, and it will extend the scope of the former Release 2 edition summarized hereafter:
The reference point Ve-Vnfm described as part of the NFV architecture framework in GS NFV002 is actually further split in the informative GS NFV MAN001 in two reference points - one between the VNF Manager and a VNF (Ve-Vnfm-vnf) and one between the VNF Manager and an EM associated with that VNF (Ve-Vnfm-em); these reference points are mainly used for the lifecycle management of that VNF. The scope of the Work Item will include the functional and information requirements of all VNF management interfaces over the reference points between the VNFM and theVNF/EM, based on which complete interfaces technical specifications can subsequently be defined, for interoperability purposes.
The results of the work item will include:
• *Detailed description of interfaces and its operations functionality.*
• *Detailed information model requirements of related VNF lifecycle management interfaces, for:*
- *Lifecycle management of VNFs, including the instantiation, modification, update, scaling, healing and termination of VNFs.*
- *Lifecycle change notifications of VNFs.*
• *Detailed information model requirements of other related generic VNF management interfaces, for:*
- *VNF fault management.*
- *VNF performance management.*
- *VNF configuration*
• *Detailed information model requirements of any other generic VNF management interfaces (new and/or previously described in GS NFV MAN 001) needed to be exposed between in support of VNF/EM and VNFM, in support of necessary VNF-related management operations.*
• *Validation of interface operations and information model requirements against end-to-end flows. Data models/schemas and protocols needed to implement the detailed functional requirements are not covered in this deliverable.*
The WI will leverage GS NFV MAN001 and will consider any applicable other guidelines, studies and requirements as appropriate, in close collaboration with the other organizations working on these aspects, such as 3GPP SA5 and TMF. The deliverable will contain normative provisions.
This revision of NFV-IFA 008 will address the Release 3 candidate features listed in Annex B of the Release 3 Definition (v0.10.0). Where needed, it will continue the previous version to enhance and complete the specified Release 3 features.
This revision will reflect the maintenance performed to NFV Release 2 documentation and of already specified Release 3 features.

Adoption: 2018.08.24   Support Companies: *Huawei, PT Portugal, Orange, DOCOMO, Telefonica, ZTE, Ericsson*

RGS/NFV-IFA010ed321 **MANO Functional Rqmts - Spec**	Rapporteur:	Ulrich KLEBER Huawei

Title:	Network Functions Virtualisation (NFV) Release 3; Management and Orchestration; Functional requirements specification

Working title:	*MANO Functional Rqmts - Spec*

Current status: TB adoption of WI since 2018.08.24   **Next** status Start of work by 2018.08.24 late!

No draft available as of 2018.09.26

Early draft plan:	**WG** Approval plan: 2018.12.31	**Pub** Plan: 2019.02.18 as v3.2.1
Stable draft plan:	**TB** Approval plan: 2019.01.31	
Final draft plan: 2018.12.31		

Scope: *This revision of NFV-IFA 010 continues the development of the specification as part of the NFV Release 3.*

This edition will add functional requirements for NFV-MANO to support the Release 3 features, and it will extend the scope of the former Release 2 edition summarized hereafter:

This WI aims for a NFV Phase 2 deliverable containing all the normative functional requirements for NFV management and orchestration e.g. to support VNF migration, VNF Healing, Health-check.

The following aspects need to be considered (in-scope) while developing such a deliverable

- Consolidating all the functional requirements scattered in various phase 1 GSs (SWA GS, REL GS, INF GSs, MAN GS, NFV004) for management and orchestration. ISG level requirements from NFV004 should be considered as default requirement for phase 2 unless specific corrections to certain requirements are agreed in ISG level.

- Refining functional requirements for concepts defined in Phase 1

The target deliverable is a requirement GS which will be fulfilled by NFV management and orchestration interface normative work. The other interface normative WI can progress in parallel. The functional requirements on interfaces and models related to interfaces are not in scope of this WI. The final deliverable will contain normative provisions.

This revision of NFV-IFA 010 will address the Release 3 candidate features listed in Annex B of the Release 3 Definition (v0.10.0). Where needed, it will continue the previous version to enhance and complete the specified Release 3 features.

This revision will reflect the maintenance performed to NFV Release 2 documentation and of already specified Release 3 features.

Adoption: 2018.08.24   Support Companies: *Huawei, PT Portugal, Orange, DOCOMO, Telefonica, ZTE*

RGS/NFV-IFA011ed261 **VNF Packaging - Spec**	Rapporteur:	Rajavarma BHYRRAJU Ericsson

Title:	Network Functions Virtualisation (NFV) Release 2; Management and Orchestration; VNF Descriptor and Packaging Specification

Working title:	*VNF Packaging - Spec*

Current status: TB adoption of WI since 2018.08.24   **Next** status Start of work by 2018.08.24 late!

No draft available as of 2018.09.26

Early draft plan:	**WG** Approval plan: 2018.12.31	**Pub** Plan: 2019.02.18 as v2.6.1
Stable draft plan:	**TB** Approval plan: 2019.01.31	
Final draft plan: 2018.12.31		

Scope: *This revision of NFV-IFA 011 conducts NFV Release 2 maintenance. It corrects errors, ambiguities, misalignments, and applies editorial modifications (i.e. Corrections of category F and D as described in ETSI TWPs Annex L). This edition does not add or modify features, nor does it extend the scope of the former Release 2 edition summarized hereafter:*

IFA 011 provides requirements for the structure and format of a VNF Package to describe the VNF properties and associated resource requirements in an interoperable template.

The focus is on VNF packaging, meta-model descriptors (e.g. VNFD) and package integrity and security considerations.

Adoption: 2018.08.24   Support Companies: *Ericsson, PT Portugal, Orange, Huawei, DOCOMO, Telefonica*

RGS/NFV-IFA011ed321 **VNF Packaging - Spec**	Rapporteur: Rajavarma BHYRRAJU
	Ericsson

Title:	Network Functions Virtualisation (NFV) Release 3; Management and Orchestration; VNF Descriptor and Packaging Specification

Working title: *VNF Packaging - Spec*

Current status: TB adoption of WI since 2018.08.24	**Next** status Start of work by 2018.08.24 late!
No draft available as of 2018.09.26	

Early draft plan:	**WG** Approval plan: 2018.12.31	**Pub** Plan: 2019.02.18 as v3.2.1
Stable draft plan:	**TB** Approval plan: 2019.01.31	
Final draft plan: 2018.12.31		

Scope: *This revision of NFV-IFA 011 continues the development of the specification as part of the NFV Release 3.*

This edition will add functional requirements and specification of the information model to support the Release 3 features, and it will extend the scope of the former Release 2 edition summarized hereafter:

This Work Item will develop a specification for packaging VNFs(Virtual Network Functions) to be delivered to service providers. This work item will build from the requirements captured in the SWA and MAN Group Specification documents related to the VNF state machine, VNF design patterns, and the VNF Descriptor information elements, among others.

The new work item will consider a holistic end-to-end view of the package lifecycle from design to runtime, thus capturing development as well as operational views.

Analysis for this WI will use and potentially refine End to end VNF Package lifecycle management operations based on use cases, detailing actors and NFV Architectural Framework functional blocks impacted. This new work item will also use other industry developments related to software procurement as input into the analysis.

Deliverables for this work item will be an informative GS document addressing:

- Requirements for the structure and format of the VNF archive, list of mandatory and optional files and authorized formats

-Extensible language independent meta-model for describing the VNF properties and resource requirements buiding on existing work on VNFD. This will require using consistent terminology and refinement of the existing VNF model

-Recommendation for Implementation ready packaging structure by selecting and reusing (e.g., profiling or identifying requirements for extension of) existing cloud services (e.g. TOSCA) and network configuration specifications (e.g. DMTF, MEF). This work item will benefit from the SDO gap analysis and it will be used as input to open source activities related to packaging tools, runtime package interpretors and execution environments.

The output of this work should be used as formal requirements for extensions into normative specifications developed by other SDOs identified in the analysis.

This revision of NFV-IFA 011 will address the Release 3 candidate features listed in Annex B of the Release 3 Definition (v0.10.0). Where needed, it will continue the previous version to enhance and complete the specified Release 3 features.

This revision will reflect the maintenance performed to NFV Release 2 documentation and of already specified Release 3 features.

Adoption: 2018.08.24   Support Companies: *Ericsson, PT Portugal, Orange, DOCOMO, Telefonica, ZTE*

DGR/NFV-IFA012 **Os-Ma-Nfvo ref point Spec - svc mgmt & info model**	Rapporteur: Michael KLOTZ
	DT

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

Working title: *Os-Ma-Nfvo ref point Spec - svc mgmt & info model*

Current status: Stable draft since 2018.08.29 version 0.12.0	**Next** status Final draft for approval by 2018.12.01
Current draft: http://docbox.etsi.org/ISG/NFV/Open/Drafts/IFA012_Os-Ma-Nfvo_ref_point_Spec_-_svc_mgmt_-_info_model/NFV-IFA012v0120.zip as of 2018.09.26	

Early draft plan:	**WG** Approval plan: 2018.12.06	**Pub** Plan: 2019.02.15 as v3.1.1
Stable draft plan: 2018.08.29	**TB** Approval plan: 2019.01.04	
Final draft plan: 2018.12.01		

Scope: *This work item will entail work to specify the use cases and the corresponding recommendations that will guide the evolution of the Os-Ma-nfvo reference point regarding applications/services on top of Network Services (NS). It will have close connections with the Work Items DGS/NFV-IFA010 for data modeling requirements and DGS/NFV-IFA013 regarding the OSS-Orchestrator interface handling of the NS. The impact on the NS shall be explored in the context of higher level application/service management where the higher level application/service is dependent on one or more NS(s). Specifically, the following items will be addressed:*

o E2E view

o Assurance

o Order management and Fulfillment o Inventory management

o Policy management

o Life cycle management of Services (applications/services on top of NS)

o Flexible/dynamic service orchestration including creation and modification (e. g. orchestration, launching of a service and adaptation of running services)

o Real-time capabilities
o Automation (recovery, healing, etc.)
o Monitoring/Tracing
o Testing o Advanced data analytics/Big data including usage of several data sources
o Interoperability
The deliverable will be informative.

Adoption: 2014.11.21 | Support Companies: *Nokia, Alcatel-Lucent, Hewlett-Packard, NEC, Telecom Italia, KPN N.V., DT, Cisco, Juniper, Amdocs Software Systems Ltd, SPRINT, Comptel Corporation, Huawei (UK)*

RGS/NFV-IFA013ed321 Os-Ma-Nfvo ref point Spec - info model	Rapporteur:	Ulrich KLEBER Huawei

Title: Network Functions Virtualisation (NFV) Release 3;
Management and Orchestration;
Os-Ma-Nfvo reference point - Interface and Information Model Specification

Working title: *Os-Ma-Nfvo ref point Spec - info model*

Current status: Early draft since 2018.08.29   version 3.1.2 | **Next** status Final draft for approval by 2018.12.31

Current draft: http://docbox.etsi.org/ISG/NFV/Open/Drafts/IFA013ed321_Os-Ma-Nfvo_ref_point_Spec_-_info_model/NFV-IFA013ed321v312.zip as of 2018.09.26

Early draft plan: 2018.08.29	**WG** Approval plan: 2018.12.31	**Pub** Plan: 2019.02.18 as v3.2.1
Stable draft plan:	**TB** Approval plan: 2019.01.31	
Final draft plan: 2018.12.31		

Scope: *This revision of NFV-IFA 013 continues the development of the specification as part of the NFV Release 3.*
This edition will add requirements and specification of interfaces and associated information model to support the Release 3 features, and it will extend the scope of the former Release 2 edition summarized hereafter:
As described in the informative GS NFV MAN 001, Os-Ma-nfvo is a reference point between the OSS and the NFV Orchestrator. This reference point is used for all management interactions between OSS and the NFV-specific management framework, and mainly used for the lifecycle management Network Services (a group of VNFs with defined relationship between them).The scope of the Work Item will include the detailed functional and information requirements of all NFV management interfaces over the reference point Os-Ma-nfvo, based on which complete interfaces technical specifications can subsequently be defined, for interoperability purposes. The results of the work item will include:
• Detailed description of interfaces and its operations functionality.
• Detailed information model requirements of related NS lifecycle management interfaces, for:
- Management of NS Descriptor and VNF Packages;
- Lifecycle management of Network Services, including the instantiation, modification, update, scaling, and termination, testing of NSs.
- Lifecycle change notifications of NSs.
• Complete and detailed information model requirements of other related NFV management interfaces, for:
- NS monitoring (e.g. NS fault information retrieval and management, NS performance information retrieval and management).
- Policy Management
• Detailed information model requirements of any other NFV management interfaces (new and/or previously described in GS NFV MAN 001) needed to be exposed between OSS and NFVO in support of necessary OSS-driven E2E operations.
• Validation of interface operations and information model requirements against end-to-end flows.
Data models/schemas and protocols needed to implement the detailed functional requirements are not covered in this deliverable. The WI will leverage GS NFV MAN001, and will consider any applicable other guidelines, studies and requirements as appropriate. The deliverable will contain normative provisions.
This revision of NFV-IFA 013 will address the Release 3 candidate features listed in Annex B of the Release 3 Definition (v0.10.0). Where needed, it will continue the previous version to enhance and complete the specified Release 3 features.
This revision will reflect the maintenance performed to NFV Release 2 documentation and of already specified Release 3 features.

Adoption: 2018.08.24 | Support Companies: *Huawei, PT Portugal, Orange, DOCOMO, Telefonica, ZTE*

RGS/NFV-IFA014ed261 **Network Service Templates Spec**	Rapporteur:	Janusz PIECZERAK *Orange*

Title:	Network Functions Virtualisation (NFV) Release 2; Management and Orchestration; Network Service Templates Specification

Working title:	*Network Service Templates Spec*

Current status: TB adoption of WI since 2018.08.24	**Next** status Start of work by 2018.08.24 late!
No draft available as of 2018.09.26	

Early draft plan:	**WG** Approval plan: 2018.12.31	**Pub** Plan: 2019.02.18 as v2.6.1
Stable draft plan:	**TB** Approval plan: 2019.01.31	
Final draft plan: 2018.12.31		

Scope: *This revision of NFV-IFA 014 conducts NFV Release 2 maintenance. It corrects errors, ambiguities, misalignments, and applies editorial modifications (i.e. Corrections of category F and D as described in ETSI TWPs Annex L). This edition does not add or modify features, nor does it extend the scope of the former Release 2 edition summarized hereafter:*
IFA 014 specifies requirements and templates for describing Network Functions Virtualisation (NFV)
Network Services (NSs) in the form of meta-data.

Adoption: 2018.08.24   Support Companies: *Orange, PT Portugal, DOCOMO, Telefonica, ZTE, Huawei, Ericsson*

RGS/NFV-IFA014ed321 **Network Service Templates Spec**	Rapporteur:	Janusz PIECZERAK *Orange*

Title:	Network Functions Virtualisation (NFV) Release 3; Management and Orchestration; Network Service Templates Specification

Working title:	*Network Service Templates Spec*

Current status: TB adoption of WI since 2018.08.24	**Next** status Start of work by 2018.08.24 late!
No draft available as of 2018.09.26	

Early draft plan:	**WG** Approval plan: 2018.12.31	**Pub** Plan: 2019.02.18 as v3.2.1
Stable draft plan:	**TB** Approval plan: 2019.01.31	
Final draft plan: 2018.12.31		

Scope: *This revision of NFV-IFA 014 continues the development of the specification as part of the NFV Release 3.*
This edition will add functional requirements and specification of the information model to support the Release 3 features, and it will extend the scope of the former Release 2 edition summarized hereafter:
This Work Item will develop a specification for describing Network Service meta-data requirements and meta-data templates used to decribe Network Services.
Examples of Network Service meta-data templates are Network Service Descriptor, VNF Forwarding Graph Descriptor, Virtual Link Descriptor and PNF Descriptor.
This work item will build from the information captured in the MAN Group Specification documents related to information elements.
Standardized meta-data templates are required for Network Services to:
•describe the relationships between NS and VNFs and/or connectivity to PNFs that are part of the NS, along with dependencies and other constraints, such as those imposed by the scope of the MANO GS MAN 001,
•describe the NFV infrastructure resource requirements for a NS in a service provider environment
•describe NS operational behaviour within the scope of NFV including NS lifecycle events (eg. scaling, upgrading).
Deliverable for this work item will be an normative GS document addressing:
-Requirements for the structure and format of the various NS meta-data templates,
-A consistent meta-model, describing the NS properties and resource requirements building,
-A consistent meta-model, describing the NS networking properties and resource requirements building,.
The output of this work should be used as formal requirements for extensions into normative specifications developed by other SDOs.
This revision of NFV-IFA 014 will address the Release 3 candidate features listed in Annex B of the Release 3 Definition (v0.10.0).
Where needed, it will continue the previous version to enhance and complete the specified Release 3 features.
This revision will reflect the maintenance performed to NFV Release 2 documentation and of already specified Release 3 features.

Adoption: 2018.08.24   Support Companies: *Orange, PT Portugal, DOCOMO, Telefonica, Huawei, Ericsson*

DGS/NFV-IFA026	**Architecture enhancement for Sec Mgmt Spec**	Rapporteur:	Alex LEADBEATER BT plc

Title:	Network Functions Virtualisation (NFV) Release 3; Management and Orchestration; Architecture enhancement for Security Management Specification

Working title:	*Architecture enhancement for Sec Mgmt Spec*

Current status: Early draft since 2017.08.07   version 0.3.0   **Next** status Stable draft by 2019.03.01

Current draft: http://docbox.etsi.org/ISG/NFV/Open/Drafts/IFA026_Architecture_enhancement_for_Sec_Mgmt_Spec/NFV-IFA026v030.zip as of 2018.09.26

Early draft plan:	2017.08.07	**WG** Approval plan:	2019.04.01	**Pub** Plan: 2019.06.17 as v3.1.1
Stable draft plan:	2019.03.01	**TB** Approval plan:	2019.05.06	
Final draft plan:	2019.04.01			

Scope: *This work will propose enhancements to the NFV architecture to support security management and monitoring. The work will build on requirements defined in SEC012 and SEC013 to develop security management and monitoring extensions to the MANO architecture. Multiple trust domains will be considered. The deliverable will contain normative provisions.*

Adoption: 2016.09.23   Support Companies: *Nokia, VODAFONE Group Plc, DT, CableLabs, BT plc, Intel, SPRINT, AT&T, Bell Mobility*

DGR/NFV-IFA029	**Arch. enhancement for Cloud-native & PaaS - Report**	Rapporteur:	Marcus BRUNNER SWISSCOM

Title:	Network Functions Virtualisation (NFV) Release 3; Architecture; Report on the Enhancements of the NFV architecture towards "Cloud-native" and "PaaS"

Working title:	*Arch. enhancement for Cloud-native & PaaS - Report*

Current status: Early draft since 2018.08.08   version 0.9.0   **Next** status Stable draft by 2018.11.01

Current draft: http://docbox.etsi.org/ISG/NFV/Open/Drafts/IFA029_Arch_enhancement_for_Cloud-native_&_PaaS/NFV-IFA029v090.docx as of 2018.09.26

Early draft plan:	2018.08.08	**WG** Approval plan:	2018.12.06	**Pub** Plan: 2019.02.15 as v3.1.1
Stable draft plan:	2018.11.01	**TB** Approval plan:	2019.01.04	
Final draft plan:	2018.12.01			

Scope: *The report will study the potential enhancements of the NFV architecture for providing "PaaS"-type capabilities and supporting VNFs which follow "cloud-native" design principles, in particular the utilization of container technologies.*
It will describe the related use cases and provide recommendations on the enhancements of the NFV architecture for flexible choices for the designers of VNFs. Such platform features can include, but are not limited to, common platform services, dependency management, and accessing other VNFs.
Management and orchestration of VNFs deployed in containers will be analyzed and resulting recommendations on the enhancements of the NFV architecture will be provided, including impacts on the NFV templates, considering dependencies on the hosting resources.
An assumption is that some VNFs may be decomposed into small components (e.g., following a micro-services approach) and/or able to rely on common platfrom services. The study will take into account other initiatives in this space.
It is not the intention of this WI to define "cloud-native", nor to recommend how VNFs shall be decomposed and implemented.
The report will include recommendations for requirements and if necessary enhancements on architecture and reference points.

Adoption: 2017.01.30   Support Companies: *SWISSCOM, ORANGE, Ericsson, TELEFONICA, DT, ZTE, Red Hat Limited*

DGS/NFV-IFA030ed321 **Multi Domain MANO - spec**	Rapporteur:	Haitao XIA
		Huawei

Title:	Network Functions Virtualisation (NFV) Release 3; Management and Orchestration; Multiple Administrative Domain Aspect Interfaces Specification

Working title:	*Multi Domain MANO - spec*

Current status: Early draft since 2018.09.10   version 3.1.1 | **Next** status Final draft for approval by 2018.12.31

Current draft: http://docbox.etsi.org/ISG/NFV/Open/Drafts/IFA030ed321/NFV-IFA030ed321v311.docx as of 2018.09.26

Early draft plan: 2018.09.10	**WG** Approval plan: 2018.12.31	**Pub** Plan: 2019.02.18 as v3.2.1
Stable draft plan:	**TB** Approval plan: 2019.01.31	
Final draft plan: 2018.12.31		

Scope: *This revision of NFV-IFA 030 continues the development of the specification as part of the NFV Release 3. The scope of the previous work item is summarized hereafter:*
Specify functional requirements, interfaces and operations to support the provision of NFV MANO services across multiple administrative domains. Work will be based on GR NFV-IFA028. The work will consider management interactions between NFVOs in different administrative domains for: 1) Management of composite Network Service (NS) and its constituent nested NSs in different administrative domains. 2) NFVIaaS when the SLPOC (Single Logical Point of Contact) is integrated in the NFVO. In addition, the work item will consider the interactions between VIMs of the same administrative domain for NFVIaaS when the SLPOC is integrated in VIMs. The resulting work item deliverable will contain normative provisions.
This revision will also reflect the maintenance needed for the previous specified version.

Adoption: 2018.08.24   Support Companies: *Huawei, PT Portugal, Telefonica, Ericsson*

DGS/NFV-IFA031ed321 **NFV-MANO mgmt - spec**	Rapporteur:	Yusuke OKAZAKI
		DOCOMO

Title:	Network Functions Virtualisation (NFV) Release 3; Management and Orchestration; Requirements and interfaces specification for management of NFV-MANO

Working title:	*NFV-MANO mgmt - spec*

Current status: TB adoption of WI since 2018.08.24 | **Next** status Start of work by 2018.08.24 late!

No draft available as of 2018.09.26

Early draft plan:	**WG** Approval plan: 2018.12.31	**Pub** Plan: 2019.02.18 as v3.2.1
Stable draft plan:	**TB** Approval plan: 2019.01.31	
Final draft plan: 2018.12.31		

Scope: *This revision of NFV-IFA 031 continues the development of the specification as part of the NFV Release 3. The scope of the previous work item is summarized hereafter:*
Describe the framework to support the management of NFV-MANO functional entities. The WI will specify the interface requirements, the interfaces and necessary information elements enabling the fault, configuration and information, performance, state and log management of NFV-MANO functional entities. The work item will use the outcomes from ETSI GR NFV-IFA 021 as baseline. The resulting deliverable will contain normative provisions.
This revision will also reflect the maintenance needed for the previous specified version.

Adoption: 2018.08.24   Support Companies: *DOCOMO, PT Portugal, Telefonica, ZTE, Huawei, Ericsson*

DGS/NFV-IFA032	**Multi-site Intfaces & InfoModel spec**	Rapporteur:	Zarrar YOUSAF NEC

Title:	Network Functions Virtualisation (NFV) Release3; Management and Orchestration; Interface and Information Model Specification for Multi-Site Connectivity Services;

Working title: *Multi-site Intfaces & InfoModel spec*

Current status: Early draft since 2018.07.17   version 0.4.0 | **Next** status Stable draft by 2018.12.01

Current draft: http://docbox.etsi.org/ISG/NFV/Open/Drafts/IFA032_Multi-site_Intfaces_&_InfoModel_spec/NFV-IFA032v040.zip as of 2018.09.26

Early draft plan: 2018.07.17	**WG** Approval plan: 2019.01.10	**Pub** Plan: 2018.08.31 as v3.1.1
Stable draft plan: 2018.12.01	**TB** Approval plan: 2019.02.15	
Final draft plan: 2019.01.10		

Scope: *This work aims at specifying the interfaces for multi-site connectivity services produced by a WAN Infrastructure Manager (WIM). The document will also describe the operations and the information elements exchanged over those interfaces.*
The interfaces are a subset, with possible modifications and/or extensions, of Or-Vi reference point. They will focus on management aspects for enabling inter-connectivity between, and management of network services across, multiple NFVI-PoPs over WAN infrastructure.
The following aspects will be addressed for the management of Wide Area Network Virtualised Resources:
- *Resources Management (e.g. allocate, query, update, terminate);*
- *Resources Reservation (e.g. create, query, update, terminate);*
- *Capacity Management (e.g. subscribe, notify, query);*
- *Information Management (e.g. subscribe, notify, query);*
- *Performance Management (e.g. subscribe, notify, get for performance information);*
- *Fault Management (e.g. create, delete, query, subscribe, notify for fault information).*
.
The work item will use the outcomes from ETSI GR NFV-IFA 022 as baseline. The resulting deliverable will contain normative provisions.

Adoption: 2017.12.08   Support Companies: *PT Portugal, NEC, TELEFONICA, NTT, ZTE, DOCOMO*

DGS/NFV-IFA033	**SEC-MANO ref points - Intface Spec**	Rapporteur:	Leslie WILLIS BT plc

Title:	Network Functions Virtualization (NFV) Release 3; Management and Orchestration; Sc-Or, Sc-Vnfm, Sc-Vi reference points - Interface and Information Model Specification

Working title: *SEC-MANO ref points - Intface Spec*

Current status: Early draft since 2018.09.12   version 0.0.1 | **Next** status Stable draft by 2018.11.14

Current draft: http://docbox.etsi.org/ISG/NFV/Open/Drafts/IFA033_SEC-MANO_ref_points_-_Intface_Spec/NFV-IFA033v001.docx as of 2018.09.26

Early draft plan: 2018.09.12	**WG** Approval plan:	**Pub** Plan: 2019.02.08 as v3.1.1
Stable draft plan: 2018.11.14	**TB** Approval plan: 2018.12.28	
Final draft plan: 2018.11.30		

Scope: *The present document specifies the interfaces supported over the sc-or, sc-vnfm, sc-vi reference points as well as the information elements exchanged over these interfaces. The purpose of the interfaces is to support security monitoring and management as described in NFV-GS-SEC-013. The interface supports delivery of information about the topology of the network and information about the creation/modification of VNFs. It includes the ability to handle VNF termination requests e.g. to respond to a DDoS attack.*

Adoption: 2018.05.30   Support Companies: *TELEFONICA, Cadzow Communications, OTD, Tencastle Limited, BT plc*

DGR/NFV-IFA034	**Licence Management support**	Rapporteur:	Abinash VISHWAKARMA
			NEC

Title:	Network Function Virtualization (NFV) Release 3; Management and Orchestration; Report on Architectural enhancement for VNF License Management support and use of VNF licenses
Working title:	*Licence Management support*

Current status: TB adoption of WI since 2018.07.25	**Next** status Start of work by 2018.06.30 late!

No draft available as of 2018.09.26

Early draft plan: 2018.09.21	**WG** Approval plan:	**Pub** Plan: 2019.02.07 as v3.1.1
Stable draft plan: 2018.10.19		
Final draft plan: 2018.11.30	**TB** Approval plan: 2018.12.27	

Scope: *This work item will study the enhancements required in the architectural framework of NFV-MANO for the VNF License Management support and use of VNF Licenses. The work will analyze the recommendations made in NFV-EVE010 and provide recommendations for the necessary enhancements of the existing IFA specifications.*

Adoption: 2018.07.25	Support Companies: *Orange, DT, CableLabs, Amdocs Software Systems Ltd, AT&T, Gemalto N.V., Verizon*

REL: 3 active Work Items

DGR/NFV-REL008	**Error Handling report**	Rapporteur:	Stefan ARNTZEN
			Huawei

Title:	Network Functions Virtualisation (NFV); Reliability; Report on Error Handling: Detection, Correlation, Notification
Working title:	*Error Handling report*

Current status: Early draft since 2018.09.12 version 0.0.6	**Next** status Stable draft by 2018.07.31 late!

Current draft: http://docbox.etsi.org/ISG/NFV/Open/Drafts/REL008_Error_Handling_report/NFV-REL008v006.zip as of 2018.09.26

Early draft plan: 2018.09.12	**WG** Approval plan: 2018.09.15	**Pub** Plan: 2018.11.26 as v1.1.1
Stable draft plan: 2018.07.31		
Final draft plan: 2018.08.31	**TB** Approval plan: 2018.10.15	

Scope: *This WI aims to provide a report on how to detect and notify errors occuring in NFV entities. The scope of the WI is focused on the hardware, software and resource related failures. It discusses mechanisms how to correlate errors that have been detected at different layers in the NFV reference architecture model but are caused by the same fault. It will be investigated how to generate notifications that allow controlling mechanisms to take decisions and actions to maintain the defined reliability, availability and other applicable SLA performance requirements. The report also focuses on identifying appropriate metrics for detection and notification. This report will use industry standard fault management terminology, conceptual and operational models, such as ITU-T X.7xx, TM Forum eTOM or ITIL. Extensions to existing NFV specifications will be recommended where necessary*

Adoption: 2016.02.23	Support Companies: *Nokia, Alcatel-Lucent, NEC, Spirent Communications, Intel, AT&T, Huawei*

DGS/NFV-REL009	**NFV Reliability Requirements**	Rapporteur:	Percy TARAPORE
			AT&T

Title:	Network Functions Virtualisation (NFV); Reliability; Specification of Requirements to Support NFV Reliability and Availability

Working title: *NFV Reliability Requirements*

Current status: Early draft since 2018.06.13   version 0.0.4 | **Next** status Stable draft by 2018.09.15

Current draft: http://docbox.etsi.org/ISG/NFV/Open/Drafts/REL009_Reliability_Requirements/NFV-REL009v004.zip as of 2018.09.26

Early draft plan: 2018.06.13	**WG** Approval plan: 2018.11.14	**Pub** Plan: 2019.01.18 as v1.1.1
Stable draft plan: 2018.09.15	**TB** Approval plan: 2018.12.07	
Final draft plan: 2018.11.14		

Scope: *Network operators are expected to configure and deploy VNFs from multiple vendors onto a common platform such that service reliability and availability expectations are satisfactorily met. This document will specify a set of normative requirements to enable development of necessary architectural mechanisms in support of service reliability and availability.*
The scope is limited to areas of reliability and availability of NFVI components, and Management and Orchestration components and their support for ensuring the reliability and availability of the VNFs. Examples include affinity and diversity handling of VNFs, support failover mechanisms of MANO and NFVI components, and virtualised resource allocation priority to support mission critical services (e.g. emergency services in disaster recovery situation).

Adoption: 2017.05.19   Support Companies: *ORANGE, Ericsson AB, CableLabs, AT&T, Verizon, Huawei*

DGR/NFV-REL010	**Resiliency for Network Slicing report**	Rapporteur:	Chidung LAC
			Orange

Title:	Network Functions Virtualisation (NFV); Reliability; Report on NFV Resiliency for the Support of Network Slicing

Working title: *Resiliency for Network Slicing report*

Current status: Early draft since 2018.09.12   version 0.0.4 | **Next** status Stable draft by 2018.09.15

Current draft: http://docbox.etsi.org/ISG/NFV/Open/Drafts/REL010_Resiliency_for_Network_Slicing_report/NFV-REL010v004.zip as of 2018.09.26

Early draft plan: 2018.09.12	**WG** Approval plan: 2018.11.01	**Pub** Plan: 2019.01.18 as v1.1.1
Stable draft plan: 2018.09.15	**TB** Approval plan: 2018.12.07	
Final draft plan: 2018.10.14		

Scope: *Network slicing leverages NFV, SDN and cloud technologies for supporting a diverse range of services with very different non-functional requirements. Resiliency (e.g., availability, reliability) constitutes a basic attribute of network slice characteristics. This report will identify the guiding principles of NFV resiliency assurance for the support of network slicing based on an NFV infrastructure. The scope of this WI covers all resiliency related operational facets supporting network slicing. This includes provisioning, scaling, migration, software modification, resource reallocation in time of scarcity, and restoration following a failure (including failure containment).*

Adoption: 2017.10.02   Support Companies: *ORANGE, Ericsson AB, CableLabs, Huawei*

SEC: 8 active Work Items

DGR/NFV-SEC005	**Certificate mgmt report**	Rapporteur:	Li FENG HuaWei Technologies Co., Ltd

Title:	Network Functions Virtualization (NFV); Trust; Report on Certificate Management

Working title: *Certificate mgmt report*

Current status: Early draft since 2018.06.12   version 0.0.12 | **Next** status Stable draft by 2018.03.01 late!

Current draft: http://docbox.etsi.org/ISG/NFV/Open/Drafts/SEC005_Certificate_mgmt_report/NFV-SEC005v0012.docx as of 2018.09.26

Early draft plan:	2018.06.12	**WG** Approval plan:	2018.06.01	**Pub** Plan: 2018.11.02 as v1.1.1
Stable draft plan:	2018.03.01	**TB** Approval plan:	2018.09.21	
Final draft plan:	2018.06.01			

Scope: *The work item will provide guidance to NFV on the use of certificates and Certificate Authorities. It will look at various certificate deployment scenarios and describe certificate specific use cases, threats to the certificate management structure, and resulting requirements for NFV.*
In addition, this work will provide an overall certificate management guidance and trust validation applied for Virtual Machines and Virtualized Network Functions.

Adoption: 2014.11.20   Support Companies: *Alcatel-Lucent, Intel, Huawei (UK), Citrix.*

DGR/NFV-SEC016	**Location, locstamp and timestamp**	Rapporteur:	Pierre COURBON Ministère Economie et Finances

Title:	Network Functions Virtualisation (NFV); Security; Report on location, timestamping of VNFs

Working title: *Location, locstamp and timestamp*

Current status: Early draft since 2018.02.25   version 0.0.2 | **Next** status Stable draft by 2018.09.21

Current draft: http://docbox.etsi.org/ISG/NFV/Open/Drafts/SEC016_Location_Locstamp_Timestamp/NFV-SEC016v002.zip as of 2018.09.26

Early draft plan:	2018.02.25	**WG** Approval plan:	2019.01.14	**Pub** Plan: 2019.04.05 as v1.1.1
Stable draft plan:	2018.09.21	**TB** Approval plan:	2019.02.22	
Final draft plan:	2018.11.01			

Scope: *A GR to study how the location of sensitive VNFs (e.g. LI functions, VNFs handling data with Data Protection location handling restrictions and network security functions) can be attested.*
The study will consider using trusted locstamp and timestamp information derived from Global Navigation Satellite Systems (GNSS), such as Galileo. The study will also consider other physical location binding solutions. The work is expected to also have benefits for other less sensitive virtualised services which may need to verify location of VNFs or data. The result of work is expected to be informative.

Adoption: 2017.02.24   Support Companies: *TELEFONICA, BT, VODAFONE Group Plc, Ministère Economie Indu. Numer, Intel, OTD, Gemalto N.V., National Technical Assistance, Microsemi, Tencastle Limited, Rogers Communication Canada Inc.*

DGR/NFV-SEC017	**Sec Pol Guidelines Report**	Rapporteur:	Fei LI Huawei

Title:	Network Functions Virtualisation (NFV); Security; Security Policy Guidelines Report

Working title: *Sec Pol Guidelines Report*

Current status: Early draft since 2018.05.11   version 0.0.3 | **Next** status Stable draft by 2018.09.20

Current draft: http://docbox.etsi.org/ISG/NFV/Open/Drafts/SEC017_Sec_Pol_Guidelines/NFV-SEC017v003.docx as of 2018.09.26

Early draft plan:	2018.05.11	**WG** Approval plan:	2019.01.14	**Pub** Plan: 2019.04.05 as v1.1.1
Stable draft plan:	2018.09.20	**TB** Approval plan:	2019.02.22	
Final draft plan:	2018.12.06			

Scope: *This WI will identify potential use cases of NFV security policies design and also identify the types of information to be included in security policies for identified use cases.*
The WI will consider how security policy applied to one domain may affect policies in other domains.
Both top-down and bottom-up approaches to information modeling will be used. Determining the detailed information model of security policies is out of scope of this work item.

Adoption: 2017.05.19   Support Companies: *NEC Corporation, Intel, China Telecommunications, Huawei*

DGR/NFV-SEC018	Remote Attestation Architecture report	Rapporteur:	Andre REIN Huawei

Title:	Network Functions Virtualisation (NFV); Security; Report on NFV Remote Attestation Architecture

Working title:	*Remote Attestation Architecture report*

Current status: Early draft since 2017.12.06   version 0.0.6   **Next** status Stable draft by 2018.05.18 late!

Current draft: http://docbox.etsi.org/ISG/NFV/Open/Drafts/SEC018_Remote_Attestation_Architecture_report/NFV-SEC018v006.docx as of 2018.09.26

Early draft plan: 2017.12.06 **Stable** draft plan: 2018.05.18 **Final** draft plan: 2018.12.06	**WG** Approval plan: 2019.01.14 **TB** Approval plan: 2019.02.22	**Pub** Plan: 2019.04.05 as v1.1.1

Scope: *This report will identify and study Remote Attestation architectures applicable to NFV systems, including the definition of attestation scope, stakeholders, interfaces and protocols required to support them.*
Additionally this work item will identify functional capabilities. The work item will produce a set of recommendations. The starting point for this work are SEC007, SEC009 and SEC012.

Adoption: 2017.09.16   Support Companies: *Ericsson, TELEFONICA, China Telecommunications, Huawei*

DGS/NFV-SEC019	Architecture for Sec enhancement Spec	Rapporteur:	Alex LEADBEATER BT plc

Title:	Network Functions Virtualisation (NFV) Release 3; Security; System Architecture Specification for NFV Security Enhancements

Working title:	*Architecture for Sec enhancement Spec*

Current status: Start of work since 2018.01.30   **Next** status Early draft by 2018.05.01 late!

No draft available as of 2018.09.26

Early draft plan: 2018.05.01 **Stable** draft plan: 2018.07.02 **Final** draft plan: 2018.12.06	**WG** Approval plan: 2019.01.14 **TB** Approval plan: 2019.02.22	**Pub** Plan: 2019.04.05 as v3.1.1

Scope: *This Work item will address known gaps in existing NFV security capabilities and specify new normative security enhancements. The work item will address both sensitive and lower sensitivity VNF, as well as NFVI and MANO aspects. Work item will extend work already completed in SEC 012.*

Adoption: 2017.09.16   Support Companies: *Ericsson, TELEFONICA, Ministère Economie Indu. Numer, Intel, OTD, Huawei, NCSC, BT plc, InterDigital, Inc.*

DGS/NFV-SEC020	Id Mgmt & Security spec	Rapporteur:	Leslie WILLIS BT plc

Title:	Network Functions Virtualisation (NFV) Release 3; Security; Identity Management and Security Specification

Working title:	*Id Mgmt & Security spec*

Current status: Start of work since 2017.10.02   **Next** status Early draft by 2018.05.01 late!

No draft available as of 2018.09.26

Early draft plan: 2018.05.01 **Stable** draft plan: 2018.11.20 **Final** draft plan: 2018.12.04	**WG** Approval plan: 2018.12.06 **TB** Approval plan: 2019.01.04	**Pub** Plan: 2019.02.15 as v3.1.1

Scope: *This Work item will specify normative requirements for secure VNF identity management and trust relationships in NFV. The work item will specify how identities are securely lifecycle managed, verified and trusted. The work item will address both horizontal and vertical relationships. The work will leverage existing work in SEC 005, 007, 009, 012 and 013.*

Adoption: 2017.09.16   Support Companies: *Ericsson, TELEFONICA, Ministère Economie Indu. Numer, Intel, OTD, Gemalto N.V., iconectiv, BT plc, InterDigital, Inc.*

DGS/NFV-SEC021	**VNF Package Security Spec**	Rapporteur:	Pradheepkumar SINGARAVELU
			NEC Corporation

Title:	Network Functions Virtualisation (NFV) Release 2; Security; VNF Package Security Specification

Working title:	*VNF Package Security Spec*

Current status: Stable draft since 2018.06.13   version 0.0.2 | **Next** status Final draft for approval by 2017.12.04 late!

Current draft: http://docbox.etsi.org/ISG/NFV/Open/Drafts/SEC021_VNF_Package_Security_Spec/NFV-SEC021v002.docx as of 2018.09.26

Early draft plan:		**WG** Approval plan:	2017.12.06	**Pub** Plan: 2019.02.15 as v2.4.1
Stable draft plan:	2018.06.13	**TB** Approval plan:	2019.01.04	
Final draft plan:	2017.12.04			

Scope: *This work item will define VNF package security requirements and procedures. This work item will address the following security issues related to VNF packages, but not limited to: • Integrity of VNF Packages*
- Authenticity for VNF Packages
- Methods to ensure Confidentiality for VNF Packages
-Credential storage and provisioning of VNF packages during Onboarding. The work already undertaken in IFA011 and SOL004 will be used as input to the work item.

Adoption: 2017.09.16   Support Companies: *NEC, TELEFONICA, NEC Corporation, Gemalto N.V., Huawei*

DGS/NFV-SEC022	**API Access Token Spec**	Rapporteur:	Anne-Marie PRADEN
			Gemalto N.V.

Title:	Network Functions Virtualisation (NFV) Release 2; Security; Access Token Specification for API Access

Working title:	*API Access Token Spec*

Current status: Early draft since 2018.09.07   version 0.0.5 | **Next** status Stable draft by 2018.05.31 late!

Current draft: http://docbox.etsi.org/ISG/NFV/Open/Drafts/SEC022_API_Access_Token_Spec/NFV-SEC022v005.zip as of 2018.09.26

Early draft plan:	2018.09.07	**WG** Approval plan:	2018.11.08	**Pub** Plan: 2019.01.08 as v2.1.1
Stable draft plan:	2018.05.31	**TB** Approval plan:	2018.12.07	
Final draft plan:	2018.11.01			

Scope: *This Group Specification will specify the access tokens and related metadata for APIs defined between VNFs, VNFM, NFVO and VIM.*
The work will consist in:
1. defining security requirements for API access tokens (e.g. API requester ID binding, provide Authentication feature),
2. Analyzing the tokens specifications (e.g. Openstack Keystone, OpenID Connect Id-Token , IETF OAuth token Binding, 3GPP TS 33.179),
3. Defining an NFV token request and generation profile, the access token format and the associated metadata. The specification will refer to existing specifications of access tokens if the NFV requirements are met by these specifications.
4. Defining the process for the token verification by the API Producer.
This WI will produce a new GS.

Adoption: 2017.12.08   Support Companies: *Nokia Corporation, TELEFONICA, NEC Corporation, Gemalto N.V., Ubiwhere Lda (UW)*

SOL: 13 active Work Items

DGS/NFV-SOL001	**TOSCA-based NFV descriptors spec**	Rapporteur:	Shitao LI Huawei

Title:	Network Functions Virtualisation (NFV) Release 2; Protocols and Data Models; NFV descriptors based on TOSCA specification

Working title: *TOSCA-based NFV descriptors spec*

Current status: Early draft since 2018.08.29   version 0.10.0 | **Next** status Stable draft by 2018.07.01 late!

Current draft: http://docbox.etsi.org/ISG/NFV/Open/Drafts/SOL001_TOSCA_desc/NFV-SOL001v0100.zip as of 2018.09.26

Early draft plan:	2018.08.29	**WG** Approval plan:	2018.08.31	**Pub** Plan: 2018.11.02 as v2.4.1
Stable draft plan:	2018.07.01			
Final draft plan:	2018.08.26	**TB** Approval plan:	2018.09.30	

Scope: *The scope of this work item is to develop a data model specification for NFV descriptors fulfilling the requirements specified in GS NFV-IFA 011 and GS NFV-IFA 014. The specification will be based on the OASIS TOSCA Simple profile in YAML specification. The deliverable will contain normative provisions and an informative mapping between the data model terminology and the terminology used in GS NFV IFA 011 and 014.*

Adoption: 2016.02.23   Support Companies: *ORANGE, PT PORTUGAL, TELECOM ITALIA , Huawei Tech.(UK), 6WIND, Nokia*

RGS/NFV-SOL002ed261	**Ve-Vnfm RESTful protocols - spec**	Rapporteur:	Jong-Hwa YI ETRI

Title:	Network Functions Virtualisation (NFV) Release 2; Protocols and Data Models; RESTful protocols specification for the Ve-Vnfm Reference Point

Working title: *Ve-Vnfm RESTful protocols - spec*

Current status: TB adoption of WI since 2018.08.24 | **Next** status Start of work by 2018.08.24 late!

No draft available as of 2018.09.26

Early draft plan:		**WG** Approval plan:	2018.12.31	**Pub** Plan: 2019.02.18 as v2.6.1
Stable draft plan:				
Final draft plan:	2018.12.31	**TB** Approval plan:	2019.01.31	

Scope: *This revision of NFV-SOL 002 conducts NFV Release 2 maintenance. It corrects errors, ambiguities, misalignments, and applies editorial modifications (i.e. Corrections of category F and D as described in ETSI TWPs Annex L). This edition does not add or modify features, nor does it extend the scope of the former Release 2 edition summarized hereafter:*
SOL 002 specifies a set of Restful protocols fulfilling the requirements specified in GS NFV-IFA 008 for the interfaces used over the Ve-Vnfm reference point.

Adoption: 2018.08.24   Support Companies: *ETRI, PT Portugal, Orange, DOCOMO, Telefonica, ZTE, Huawei, Ericsson*

RGS/NFV-SOL002ed311	**Ve-Vnfm RESTful protocols - spec**	Rapporteur:	Yuya KUNO DOCOMO

Title:	Network Functions Virtualisation (NFV) Release 3; Protocols and Data Models; RESTful protocols specification for the Ve-Vnfm Reference Point

Working title: *Ve-Vnfm RESTful protocols - spec*

Current status: TB adoption of WI since 2018.08.24 | **Next** status Start of work by 2018.08.24 late!

No draft available as of 2018.09.26

Early draft plan:		**WG** Approval plan:	2018.12.31	**Pub** Plan: 2019.02.18 as v3.1.1
Stable draft plan:				
Final draft plan:	2018.12.31	**TB** Approval plan:	2019.01.31	

Scope: *This revision of NFV-SOL 002 propagates the deliverable into NFV Release 3.*
This edition will add protocol and data models to support the Release 3 features, and it will extend the scope of the former Release 2 edition summarized hereafter:
SOL 002 specifies a set of Restful protocols fulfilling the requirements specified in GS NFV-IFA 008 for the interfaces used over the Ve-Vnfm reference point.
This revision of NFV-SOL 002 will address the Release 3 candidate features listed in Annex B of the Release 3 Definition (v0.10.0).
This revision will reflect the maintenance performed to NFV Release 2 documentation.

Adoption: 2018.08.24   Support Companies: *PT Portugal, Orange, DOCOMO, Telefonica, ZTE, Huawei, Ericsson*

RGS/NFV-SOL003ed261	Or-Vnfm RESTful protocols - spec	Rapporteur:	Uwe RAUSCHENBACH
			Nokia

Title:	Network Functions Virtualisation (NFV) Release 2; Protocols and Data Models; RESTful protocols specification for the Or-Vnfm Reference Point

Working title: *Or-Vnfm RESTful protocols - spec*

Current status: TB adoption of WI since 2018.08.24 | **Next** status Start of work by 2018.08.24 late!

No draft available as of 2018.09.26

Early draft plan:		
Stable draft plan:	**WG** Approval plan: 2018.12.31	
Final draft plan: 2018.12.31	**TB** Approval plan: 2019.01.31	**Pub** Plan: 2019.02.18 as v2.6.1

Scope: *This revision of NFV-SOL 002 conducts NFV Release 2 maintenance. It corrects errors, ambiguities, misalignments, and applies editorial modifications (i.e. Corrections of category F and D as described in ETSI TWPs Annex L). This edition does not add or modify features, nor does it extend the scope of the former Release 2 edition summarized hereafter:*
SOL 002 specifies a set of Restful protocols fulfilling the requirements specified in GS NFV-IFA 008 for the interfaces used over the Ve-Vnfm reference point.

Adoption: 2018.08.24   Support Companies: *kia, PT Portugal, Orange, DOCOMO, Telefonica, Huawei, Ericsson*

RGS/NFV-SOL003ed311	Or-Vnfm RESTful protocols - spec	Rapporteur:	Uwe RAUSCHENBACH
			Nokia

Title:	Network Functions Virtualisation (NFV) Release 3; Protocols and Data Models; RESTful protocols specification for the Or-Vnfm Reference Point

Working title: *Or-Vnfm RESTful protocols - spec*

Current status: TB adoption of WI since 2018.08.24 | **Next** status Start of work by 2018.08.24 late!

No draft available as of 2018.09.26

Early draft plan:		
Stable draft plan:	**WG** Approval plan: 2018.12.31	
Final draft plan: 2018.12.31	**TB** Approval plan: 2019.01.31	**Pub** Plan: 2019.02.18 as v3.1.1

Scope: *This revision of NFV-SOL 003 propagates the deliverable into NFV Release 3.*
This edition will add protocol and data models to support the Release 3 features, and it will extend the scope of the former Release 2 edition summarized hereafter:
SOL 003 specifies a set of RESTful protocols and data models fulfilling the requirements specified in ETSI GS NFV-IFA 007 for the interfaces used over the Or-Vnfm reference point, except for the "Virtualised Resources Management interfaces in indirect mode" as defined in clause 6.4 of ETSI GS NFV-IFA 007.
This revision of NFV-SOL 003 will address the Release 3 candidate features listed in Annex B of the Release 3 Definition (v0.10.0).
This revision will reflect the maintenance performed to NFV Release 2 documentation.

Adoption: 2018.08.24   Support Companies: *Nokia, PT Portugal, Orange, DOCOMO, Telefonica, Huawei, Ericsson*

RGS/NFV-SOL004ed261	VNF Package Stage 3 - spec	Rapporteur:	Andrei KOJUKHOV
			Amdocs Software Systems Ltd

Title:	Network Functions Virtualisation (NFV) Release 2; Protocols and Data Models; VNF Package specification

Working title: *VNF Package Stage 3 - spec*

Current status: TB adoption of WI since 2018.08.24 | **Next** status Start of work by 2018.08.24 late!

No draft available as of 2018.09.26

Early draft plan:		
Stable draft plan:	**WG** Approval plan: 2018.12.31	
Final draft plan: 2018.12.31	**TB** Approval plan: 2019.01.31	**Pub** Plan: 2019.02.18 as v2.6.1

Scope: *This revision of NFV-SOL 003 conducts NFV Release 2 maintenance. It corrects errors, ambiguities, misalignments, and applies editorial modifications (i.e. Corrections of category F and D as described in ETSI TWPs Annex L). This edition does not add or modify features, nor does it extend the scope of the former Release 2 edition summarized hereafter:*
SOL 003 specifies a set of RESTful protocols and data models fulfilling the requirements specified in ETSI GS NFV-IFA 007 for the interfaces used over the Or-Vnfm reference point, except for the "Virtualised Resources Management interfaces in indirect mode" as defined in clause 6.4 of ETSI GS NFV-IFA 007.

Adoption: 2018.08.24   Support Companies: *Amdocs, PT Portugal, Orange, DOCOMO, Telefonica, Huawei, Ericsson*

RGS/NFV-SOL004ed311 **VNF Package Stage 3 - spec**	Rapporteur:	Andrei KOJUKHOV
		Amdocs Software Systems Ltd

Title:	Network Functions Virtualisation (NFV) Release 3; Protocols and Data Models; VNF Package specification
Working title:	*VNF Package Stage 3 - spec*

Current status: TB adoption of WI since 2018.08.24	**Next** status Start of work by 2018.08.24 late!
No draft available as of 2018.09.26	

Early draft plan:	**WG** Approval plan: 2018.12.31	**Pub** Plan: 2019.02.18 as v3.1.1
Stable draft plan:	**TB** Approval plan: 2019.01.31	
Final draft plan: 2018.12.31		

Scope: *This revision of NFV-SOL 004 propagates the deliverable into NFV Release 3.*
This edition will add protocol and data models to support the Release 3 features, and it will extend the scope of the former Release 2 edition summarized hereafter:
SOL 004 specifies the structure and format of a VNF package file and its constituents, fulfilling the requirements specified in ETSI GS NFV-IFA 011 for a VNF package.
This revision of NFV-SOL 004 will address the Release 3 candidate features listed in Annex B of the Release 3 Definition (v0.10.0).
This revision will reflect the maintenance performed to NFV Release 2 documentation.

Adoption: 2018.08.24	Support Companies: *Amdocs, PT Portugal, Orange, DOCOMO, Telefonica, Huawei, Ericsson*

DGS/NFV-SOL005ed251 **Os-Ma-nfvo APIs**	Rapporteur:	Ernest BAYHA
		Ericsson

Title:	Network Functions Virtualisation (NFV) Release 2; Protocols and Data Models; RESTful protocols specification for the Os-Ma-nfvo Reference Point
Working title:	*Os-Ma-nfvo APIs*

Current status: Draft receipt by ETSI Secretariat since	**Next** status Publication by 2018.08.29 late!
2018.09.03 version 2.4.8	
Current draft: http://docbox.etsi.org/ISG/NFV/Open/Drafts/SOL005ed251_Os-Ma-nfvo_APIs/NFV-SOL005ed251v248.zip as of 2018.09.26	

Early draft plan:	**WG** Approval plan:	**Pub** Plan: 2018.08.29 as v2.5.1
Stable draft plan:	**TB** Approval plan: 2018.09.03	
Final draft plan:		

Scope: *This revision of NFV-SOL 005 conducts NFV Release 2 maintenance. It corrects errors, ambiguities, misalignments, and applies editorial modifications (i.e. Corrections of category F and D as described in ETSI TWPs Annex L). This edition does not add or modify features, nor does it extend the scope of the former Release 2 edition summarized hereafter*
SOL 005 specifies a set of Restful protocol specifications and data models fulfilling the requirements specified in ETSI GS NFV-IFA 013 for the interfaces used over the Os-Ma-nfvo reference point.

Adoption: 2018.02.26	Support Companies: *Ericsson, PT Portugal, Orange, Huawei, Telefonica, DOCOMO*

DGS/NFV-SOL005ed261 **Os-Ma-nfvo APIs - spec**	Rapporteur:	Vlademir BRUSSE
		Ericsson

Title:	Network Functions Virtualisation (NFV) Release 2; Protocols and Data Models; RESTful protocols specification for the Os-Ma-nfvo Reference Point
Working title:	*Os-Ma-nfvo APIs - spec*

Current status: TB adoption of WI since 2018.08.24	**Next** status Start of work by 2018.08.24 late!
No draft available as of 2018.09.26	

Early draft plan:	**WG** Approval plan: 2018.12.31	**Pub** Plan: 2019.02.18 as v2.6.1
Stable draft plan:	**TB** Approval plan: 2019.01.31	
Final draft plan: 2018.12.31		

Scope: *This revision of NFV-SOL 003 conducts NFV Release 2 maintenance. It corrects errors, ambiguities, misalignments, and applies editorial modifications (i.e. Corrections of category F and D as described in ETSI TWPs Annex L). This edition does not add or modify features, nor does it extend the scope of the former Release 2 edition summarized hereafter:*
SOL 003 specifies a set of RESTful protocols and data models fulfilling the requirements specified in ETSI GS NFV-IFA 007 for the interfaces used over the Or-Vnfm reference point, except for the "Virtualised Resources Management interfaces in indirect mode" as defined in clause 6.4 of ETSI GS NFV-IFA 007.

Adoption: 2018.08.24	Support Companies: *Ericsson, PT Portugal, Orange, DOCOMO, Telefonica, ZTE, Huawei*

DGS/NFV-SOL005ed311 **Os-Ma-nfvo APIs - spec**	Rapporteur:	Vlademir BRUSSE
		Ericsson

Title:	Network Functions Virtualisation (NFV) Release 3; Protocols and Data Models; RESTful protocols specification for the Os-Ma-nfvo Reference Point

Working title: *Os-Ma-nfvo APIs - spec*

Current status: TB adoption of WI since 2018.08.24	**Next** status Start of work by 2018.08.24 late!

No draft available as of 2018.09.26

Early draft plan:		**WG** Approval plan:	2018.12.31	**Pub** Plan: 2019.02.18 as v3.1.1
Stable draft plan:		**TB** Approval plan:	2019.01.31	
Final draft plan:	2018.12.31			

Scope: *This revision of NFV-SOL 005 propagates the deliverable into NFV Release 3.*

This edition will add protocol and data models to support the Release 3 features, and it will extend the scope of the former Release 2 edition summarized hereafter:

SOL 005 specifies a set of Restful protocol specifications and data models fulfilling the requirements specified in ETSI GS NFV-IFA 013 for the interfaces used over the Os-Ma-nfvo reference point.

This revision of NFV-SOL 005 will address the Release 3 candidate features listed in Annex B of the Release 3 Definition (v0.10.0). This revision will reflect the maintenance performed to NFV Release 2 documentation.

Adoption: 2018.08.24	Support Companies: *Ericsson, PT Portugal, Orange, DOCOMO, Telefonica, ZTE, Huawei*

DGS/NFV-SOL006 **YANG based NFV Descriptors spec**	Rapporteur:	Mahesh
		JETHANANDANI
		Cisco

Title:	Network Functions Virtualisation (NFV) Release 2; Protocols and Data Models; NFV Descriptors based on YANG Specification

Working title: *YANG based NFV Descriptors spec*

Current status: Early draft since 2017.10.10 version 0.0.2	**Next** status Stable draft by 2018.12.07

Current draft: http://docbox.etsi.org/ISG/NFV/Open/Drafts/SOL006_YANG_based_NFV_Descriptors_spec/NFV-SOL006v002.zip as of 2018.09.26

Early draft plan:	2017.10.10	**WG** Approval plan:	2019.02.28	**Pub** Plan: 2019.05.12 as v2.4.1
Stable draft plan:	2018.12.07	**TB** Approval plan:	2019.03.31	
Final draft plan:	2019.02.26			

Scope: *The scope of this work item is to develop a data model specification for NFV descriptors fulfilling the requirements specified in GS NFV- IFA 011 and NFV GS NFV-IFA 014.*

The specification will be based on the YANG data modeling language (see RFC 6020, and the common data types defined in RFC 6021) . The deliverable will consist of a translation in YANG of the constructs in the template specified in GS NFV-SOL 001, and may contain any other artifact required to ensure descriptor equivalence.

The deliverable will contain normative provisions and, if necessary, an informative mapping between the terminology used in the YANG model and the terminology used in GS NFV-IFA 011 and 014. The need for this informative mapping will be assessed as the work progresses.

Adoption: 2017.09.16	Support Companies: *TELENOR ASA, TELEFONICA, Cisco, ZTE, BT plc*

DGS/NFV-SOL007 **NSD file structure spec**	Rapporteur:	Manchang JU
		ZTE

Title:	Network Functions Virtualisation (NFV) Release 2; Protocols and Data Models; Network Service Descriptor file structure specification

Working title: *NSD file structure spec*

Current status: Early draft since 2018.08.29 version 0.0.3	**Next** status Stable draft by 2018.09.07 late!

Current draft: http://docbox.etsi.org/ISG/NFV/Open/Drafts/SOL007_NSD_file_structure_spec/NFV-SOL007v003.zip as of 2018.09.26

Early draft plan:	2018.08.29	**WG** Approval plan:	2018.10.31	**Pub** Plan: 2019.01.11 as v2.6.1
Stable draft plan:	2018.09.07	**TB** Approval plan:	2018.11.30	
Final draft plan:	2018.10.26			

Scope: *The scope of this work item is to specify the Network Service Descriptor file structure and naming conventions for the different files, fulfilling the requirements specified in ETSI GS NFV-IFA 014.*
The work item deliverable will contain normative provisions.

Adoption: 2018.03.12	Support Companies: *Ericsson, NEC, Amdocs Software Systems Ltd, ZTE, Huawei*

| **DMI/NFV-SOL008** **OpenAPI Work Programme** | Rapporteur: | Vlademir BRUSSE |
| | | Ericsson |

Title:	Network Functions Virtualisation (NFV); Protocol and Data Models; Creation and Management of the OpenAPI Work Programme

Working title:	*OpenAPI Work Programme*

Current status: TB adoption of WI since 2018.09.11 | **Next** status Start of work by 2018.09.30

No draft available as of 2018.09.26

Early draft plan:	**WG** Approval plan:	**Pub** Plan: as v
Stable draft plan:	**TB** Approval plan:	
Final draft plan:		

Scope: *This work item aims at creating and managing the OpenAPI work programme. This will enable the ETSI NFV OpenAPI work to be tracked within the ETSI Work Programme to assess progress towards the completion of deliverables. Deliverables include:*

1. The definition and maintenance of OpenAPI representations of the ETSI NFV Release 2 APIs and beyond

2. Enhancements/modifications to OpenAPI governance

3. Maintenance of the ETSI NFV SOL WG public and private Wiki pages

4. Recommendations to improve ETSI CTI tools to better enable the management of the OpenAPI work programme

Within this MI, the OpenAPI representations will be developed and maintained for each SOL WG API publication (currently GS NFV-SOL 002, GS NFV-SOL 003, and GS NFV-SOL 005, but not limited to these GSs in the future). Within the OpenAPI work programme, reported "bugs" and their resolution will be tracked.

Adoption: 2018.09.11   Support Companies: *Orange, Ericsson, DOCOMO, Nokia*

TST: 7 active Work Items

DMI/NFV-TST003	Open Source Components for NFV	Rapporteur:	Gergely CSATARI Nokia

Title:	Network Functions Virtualisation (NFV); Open Source Components for NFV

Working title: *Open Source Components for NFV*

Current status: Final draft for approval since 2017.09.15 | **Next** status WG approval by 2017.11.01 late!

No draft available as of 2018.09.26

Early draft plan:			
Stable draft plan:	**WG** Approval plan: 2017.11.01	**Pub** Plan: 2017.12.08 as v
Final draft plan: 2017.09.15	**TB** Approval plan: 2017.12.08	

Scope: *Open source is understood as a key component to facilitate interoperability (e.g. as pieces of a reference platform). This work item aims at creating and maintaining a feedback loop between the ISG NFV and relevant open source projects (for example, OPNFV, OpenStack, OpenDaylight), reducing the "impedance mismatch" in approaches, working procedures and languages between both worlds.*
Specifically, this work item aims to:
- Open appropriate communication channels to relevant open source projects and create awareness of NFV work.
- Provide guidance/best practices recommendations to NFV WGs with respect to effective communication to Open Source communities.
- Coordinate the collection of NFV requirements and feature requests and feeding them to these projects in a digestible, prioritized format to influence new releases.
- Support and contribute to the identification and tracking of gaps between the implementation of these projects and NFV requirements and feature requests.
- Provide feedback on implementation experience gained during running PoCs, interop tests, and other experimental activities to these projects (e.g. as reports on guidelines, best practices, etc.).
- Provide feedback on implementation experience from these projects to the ISG.
- Create awareness of the work (e.g. available components, features, release plans) of relevant open source projects and mapping it to ISG E2E architecture, use cases, and/or requirements.
- Identify in on-going industry initiatives the intercept between ETSI NFV WI requirements and OPNFV planned features, and raiseawareness in ETSI NFV to those priorities.
Informative outputs from this WI is stored on NFV Private Wiki here:
http://nfvprivatewiki.etsi.org/index.php?title=Open_Source_WI

Adoption: 2015.02.24 | Support Companies: *Hewlett-Packard, TELEFONICA, Intel, Oracle Corporation, DOCOMO, AT&T, Huawei (UK)*

DGR/NFV-TST006	CICD & Devops report	Rapporteur:	Pierre LYNCH Keysight Technologies UK Ltd

Title:	Network Functions Virtualisation (NFV); Testing; Report on NFV CICD and Devops

Working title: *CICD & Devops report*

Current status: Stable draft since 2018.05.08   version 0.0.9 | **Next** status Final draft for approval by 2018.10.15

Current draft: http://docbox.etsi.org/ISG/NFV/Open/DRAFTS/TST006_CICD_and_Devops_report/NFV-TST006v009.docx as of 2018.09.26

Early draft plan:			
Stable draft plan: 2018.05.08	**WG** Approval plan: 2018.11.03	**Pub** Plan: 2019.01.18 as v1.1.1
Final draft plan: 2018.10.15	**TB** Approval plan: 2018.12.07	

Scope: *- Will provide guidance and recommendations on how to leverage DevOps and CI/CD techniques across the boundary from SW provider to sercice provider, or any combination of developer, installation and operational entities*
- Will explore the implications of the processes with regard to the impact of the SW package handoff between SW provider and service provider, the required functionality in the NFV system, the different deployment and operational options

- May provide recommendations for a modification or addition to the description and contents of the SW package for testing/validation capability. It may impact DGS/NFV-IFA011 (Network Functions Virtualisation (NFV); Management and Orchestration; VNF Packaging Specification
- May have some recommendations for future enhancements to the lifecycle management for upgrading the SW code, and test and performance metrics. Based on the existing and enhanced lifecycle management, the general procedures for software upgrade testing will be developed. Reference NFV(15)000275 NFV REL "Software Update/Upgrade Functionality Specification"
- The resulting deliverable will be informative

Adoption: 2016.02.23 | Support Companies: *SWISSCOM, Telecom Italia, Huawei, AT&T, Ixia Technologies*

RGR/NFV-TST007ed261 **MANO Iop Testing Guidelines**	Rapporteur: Carsten ROSSENHOEVEL EANTC AG

Title:	Network Functions Virtualisation (NFV) Release 2; Testing; Guidelines on Interoperability Testing for MANO
Working title:	*MANO Iop Testing Guidelines*

Current status: TB adoption of WI since 2018.08.24	**Next** status Start of work by 2018.08.24 late!

No draft available as of 2018.09.26

Early draft plan:	**WG** Approval plan: 2018.12.31	**Pub** Plan: 2018.02.18 as v2.6.1
Stable draft plan:	**TB** Approval plan: 2018.01.31	
Final draft plan: 2018.12.31		

Scope: *This revision of NFV-TST 007 conducts NFV Release 2 maintenance. It corrects errors, ambiguities, misalignments, and applies editorial modifications (i.e. Corrections of category F and D as described in ETSI TWPs Annex L). This edition does not add or modify features, nor does it extend the scope of the former Release 2 edition summarized hereafter*

TST 007 provides informative interoperability test guidelines for NFV capabilities requiring interaction among VNF, MANO and VIM-NFVI, such as (but not limited to): NS Lifecycle Management, VNF Lifecycle management, VNF Package Management, Software Image Management,... The document follows the Interoperability Testing Methodology developed by the NFV TST WG (TST002) and is intended to be applicable for all implementations aligned with ETSI NFV architecture; references to open source implementations may be included as examples.

Adoption: 2018.08.24   Support Companies: *EANTC, PT Portugal, Telefonica, Keysight Technologies UK Ltd, Ericsson, AT&T*

RGS/NFV-TST008ed321 **NFVI Compute & Nwk Metrics - Spec**	Rapporteur: Al MORTON AT&T

Title:	Network Functions Virtualisation (NFV) Release 3; Testing; NFVI Compute and Network Metrics Specification
Working title:	*NFVI Compute & Nwk Metrics - Spec*

Current status: TB adoption of WI since 2018.08.24	**Next** status Start of work by 2018.08.24 late!

No draft available as of 2018.09.26

Early draft plan:	**WG** Approval plan: 2018.12.31	**Pub** Plan: 2019.02.18 as v3.2.1
Stable draft plan:	**TB** Approval plan: 2019.01.31	
Final draft plan: 2018.12.31		

Scope: *This revision of NFV-TST 008 continues the development of the specification as part of the NFV Release 3.*

This edition will add requirements and specification of metrics to support the Release 3 features, and it will extend the scope of the former Release 2 edition summarized hereafter:

Specify detailed and vendor-agnostic key operational performance metrics at different layers of the Network Function Virtualization Infrastructure (NFVI), especially processor usage and network interface usage metrics.These metrics are expected to serve as references for processed and time-aggregated measurement values for performance management information that traverses the Or-Vi and/or Vi-Vnfm reference points.

The work item deliverable will contain normative provisions.

This revision of NFV-TST 008 will address the Release 3 candidate features listed in Annex B of the Release 3 Definition (v0.10.0). Where needed, it will continue the previous version to enhance and complete the specified Release 3 features.

This revision will reflect the maintenance performed to NFV Release 2 documentation and of already specified Release 3 features.

Adoption: 2018.08.24   Support Companies: *AT&T, PT Portugal, Telefonica, Swisscom*
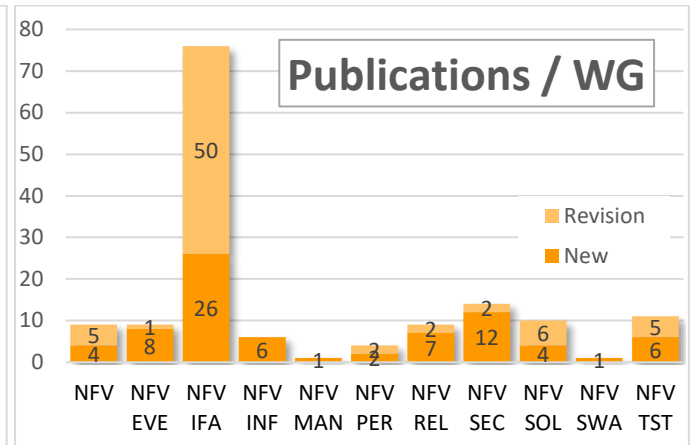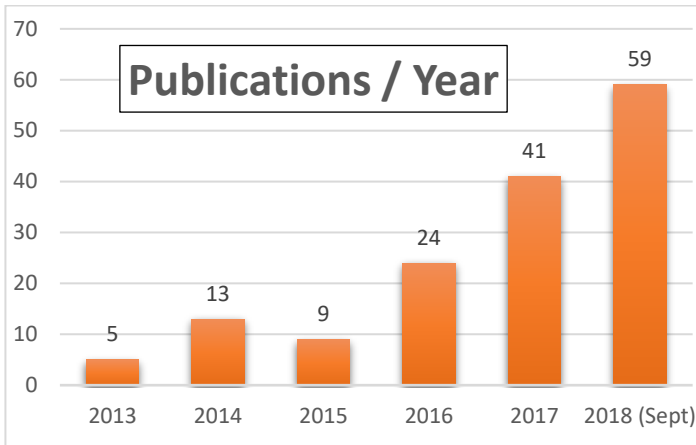
DGS/NFV-TST009 **NFVI_Benchmarks**	Rapporteur:	Al MORTON AT&T

Title:	Network Functions Virtualisation (NFV) Testing Specification of Networking Benchmarks and Measurement Methods for NFVI

Working title:	*NFVI_Benchmarks*

Current status: Final draft for approval since 2018.08.22   version 0.0.15 | **Next** status WG approval by 2018.08.17 late!

Current draft: http://docbox.etsi.org/ISG/NFV/Open/DRAFTS/TST009_NFVI_Benchmarks/NFV-TST009v0015.zip as of 2018.09.26

Early draft plan:		**WG** Approval plan:	2018.08.17	**Pub** Plan: 2018.10.29 as v1.1.1
Stable draft plan:		**TB** Approval plan:	2018.09.17	
Final draft plan:	2018.08.22			

Scope: *This work item will specify vendor-agnostic definitions of performance metrics and the associated methods of measurement for Benchmarking networks supported in the NFVI. The Benchmarks and Methods will take into account the communication-affecting aspects of the compute/networking/virtualization environment (such as the transient interrupts that block other processes, or the ability to dedicate variable amounts of resources to communication processes).*
These Benchmarks are intended to serve as a basis for fair comparison of different implementations of NFVI, (composed of various hardware and software components) according to each individual Benchmark and networking configuration evaluated. Note that a Virtual Infrastructure Manager (VIM) may play a supporting role in configuring the network under test. Example of existing Benchmarks include RFC 2544 Throughput and Latency (developed for physical network functions).

Adoption: 2017.05.19   Support Companies: *SWISSCOM, Spirent Communications, AT&T, EANTC AG, Ixia Technologies*

DGS/NFV-TST010 **API Conformance Testing**	Rapporteur:	Pierre LYNCH Keysight Technologies UK Ltd

Title:	Network Function Virtualisation (NFV) Release 2; Testing; API Conformance Testing Specification

Working title:	*API Conformance Testing*

Current status: Early draft since 2018.08.28   version 0.0.3 | **Next** status Stable draft by 2018.12.06

Current draft: http://docbox.etsi.org/ISG/NFV/Open/DRAFTS/TST010_API_Conformance_Testing/NFV-TST010v003.docx as of 2018.09.26

Early draft plan:	2018.08.28	**WG** Approval plan:	2019.04.18	**Pub** Plan: 2019.07.05 as v2.1.1
Stable draft plan:	2018.12.06	**TB** Approval plan:	2019.05.24	
Final draft plan:	2019.04.11			

Scope: *Test descriptions, procedures, methods and test configurations, along with precise expected outcomes that will comprise a conformance test plan for the APIs exposed on the following reference points: Os-Ma-Nfvo, Or-Vnfm, and Ve-Vnfm, defined in ETSI GS NFV-SOL 002, ETS GS NFV-SOL 003, and ETSI GS-NFV SOL005. Where possible, the tests will be specified using means to facilitate automation of the testing.*

Adoption: 2017.12.08   Support Companies: *Orange, Ericsson, DOCOMO, Ixia Technologies*

DGR/NFV-TST011	**Tst Domain & Description Lang.**	Rapporteur:	Frank MASSOUDIAN
			Huawei

Title:	Network Functions Virtualization (NFV); Testing; Test Domain and Description Language Recommendations
Working title:	*Tst Domain & Description Lang.*

Current status: Early draft since 2018.08.24   version 0.0.3 | **Next** status Stable draft by

Current draft: http://docbox.etsi.org/ISG/NFV/Open/DRAFTS/TST011_Tst_Domain_&_Description_Lang/NFV-TST011v003.docx as of 2018.09.26

Early draft plan:	2018.08.24	**WG** Approval plan:	**Pub** Plan: 2019.01.25 as v1.1.1
Stable draft plan:		**TB** Approval plan: 2018.12.14	
Final draft plan:	2018.11.01		

Scope: *The report will propose a model of the NFV test domain and recommend requirements for a test Domain Specific Language (DSL) to manipulate it. The description will include an NFV test automation ecosystem that facilitates interaction among NFV suppliers and operators, based on the DevOps principles outlined in TST006.*
The scope of the NFV test domain considered by this work item contains:
- System Under Test (SUT): Network Functions (NF), Network Functions Virtualization Infrastructure (NFVI), and Network Services (NS)
- Test Resources: tools or instrumented NF's and NFVI elements that test cases can interface to manipulate the SUT
- Test Execution Flow: controlled and uncontrolled state transitions
- Test case configuration data and parameters: test-resource-specific and non-test-resource-specific
The report will explore the following attributes to enable efficient multi-supplier NFV interaction:
- Reusability of test plans, test cases and test resources
- Abstraction of test data
- Decoupling of test case from the test environment
- Use of test resource abstractions in place of concrete test resources
- Dynamic allocation of concrete test resources

Adoption: 2018.05.18   Support Companies: *SWISSCOM, Telecom Italia, Keysight Technologies UK Ltd, Huawei*

DETAILED view of PUBLISHED Work

150 ISG NFV deliverables **PUBLISHED**.

GS NFV 001 v1.1.1	**NFV Use Cases**	Rapporteur: Elena Demaria

Full Title: Network Functions Virtualisation (NFV);
Use Cases

Current status: **PUBLICATION** since 10/10/2013

Scope: *The scope of this work is to collect and define the use cases of interest for NFV.*

Support Companies: *TELEFONICA, Telecom Italia, BT, DT, Verizon*

GR NFV 001 v1.2.1	**NFV Use Cases revision**	Rapporteur: Elena Demaria

Full Title: Network Functions Virtualisation (NFV);
Use Cases

Current status: **PUBLICATION** since 5/12/2017

Scope: *This Work Item will revise ETSI GS NFV 001 with the following objectives:*
- Provide a detailed user story description for all use cases already present in the published deliverable.
- Align the description of existing NFV use cases with the terminology defined in ETSI GS NFV 003 and other ISG NFV deliverables.
- Identify any additional NFV use cases that have material impact on the specification work of NFV ISG.
The deliverable will be informative.

Support Companies: *ORANGE, PT PORTUGAL, HPE, Telecom Italia, KPN N.V., TeliaSonera AB, CableLabs, Telefonica I+D, Juniper, DOCOMO, 6WIND, Ericsson*

GS NFV 002 v1.1.1	**NFV Architectural Framework**	Rapporteur: Joan Triay

Full Title: Network Functions Virtualisation (NFV);
Architectural Framework

Current status: **PUBLICATION** since 10/10/2013

Scope: *This document is an input to the NFV end-to-end architecture. The purpose of this document is to build a common understanding of "architecture" in the NFV ISG context and provides a central focus to enhance cross-WG coordination to ensure a consistent set of underpinning documents (WG work items). It may eventually be released as a public document and is written with this goal in mind.*

Support Companies: *Telefon AB LM Ericsson, TELEFONICA, BT, DT, Verizon, Huawei (UK)*

GS NFV 002 v1.2.1	**NFV Architectural Framework**	Rapporteur: Joan Triay

Full Title: Network Functions Virtualisation (NFV);
Architectural Framework

Current status: **PUBLICATION** since 12/23/2014

Scope: *The document describes the high-level architectural framework and design philosophy of VNFs, and of the supporting platform and infrastructure. The work to realize in the revision of the Architectural Framework aims at developing the basic principles of the existing framework and implementing any current missing description that will help improve the understanding of the NFV architecture within and outside the NFV ISG context.*

Support Companies: *ORANGE, NSN, Ericsson, TELEFONICA, Telecom Italia, BT, VODAFONE Group Plc, DT, DOCOMO, AT&T, Verizon, Huawei (UK)*

GS NFV 003 v1.1.1	**Terminology for Main Concepts in NFV**	Rapporteur: Andy Bennett

Full Title: Network Functions Virtualisation (NFV);
Terminology for Main Concepts in NFV

Current status: **PUBLICATION** since 10/10/2013

Scope: *This document intends to provide terms and definitions for conceptual entities with the scope of the NFV work, in order to achieve a "common language" across all the NFV working groups and for wider industry discussions on this topic.*
It should be noted, that terminology and architecture very much depend on each others, and that this document may need to be revised throughout the process of architecture work. In that sense this document shall be understood as a living document, which requires regular update and extension, the more granular conceptual entities are defined. Workgroups are requested to contribute to this paper to capture the latest discussions on conceptual entities being defined in the different Working Groups.

Support Companies: *TELEFONICA, BT, DT, Verizon*

GS NFV 003 v1.2.1	**Terminology for Main Concepts in NFV**	Rapporteur: Andy Bennett

Full Title: Network Functions Virtualisation (NFV);
Terminology for Main Concepts in NFV

Current status: **PUBLICATION** since 12/23/2014

Scope: *This document intends to provide terms and definitions for conceptual entities with the scope of the NFV work, in order to achieve a "common language" across all the NFV working groups and for wider industry discussions on this topic.*
It should be noted, that terminology, architecture and requirements very much depend on each other, and that this document may need to be revised to align with the content of various group specifications and iterations of the ISG architecture document.
Workgroups are requested to contribute to this paper to capture the latest discussions on conceptual entities being defined in the different Working Groups

Support Companies: *Hewlett-Packard, NEC, TELEFONICA, Cisco, DOCOMO, AT&T, Verizon*

GS NFV 003 v1.3.1	**Terminology**	Rapporteur: Julien Maisonneuve

Full Title: Network Functions Virtualisation (NFV);
Terminology for Main Concepts in NFV

Current status: **PUBLICATION** since 1/8/2018

Scope: *This Work Item intends to provide terms and definitions for conceptual entities within the scope of ISG NFV work, in order to achieve a "common language" across all the NFV working groups and for wider industry discussions on this topic.*

Support Companies: *ORANGE, Cisco, Oracle Corporation, 6WIND*

GS NFV 003 v1.4.1	**Terminology**	Rapporteur: Julien Maisonneuve

Full Title: Network Functions Virtualisation (NFV);
Terminology for Main Concepts in NFV

Current status: **PUBLICATION** since 8/10/2018

Scope: *This document intends to provide terms and definitions for conceptual entities with the scope of the NFV work, in order to achieve a "common language" across all the NFV working groups and for wider industry discussions on this topic. It should be noted, that terminology, architecture and requirements very much depend on each other, and that this document may need to be revised to align with the content of various group specifications and iterations of the ISG architecture document.*

Support Companies: *Orange, Nokia Corporation, TELEFONICA, CableLabs, DOCOMO, Verizon, Ixia Technologies, Huawei.*

GS NFV 004 v1.1.1	**NFV Virtualisation Requirements**	Rapporteur: Susana Sabater

Full Title: Network Functions Virtualisation (NFV);
Virtualisation Requirements

Current status: **PUBLICATION** since 10/10/2013

Scope: *This WI specifies the requirements on Network Functions Virtualisation in order to consolidate network equipment, belonging to fixed and mobile networks, onto industry standard high volume servers, switches and storage, which could be located in Datacentres, Network Nodes and in end user premises. This work will address the requirements on the following areas:• Portability/Interoperability. • Performance.• Elasticity• Security • Resiliency. • Network Stability. • Service continuity• Operations• Energy Efficiency • Migration and co-existence with existing platforms. And will address high level requirements for the virtualisation domains, i.e. Infrastructure domain, applications domain and management and orchestration domain as well as the requirements inherent to the interactions amongst them*

Support Companies: *AT&T; BT; Cisco; DOCOMO; DT; Telefon AB LM Ericsson; Hewlett-Packard; Huawei (UK); NEC; Nokia Siemens Networks ; NTT ; France Tele*

GS NFV-EVE 001 v3.1.1 Hypervisor Rqmts spec	Rapporteur: Bruno Chatras

Full Title: Network Functions Virtualisation (NFV);
Virtualisation Technologies;
Hypervisor Domain Requirements specification; Release 3

Current status: **PUBLICATION** since 7/25/2017

Scope: *The scope of this work item is to:*

1) Address   - Requirements on the hypervisor to enable use of a stand-alone (*) vswitch
- Support of VNF(C) live migration.
2) Restructure/rewrite the existing text to clearly distinguish between normative requirements to be fulfilled by the hypervisor domain and other informative material (e.g. best practices)
3) Update the state-of-the-art (e;g. options for vswitch implementations) and identification of challenges, based on industry progress and lessons learnt from the PoCs.
4) Update the document to align with the "vSwitch Benchmarking and Acceleration" deliverable
(*) In the above context, "stand-alone" refers to a vswitch whose lifecycle events (restart, upgrade…) do not directly impact virtual machines and that can be provided by software vendor independent from the hypervisor provider
The deliverable will contain normative provisions.

Support Companies: *ORANGE, PT PORTUGAL, Cisco, Intel, AT&T*

GS NFV-EVE 003 v1.1.1 NFVI Node Arch report	Rapporteur: Percy Tarapore

Full Title: Network Functions Virtualisation (NFV);
Ecosystem;
Report on NFVI Node Physical Architecture Guidelines for Multi-Vendor Environment

Current status: **PUBLICATION** since 1/8/2016

Scope: *This WI will develop a report to study the internal architectural structure/physical components of an NFVI Nodeand provide a set of guidelines to support an NFV environment. The goai is to facilitate the availability of these components in a multi-vendor environment. The scope is limited to the "Hardware Resources" portion of Figure 2 of the Infrastructure Overview GS INF001 V1.1.1. These Resources include the Compute, Storage, and Network hardware. Accordingly, this document will study:*
- Applicable Architectural Principles (e.g., Open Compute Project)
- Physical Hardware Components
- Node Construction (e.g., COTS Products, Rack Designs, Processors, Heating/Cooling Issues)
- Interconnection Methods
- "Building" NFVI Node Configurations with generic set of components (e.g., Transport, Access, Customer Prem, Provider Edge, etc.)
- Support Various Use Cases specified in GS INF001 (e.g., Cloud Computing Services, Cloud Deployment Models, etc.)
- Scaling Issues (Minimum configuration to support specified function, Stacking components to meet various node "size" requirements)
The proposed GS intends to cover these topics at an acceptable level of detail. It is expected that this study may highlight the need for additional requirements for individual components such as processors. Such requirements can then be pursued either in the ISG or in other SDO's as applicable.

Support Companies: *ORANGE, Ericsson, NEC, BT, Intel, AT&T*

GS NFV-EVE 004 v1.1.1 Virtualisation technologies Report	Rapporteur: Bruno Chatras

Full Title: Network Functions Virtualisation (NFV);
Virtualisation Technologies;
Report on the application of Different Virtualisation Technologies in the NFV Framework

Current status: **PUBLICATION** since 3/11/2016

Scope: *Although the NFV architecture is not tied to hypervisor-based solutions, the detailed specifications (e.g. MANO) are biased towards these solutions. The hypervisor approach has some cost in terms of efficiency and the scalability may not be sufficient for cases where a huge number of virtualisation containers need to be deployed and managed.*
The scope of this work item is twofold:

- *Identtify the impact of using alternative virtualisation technologies on the NFV framework and specifications, and propose appropriate changes.*
- *Provide an analysis of the pros and cons of these alternative technologies Alternative virtualisation technologies to be considered include – but are not limited to – the following ones:*
    - *Container-based operating system virtualization such as LXC*
    - *Higher layer container technology such as Java virtual machines*

The deliverable will contain informative material only, including recommendations on how to modify other ETSI NFV specifications to cover Non hypervisor-based virtualisation. These modifications are expected to be performed under separate work items.

Support Companies:	*SWISSCOM, ORANGE, PT PORTUGAL, Telecom Italia, Ericsson AB, Oracle Corporation, AT&T*

GS NFV-EVE 005 v1.1.1 SDN usage in NFV Report	Rapporteur: Marie-Paule Odini

Full Title:	Network Functions Virtualisation (NFV); Ecosystem; Report on SDN Usage in NFV Architectural Framework

Current status: **PUBLICATION** since 12/18/2015

Scope: *Software-Defined Networking (SDN) is mentioned in different ETSI NFV GSs (e.g. SWA001 Annex A). A number of POCs also combine NFV with SDN. The deliverable for this Work Item (WI) will identify use cases, clarify the different usages of SDN within the context of the NFV architecture framework, including SDN Controller as a VNF, SDN Controller as a realization of the Infrastructure network controller, etc. , and proposes requirements to be fulfilled, e.g. by an SDN controller playing the role of network controller in the NFV architecture (cf. MAN001 clause 5.6). Network domains to be covered include datacenter SDN, datacenter-WAN interworking, access network and WAN. The WI will also provide a comparison with other forms of network controllers.*
The work item will leverage existing work from ETSI ISG NFV. It will support discussions with other SDO and Opensource projects such as IETF, OPNFV, ONF, OpenStack, OpenDaylight and others as appropriate. The deliverable will contain informative material only but will also make recommendations as to whether normative work should be initiated as a follow-up activity.

Support Companies:	*ORANGE, Nokia, Hewlett-Packard, NEC, Coriant, DT, CableLabs, NTT, Intel, Telefonica Europe plc, AT&T, ConteXtream Inc., Citrix.*

GS NFV-EVE 007 v3.1.1 NFVI Hw rqmts spec	Rapporteur: Percy Tarapore

Full Title:	Network Functions Virtualisation (NFV) Release 3; NFV Evolution and Ecosystem; Hardware Interoperability Requirements Specification

Current status: **PUBLICATION** since 3/23/2017

Scope: *This Work Item proposes to develop a set of Normative interoperability requirements for the NFV hardware ecosystem and telecommunications physical environment to support NFV deployment. It builds on the work originated in EVE003.*
The Work Item scope encompasses the following:
-Specification of requirements to enable interoperability of equipment in the telecommunications environment to support NFV deployment. The focus includes the following areas:
-Operations
-Environmental
-Mechanical
-Cabling
-Maintenance.
•Specification of requirements for the support of lawful intercept and/or critical national infrastructures.
•Investigate baseline reliability requirements for NFVI Node
•Collaborate with other existing industry fora or SDOs (e.g., Open Compute Project – Telco Project) to ensure NFV hardware interoperability requirements are fulfilled.

Support Companies:	*SWISSCOM, Nokia, NEC, BT, CableLabs, Intel, AT&T, Huawei*

GS NFV-EVE 007 v3.1.2   NFVI Hw rqmts spec

Rapporteur: Percy Tarapore

Full Title: Network Functions Virtualisation (NFV) Release 3;
NFV Evolution and Ecosystem;
Hardware Interoperability Requirements Specification

Current status: **PUBLICATION** since 3/31/2017

Scope: *This Work Item proposes to develop a set of Normative interoperability requirements for the NFV hardware ecosystem and telecommunications physical environment to support NFV deployment. It builds on the work originated in EVE003.*
The Work Item scope encompasses the following:
-Specification of requirements to enable interoperability of equipment in the telecommunications environment to support NFV deployment. The focus includes the following areas:
-Operations
-Environmental
-Mechanical
-Cabling
-Maintenance.
•Specification of requirements for the support of lawful intercept and/or critical national infrastructures.
•Investigate baseline reliability requirements for NFVI Node
•Collaborate with other existing industry fora or SDOs (e.g., Open Compute Project – Telco Project) to ensure NFV hardware interoperability requirements are fulfilled.

Support Companies: *SWISSCOM, Nokia, NEC, BT, CableLabs, Intel, AT&T, Huawei*

GR NFV-EVE 008 v3.1.1   Charging and Billing report

Rapporteur: Rajshree Char

Full Title: Network Functions Virtualisation (NFV) Release 3;
Charging;
Report on Usage Metering and Charging Use Cases and Architectural Study

Current status: **PUBLICATION** since 12/14/2017

Scope: *The present document studies use cases and charging triggers for usage metering of virtualised resources. It proposes new functional blocks for 1) the collection and provision of accounting information, and 2) the triggering of charging requests.*
The interfaces (and information flows) between the proposed functional blocks and the current NFV Architectural Framework are part of the study.
The following models have been taken into account: Infrastructure as a Service (IaaS), and VNF as a Service (VNFaaS). The present document includes recommendations to either modify existing or new specifications, or both.
While management and orchestration event charging for VNFaasS is part of the present work, usage event charging for VNFaaS is for further study.

Support Companies: *Nokia, Alcatel-Lucent, Telecom Italia, DT, Openet Telecom, Hitachi Europe Ltd., Huawei, NetCracker*

GR NFV-EVE 010 v3.1.1   License Management report

Rapporteur: Abinash Vishwakarma

Full Title: Network Functions Virtualisation (NFV) Release 3;
Licensing Management;
Report on License Management for NFV

Current status: **PUBLICATION** since 12/20/2017

Scope: *This Work Item studies the features needed within the NFV-MANO framework to support license management for NFV. In this version, focus is made on the software licenses for VNFs. A set of use cases related to VNF licenses in the NFV environment are described, analyzed and used to understand the issues and produce recommendations regarding support for license management within the NFV architectural and NFV-MANO frameworks.*

Support Companies: *ORANGE, Ericsson, BT, DT, CableLabs, Openet Telecom, Amdocs Software Systems Ltd, Verizon, RIFT.io, NetCracker*

GR NFV-EVE 012 v3.1.1 Network Slicing report	Rapporteur:	Tetsuya Nakamura

Full Title: Network Functions Virtualisation (NFV) Release 3;
Evolution and Ecosystem;
Report on Network Slicing Support with ETSI NFV Architecture Framework

Current status: **PUBLICATION** since 12/21/2017

Scope: *This Work Item will analyze Use Cases related to Network Slicing as defined in SDOs and industry fora. Furthermore, the WID will document how these use cases could be mapped to current NFV concepts and supported by the ETSI NFV architecture framework*

Support Companies: *ORANGE, HPE, TELEFONICA, Telecom Italia, DT, CableLabs, Intel, ZTE, Gemalto N.V., Huawei, NetCracker, Nokia*

GS NFV-IFA 001 v1.1.1 Acceleration - UCs report	Rapporteur:	Jinwei Xia

Full Title: Network Functions Virtualisation (NFV);
Acceleration Technologies;
Report on Acceleration Technologies & Use Cases

Current status: **PUBLICATION** since 12/4/2015

Scope: *This WI suggests a common architecture and abstraction layer for the NFV acceleration (hardware & software), which allows deployment of various accelerators within NFVI and facilitates interoperability between various VNFs and accelerators. As well as presenting the general overview of the NFV acceleration, this WI also describes a set of use cases illustrating the usage of NFV acceleration in NFV environment.*
The deliverable will contain informative material only. This Work Item is the 1st of a series of Work Items on NFV Acceleration. Its deliverable will be the 1st part of a multi-part Group Specification.

Support Companies: *ORANGE, Nokia, Hewlett-Packard, Intel, China Telecommunications, Huawei (UK)*

GS NFV-IFA 002 v2.1.1 Acceleration - VNF Intface Spec	Rapporteur:	Abdel Hafiz Rabi

Full Title: Network Functions Virtualisation (NFV);
Acceleration Technologies;
VNF Interfaces Specification

Current status: **PUBLICATION** since 3/30/2016

Scope: *The scope of this work item is to specify:*
1) Requirements for a set of abstract interfaces, enabling a VNF to leverage acceleration services from the infrastructure, regardless of their implementation.
2) A deployment model of the above interfaces.
The list of abstract interfaces to be specified will be derived from the use cases described in IFA 001 (Overview and Use Cases) of the multi-part GS on NFV Acceleration. Results will be a normative specification .
This Work Item is the 2nd of a series of Work Items on NFV Acceleration.

Support Companies: *ORANGE, PT PORTUGAL, Huawei, China Telecommunications*

GS NFV-IFA 002 v2.3.1 Acceleration - VNF Intface Spec	Rapporteur:	Abdel Hafiz Rabi

Full Title: Network Functions Virtualisation (NFV) Release 2;
Acceleration Technologies;
VNF Interfaces Specification

Current status: **PUBLICATION** since 8/21/2017

Scope: *This work item is a revision of IFA002. It develops a set of interface specifications in the form of message flows and information elements fulfilling the requirements specified in clause 5 of IFA002 v2.1.1 and may perform maintenance activities. The deliverable will be a normative specification.*

Support Companies: *ORANGE, TeliaSonera AB, Huawei, 6WIND*

GS NFV-IFA 002 v2.4.1 Acceleration - VNF Intface Spec	Rapporteur:	Abdel Hafiz Rabi

Full Title:	Network Functions Virtualisation (NFV) Release 2; Acceleration Technologies; VNF Interfaces Specification

Current status: **PUBLICATION** since 2/22/2018

Scope: *This revision of NFV-IFA 002 conducts NFV Release 2 maintenance: it corrects errors, ambiguities, misalignments, and applies editorial modifications (i.e. Corrections of category F and D as described in ETSI TWPs Annex L). This edition does not add or modify features, nor does it extend the scope of the former Release 2 edition summarized hereafter:*
IFA 002 specifies requirements for a set of abstract interfaces enabling a VNF to leverage acceleration services from the infrastructure, regardless of their implementation. IFA 002 also provides an acceleration architectural model to support its deployment model.

Support Companies:	*Vodafone, PT Portugal, Orange, Huawei, Telefonica*

GS NFV-IFA 003 v2.1.1 Acceleration - Switching Aspects Spec	Rapporteur:	Brian Skerry

Full Title:	Network Functions Virtualisation (NFV); Acceleration Technologies; vSwitch Benchmarking and Acceleration Specification

Current status: **PUBLICATION** since 4/19/2016

Scope: *The scope of this work item includes the following deliverables: - Define performance benchmarking parameters for virtual switching in the usage models provided in the companion work item "Overview & Use Cases". - Define requirements for virtual switch acceleration, and quantify possible gains in performance, latency & SLA metrics. - Define deployment scenarios for compute node based virtual switching that is supportable in any virtual switch data path or in any intelligent NIC, in a consistent manner across multiple vendor implementations. - Define requirements for common virtual switching functions across usage models such as packet delivery into VNFs, network overlay and tunnel termination, stateful NAT, service chaining, load balancing and, in general, match-action based policies applied to network functions running in VMs. - Recommendations for potential follow-on PoCs to demonstrate feasibility. The deliverable's will contain both normative provisions and informative material.*

Support Companies:	*ORANGE, British Telecommunications plc, Intel, Telefonica Europe plc, Huawei (UK)*

GS NFV-IFA 003 v2.3.1 Acceleration - Switching Aspects Spec	Rapporteur:	Abdel Hafiz Rabi

Full Title:	Network Functions Virtualisation (NFV) Release 2; Acceleration Technologies; vSwitch Benchmarking and Acceleration Specification

Current status: **PUBLICATION** since 8/21/2017

Scope: *This revision of IFA003 is created to conduct NFV Release 2 maintenance, i.e. apply corrections of Category F and D as defined in Annex L, clause L3 of ETSI Technical Working Procedures. This revision does not extend the scope of IFA003 v2.1.1.*

Support Companies:	*PT PORTUGAL, Intel, Orange, Telefonica*

GS NFV-IFA 003 v2.4.1 Acceleration - Switching Aspects Spec	Rapporteur: Abdel Hafiz Rabi

Full Title:	Network Functions Virtualisation (NFV) Release 2; Acceleration Technologies; vSwitch Benchmarking and Acceleration Specification

Current status: **PUBLICATION** since 2/23/2018

Scope: *This revision of NFV-IFA 003 conducts NFV Release 2 maintenance: it corrects errors, ambiguities, misalignments, and applies editorial modifications (i.e. Corrections of category F and D as described in ETSI TWPs Annex L). This edition does not add or modify features, nor does it extend the scope of the former Release 2 edition summarized hereafter:*
IFA 003 specifies performance benchmarking metrics for virtual switching, with the goal that the metrics will adequately quantify performance gains achieved through virtual switch acceleration conforming to the associated requirements specified herein. The acceleration-related requirements will be applicable to common virtual switching functions across usage models such as packet delivery into VNFs, network overlay and tunnel termination, stateful Network Address Translators (NAT), service chaining, load balancing and, in general, match-action based policies/flows applied to traffic going to/from the VMs. IFA 003 also provides deployment scenarios with applicability to multiple vendor implementations and recommendations for follow-on proof of concept activities.

Support Companies:	*Vodafone, PT Portugal, Orange, Huawei, Telefonica*

GS NFV-IFA 004 v2.1.1 Acceleration - Mgmt aspects Spec	Rapporteur: Zhipeng Huang

Full Title:	Network Functions Virtualisation (NFV); Acceleration Technologies; Management Aspects Specification

Current status: **PUBLICATION** since 4/21/2016

Scope: *This work item will specify functional requirements for both Virtualised Infrastructure Manager (VIM) and the NFV Infrastructure (NFVI), for NFV acceleration from infrastructure management perspective. This includes the control and the management of acceleration resources, e.g. allocation, release, discovery of acceleration resources. As part of the WI, the corresponding impacts on VIM related specifications regarding functional requirements [GS NFV IFA010] and reference points ([GS NFV IFA005], [GS NFV IFA006]) will be identified.*

Support Companies:	*ORANGE, Nokia, BT, Juniper, China Telecommunications, Huawei (UK)*

GS NFV-IFA 004 v2.3.1 Acceleration - Mgmt aspects Spec	Rapporteur: Zhipeng Huang

Full Title:	Network Functions Virtualisation (NFV) Release 2; Acceleration Technologies; Management Aspects Specification

Current status: **PUBLICATION** since 8/4/2017

Scope: *This revision of IFA004 is created to conduct NFV Release 2 maintenance, i.e. apply corrections of Category F and D as defined in Annex L, clause L3 of ETSI Technical Working Procedures. This revision does not extend the scope of IFA004 v2.1.1.*

Support Companies:	*PT PORTUGAL, Huawei, Orange, Telefonica*

GS NFV-IFA 004 v2.4.1 Acceleration - Mgmt aspects Spec	Rapporteur: Zhipeng Huang

Full Title:	Network Functions Virtualisation (NFV) Release 2; Acceleration Technologies; Management Aspects Specification

Current status: **PUBLICATION** since 2/22/2018

Scope: *This revision of NFV-IFA 004 conducts NFV Release 2 maintenance: it corrects errors, ambiguities, misalignments, and applies editorial modifications (i.e. Corrections of category F and D as described in ETSI TWPs Annex L). This edition does not add or modify features, nor does it extend the scope of the former Release 2 edition summarized hereafter:*
IFA 004 specifies functional requirements for both the Virtualised Infrastructure Manager (VIM) and the NFV Infrastructure (NFVI), for NFV acceleration from an infrastructure management perspective. This includes the controlling and management of acceleration resources, e.g. allocation, release and discovery of acceleration resources. IFA 004 also identifies the corresponding impacts on VIM related specifications regarding functional requirements ETSI GS NFV-IFA 010 and reference points (ETSI GS NFV-IFA 005 and ETSI GS NFV-IFA 006).

Support Companies:	*Huawei, PT Portugal, Orange, Telefonica*

GS NFV-IFA 005 v2.1.1 Or-Vi ref point Spec	Rapporteur: Andy Bennett

Full Title: Network Functions Virtualisation (NFV);
Management and Orchestration;
Or-Vi reference point - Interface and Information Model Specification

Current status: **PUBLICATION** since 4/21/2016

Scope: *This Work Item describe the complete functional requirements for interfaces on the Or-Vi reference point between the NFVO and the VIM(s), to address the functions specified in GS NFV MAN 001.*
The work will include:
1) Detailed description of interfaces and its operations functionality, and
2) Information elements of:
*   a) Virtualized resource management interfaces, for:*
*   i) Lifecycle management of virtualized resources, including instantiation, modification, configuration and termination of such virtualized resources.*
*   ii) Fault management of virtualized resources.*
*   iii) Performance management of virtualized resources.*
*   b) Resource orchestration interfaces, for:*
*   i) Virtualized resources/NFVI capacity management.*
*   ii) Resources reservation management.*
*   iii) Virtualized resources information management.*
*   iv) Software image management,*
*   v) NFP management.*
The resulting deliverable will contain normative provisions.

Support Companies: *ORANGE, PT PORTUGAL, Nokia, Hewlett-Packard, Ericsson, NEC EUROPE, TELEFONICA, Telecom Italia, KPN N.V., VODAFONE, DT, Cisco, CableLabs, Sonus Networks Ltd, NTT corp., Openet Telecom, Juniper, DOCOMO*

GS NFV-IFA 005 v2.3.1 Or-Vi ref point Spec	Rapporteur: Andy Bennett

Full Title: Network Functions Virtualisation (NFV) Release 2;
Management and Orchestration;
Or-Vi reference point - Interface and Information Model Specification

Current status: **PUBLICATION** since 8/23/2017

Scope: *This revision of IFA005 is created to conduct NFV Release 2 maintenance, i.e. apply corrections of Category F and D as defined in Annex L, clause L3 of ETSI Technical Working Procedures. This revision does not extend the scope of IFA005 v2.1.1.*

Support Companies: *PT PORTUGAL, HPE, Orange, Cisco, Docomo, Telefonica, ZTE, Telecom Italia, Nokia, NTT, Vodafone, Ericsson*

GS NFV-IFA 005 v2.4.1 Or-Vi ref point Spec	Rapporteur: Andy Bennett

Full Title: Network Functions Virtualisation (NFV) Release 2;
Management and Orchestration;
Or-Vi reference point - Interface and Information Model Specification

Current status: **PUBLICATION** since 2/14/2018

Scope: *This revision of NFV-IFA 005 conducts NFV Release 2 maintenance: it corrects errors, ambiguities, misalignments, and applies editorial modifications (i.e. Corrections of category F and D as described in ETSI TWPs Annex L). This edition does not add or modify features, nor does it extend the scope of the former Release 2 edition summarized hereafter:*
IFA 005 specifies the interfaces supported over the Or-Vi reference point of the NFV-MANO
architectural framework GS NFV 002 as well as the information elements exchanged over those interfaces.

Support Companies: *Samsung, PT Portugal, Orange, Docomo, Huawei, Telefonica, Ericsson*

GS **NFV-IFA 005** **v3.1.1** **Or-Vi ref point Spec**	Rapporteur: Andy Bennett

Full Title:	Network Functions Virtualisation (NFV) Release 3; Management and Orchestration; Or-Vi reference point - Interface and Information Model Specification

Current status: **PUBLICATION** since 8/10/2018

Scope: *This revision of NFV-IFA 005 propagates the deliverable into NFV Release 3.*

This edition will add requirements and specification of interfaces and associated information model to support the Release 3 features, and it will extend the scope of the former Release 2 edition summarized hereafter:

This Work Item describe the complete functional requirements for interfaces on the Or-Vi reference point between the NFVO and the VIM(s), to address the functions specified in GS NFV MAN 001.

The work will include:

1) Detailed description of interfaces and its operations functionality, and

2) Information elements of:

    a) Virtualized resource management interfaces, for:

      i) Lifecycle management of virtualized resources, including instantiation, modification, configuration and termination of such virtualized resources.

      ii) Fault management of virtualized resources.

      iii) Performance management of virtualized resources.

    b) Resource orchestration interfaces, for:

      i) Virtualized resources/NFVI capacity management.

      ii) Resources reservation management.

      iii) Virtualized resources information management.

      iv) Software image management,

      v) NFP management.

The resulting deliverable will contain normative provisions.

This revision of NFV-IFA 005 will address the Release 3 candidate features listed in Annex B of the Release 3 Definition (v0.8.0).

This revision will also reflect the maintenance performed to NFV Release 2 documentation.

Support Companies:	*Samsung R&D Institute UK, PT Portugal, DOCOMO Communications Lab, HPE, NTT Corp*

GS **NFV-IFA 005** **v2.5.1** **Or-Vi ref point Spec**	Rapporteur: Andy Bennett

Full Title:	Network Functions Virtualisation (NFV) Release 2; Management and Orchestration; Or-Vi reference point - Interface and Information Model Specification

Current status: **PUBLICATION** since 8/10/2018

Scope: *This revision of NFV-IFA 005 conducts NFV Release 2 maintenance. It corrects errors, ambiguities, misalignments, and applies editorial modifications (i.e. Corrections of category F and D as described in ETSI TWPs Annex L). This edition does not add or modify features, nor does it extend the scope of the former Release 2 edition summarized hereafter:*

IFA 005 specifies the interfaces supported over the Or-Vi reference point of the NFV-MANO architectural framework ETSI GS NFV 002 as well as the information elements exchanged over those interfaces.

Support Companies:	*PT Portugal, Orange, Huawei, Telefonica, DOCOMO, Samsung*

GS **NFV-IFA 006** **v2.1.1** **Vi-Vnfm ref point Spec**	Rapporteur: Zarrar Yousaf

Full Title:	Network Functions Virtualisation (NFV); Management and Orchestration; Vi-Vnfm reference point - Interface and Information Model Specification

Current status: **PUBLICATION** since 4/20/2016

Scope: *This Work Item will describe the complete functional requirements for interfaces on the Vi-Vnfm reference point in between the VNFM and the VIM(s), to address the functions specified in GS NFV MAN 001. The results of the work item will include:*

1) Detailed description of interfaces and its operations functionality, and

2) Information elements of:

    a) Virtualized resource management interfaces, for:

      i) Lifecycle management of virtualized resources, including instantiation, modification, configuration and termination of such virtualized resources.

      ii) Fault management of virtualized resources.

iii) Performance management of virtualized resources.
  b) Resource management interfaces, for:
    i) Resources reservation information retrieval.
    ii) Virtualized resources information retrieval.
    iii) Software image management.
The resulting deliverable will contain normative provisions.

Support Companies:	ORANGE, PT PORTUGAL, Nokia, Hewlett-Packard, Ericsson, NEC EUROPE, TELEFONICA, TELECOM ITALIA, KPN N.V., VODAFONE, DT, Cisco, CableLabs, Sonus Networks Ltd, NTT corp., Openet Telecom, Juniper, DOCOMO

GS NFV-IFA 006 v2.3.1 Vi-Vnfm ref point Spec	Rapporteur:	Zarrar Yousaf

Full Title: Network Functions Virtualisation (NFV) Release 2;
Management and Orchestration;
Vi-Vnfm reference point - Interface and Information Model Specification

Current status: **PUBLICATION** since 8/7/2017

Scope: *This revision of IFA006 is created to conduct NFV Release 2 maintenance, i.e. apply corrections of Category F and D as defined in Annex L, clause L3 of ETSI Technical Working Procedures. This revision does not extend the scope of IFA006 v2.1.1.*

Support Companies:	PT PORTUGAL, HPE, Orange, NEC, Docomo, Telefonica, ZTE, Telecom Italia, Nokia, NTT, Vodafone, Ericsson

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GS NFV-IFA 006 v2.4.1 Vi-Vnfm ref point Spec	Rapporteur:	Zarrar Yousaf

Full Title: Network Functions Virtualisation (NFV) Release 2;
Management and Orchestration;
Vi-Vnfm reference point - Interface and Information Model Specification

Current status: **PUBLICATION** since 2/13/2018

Scope: *This revision of NFV-IFA 006 conducts NFV Release 2 maintenance: it corrects errors, ambiguities, misalignments, and applies editorial modifications (i.e. Corrections of category F and D as described in ETSI TWPs Annex L). This edition does not add or modify features, nor does it extend the scope of the former Release 2 edition summarized hereafter:*
IFA 006 specifies the interfaces supported over the Vi-Vnfm reference point of the NFV-MANO architectural framework ETSI GS NFV-MAN 001 as well as the information elements exchanged over those interfaces.

Support Companies:	NEC, PT Portugal, Orange, Docomo, Huawei, Telefonica, Ericsson

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GS NFV-IFA 006 v3.1.1 Vi-Vnfm ref point Spec	Rapporteur:	Zarrar Yousaf

Full Title: Network Functions Virtualisation (NFV) Release 3;
Management and Orchestration;
Vi-Vnfm reference point - Interface and Information Model Specification

Current status: **PUBLICATION** since 8/10/2018

Scope: *This revision of NFV-IFA 006 propagates the deliverable into NFV Release 3.*
This edition will add requirements and specification of interfaces and associated information model to support the Release 3 features, and it will extend the scope of the former Release 2 edition summarized hereafter:
This Work Item will describe the complete functional requirements for interfaces on the Vi-Vnfm reference point in between the VNFM and the VIM(s), to address the functions specified in GS NFV MAN 001. The results of the work item will include:
1) Detailed description of interfaces and its operations functionality, and
2) Information elements of:
  a) Virtualized resource management interfaces, for:
    i) Lifecycle management of virtualized resources, including instantiation, modification, configuration and termination of such virtualized resources.
    ii) Fault management of virtualized resources.
    iii) Performance management of virtualized resources.
  b) Resource management interfaces, for:
    i) Resources reservation information retrieval.
    ii) Virtualized resources information retrieval.
    iii) Software image management.
The resulting deliverable will contain normative provisions.
This revision of NFV-IFA 006 will address the Release 3 candidate features listed in Annex B of the Release 3 Definition (v0.8.0).
This revision will also reflect the maintenance performed to NFV Release 2 documentation.

Support Companies:	NEC Europe, PT Portugal, DOCOMO Communications Lab, HPE

GS NFV-IFA 006 v2.5.1 Vi-Vnfm ref point Spec	Rapporteur: Zarrar Yousaf

Full Title:	Network Functions Virtualisation (NFV) Release 2; Management and Orchestration; Vi-Vnfm reference point - Interface and Information Model Specification

Current status: **PUBLICATION** since 8/10/2018

Scope: *This revision of NFV-IFA 006 conducts NFV Release 2 maintenance. It corrects errors, ambiguities, misalignments, and applies editorial modifications (i.e. Corrections of category F and D as described in ETSI TWPs Annex L). This edition does not add or modify features, nor does it extend the scope of the former Release 2 edition summarized hereafter:*
IFA 006 specifies the interfaces supported over the Vi-Vnfm reference point of the NFV-MANO architectural framework ETSI GS NFV-MAN 001 as well as the information elements exchanged over those interfaces.

Support Companies: *PT Portugal, Orange, Huawei, Telefonica, NEC, DOCOMO*

GS NFV-IFA 007 v2.1.1 Or-Vnfm ref point Spec	Rapporteur: Uwe Rauschenbach

Full Title:	Network Functions Virtualisation (NFV); Management and Orchestration; Or-Vnfm reference point - Interface and Information Model Specification

Current status: **PUBLICATION** since 10/18/2016

Scope: *The scope of the Work Item will include the complete functional requirements for interfaces on the Or-Vnfm reference point between the VNFM and the NFVO, to address the functions specified in GS NFV MAN 001.*
The results of the work item will include:
1) Detailed description of interfaces and its operations functionality.
2) Information flows and information elements of:
a) VNF lifecycle management interfaces, for:
i) Lifecycle management of VNFs, including the instantiation, modification, update, scaling and termination of VNFs.
ii) Lifecycle change notifications of VNFs.
b) VNF orchestration interfaces, for:
i) Lifecycle operation and resource granting.
c) Other related VNF management interfaces, for:
i) VNF fault information retrieval and management.
ii) VNF performance information retrieval and management.
iii) VNF package management.
iv) Policy management.
The resulting deliverable will contain normative provisions.

Support Companies: *ORANGE, PT PORTUGAL, Nokia, Hewlett-Packard, Ericsson, NEC EUROPE, TELEFONICA, TELECOM ITALIA, KPN N.V., VODAFONE, DT, Cisco, CableLabs, Sonus Networks NTT, Openet Telecom, Amdocs Software, Juniper, DOCOMO*

GS NFV-IFA 007 v2.3.1 Or-Vnfm ref point Spec	Rapporteur: Uwe Rauschenbach

Full Title:	Network Functions Virtualisation (NFV) Release 2; Management and Orchestration; Or-Vnfm reference point - Interface and Information Model Specification

Current status: **PUBLICATION** since 8/21/2017

Scope: *This revision of IFA007 is created to conduct NFV Release 2 maintenance, i.e. apply corrections of Category F and D as defined in Annex L, clause L3 of ETSI Technical Working Procedures. This revision does not extend the scope of IFA007 v2.1.1.*

Support Companies: *PT PORTUGAL, HPE, Orange, Nokia, Docomo, Ericsson, Telefonica, ZTE, Telecom Italia, NTT, Vodafone, Ericsson*

GS NFV-IFA 007 v2.4.1 **Or-Vnfm ref point Spec**	Rapporteur:	Uwe Rauschenbach

Full Title:	Network Functions Virtualisation (NFV) Release 2; Management and Orchestration; Or-Vnfm reference point - Interface and Information Model Specification

Current status: **PUBLICATION** since 2/14/2018

Scope: *This revision of NFV-IFA 007 conducts NFV Release 2 maintenance: it corrects errors, ambiguities, misalignments, and applies editorial modifications (i.e. Corrections of category F and D as described in ETSI TWPs Annex L). This edition does not add or modify features, nor does it extend the scope of the former Release 2 edition summarized hereafter:*

IFA 007 specifies the interfaces supported over the Or-Vnfm reference point of the Network Functions Virtualisation Management and Orchestration (NFV-MANO) architectural framework ETSI GS NFV-MAN 001 as well as the information elements exchanged over those interfaces.

Support Companies: *Nokia, PT Portugal, Orange, Docomo, Huawei, Telefonica, Ericsson*

GS NFV-IFA 007 v3.1.1 **Or-Vnfm ref point Spec**	Rapporteur:	Ernest Bayha

Full Title:	Network Functions Virtualisation (NFV) Release 3; Management and Orchestration; Or-Vnfm reference point - Interface and Information Model Specification

Current status: **PUBLICATION** since 8/10/2018

Scope: *This revision of NFV-IFA 007 propagates the deliverable into NFV Release 3.*

This edition will add requirements and specification of interfaces and associated information model to support the Release 3 features, and it will extend the scope of the former Release 2 edition summarized hereafter:

The scope of the Work Item will include the complete functional requirements for interfaces on the Or-Vnfm reference point between the VNFM and the NFVO, to address the functions specified in GS NFV MAN 001.

The results of the work item will include:

1) Detailed description of interfaces and its operations functionality.

2) Information flows and information elements of:

a) VNF lifecycle management interfaces, for:

i) Lifecycle management of VNFs, including the instantiation, modification, update, scaling and termination of VNFs.

ii) Lifecycle change notifications of VNFs.

b) VNF orchestration interfaces, for:

i) Lifecycle operation and resource granting.

c) Other related VNF management interfaces, for:

i) VNF fault information retrieval and management.

ii) VNF performance information retrieval and management.

iii) VNF package management.

iv) Policy management.

The resulting deliverable will contain normative provisions.

This revision of NFV-IFA 007 will address the Release 3 candidate features listed in Annex B of the Release 3 Definition (v0.8.0).

This revision will also reflect the maintenance performed to NFV Release 2 documentation.

Support Companies: *Nokia, PT Portugal, DOCOMO Communications Lab, Orange*

GS NFV-IFA 007 v2.5.1 **Or-Vnfm ref point Spec**	Rapporteur:	Ernest Bayha

Full Title:	Network Functions Virtualisation (NFV) Release 2; Management and Orchestration; Or-Vnfm reference point - Interface and Information Model Specification

Current status: **PUBLICATION** since 8/10/2018

Scope: *This revision of NFV-IFA 007 conducts NFV Release 2 maintenance. It corrects errors, ambiguities, misalignments, and applies editorial modifications (i.e. Corrections of category F and D as described in ETSI TWPs Annex L). This edition does not add or modify features, nor does it extend the scope of the former Release 2 edition summarized hereafter:*

IFA 007 specifies the interfaces supported over the Or-Vnfm reference point of the Network Functions Virtualisation Management and Orchestration (NFV-MANO) architectural framework ETSI GS NFV-MAN 001 as well as the information elements exchanged over those interfaces.

Support Companies: *Nokia, PT Portugal, Orange, Huawei, Telefonica, Ericsson, DOCOMO,*

GS NFV-IFA 008 v2.1.1 Ve-Vnfm ref point Spec	Rapporteur:	Shitao Li

Full Title: Network Functions Virtualisation (NFV);
Management and Orchestration;
Ve-Vnfm reference point - Interface and Information Model Specification

Current status: **PUBLICATION** since 10/18/2016

Scope: *The reference point Ve-Vnfm described as part of the NFV architecture framework in GS NFV002 is actually further split in the informative GS NFV MAN001 in two reference points – one between the VNF Manager and a VNF (Ve-Vnfm-vnf) and one between the VNF Manager and an EM associated with that VNF (Ve-Vnfm-em); these reference points are mainly used for the lifecycle management of that VNF. The scope of the Work Item will include the functional and information requirements of all VNF management interfaces over the reference points between the VNFM and theVNF/EM, based on which complete interfaces technical specifications can subsequently be defined, for interoperability purposes.. The results of the work item will include: • Detailed description of interfaces and its operations functionality. • Detailed information model requirements of related VNF lifecycle management interfaces, for: – Lifecycle management of VNFs, including the instantiation, modification, update, scaling, healing and termination of VNFs. – Lifecycle change notifications of VNFs. • Detailed information model requirements of other related generic VNF management interfaces, for: – VNF fault management. – VNF performance management. – VNF configuration • Detailed information model requirements of any other generic VNF management interfaces (new and/or previously described in GS NFV MAN 001) needed to be exposed between in support of VNF/EM and VNFM, in support of necessary VNF-related management operations. • Validation of interface operations and information model requirements against end-to-end flows. Data models/schemas and protocols needed to implement the detailed functional requirements are not covered in this deliverable. The WI will leverage GS NFV MAN001 and will consider any applicable other guidelines, studies and requirements as appropriate, in close collaboration with the other organizations working on these aspects, such as 3GPP SA5 and TMF. The deliverable will contain normative provisions.*

Support Companies: *ORANGE, Alcatel-Lucent, Hewlett-Packard, Ericsson, TELEFONICA, Sonus Networks Limited, Juniper, Amdocs Software Systems Ltd, SPRINT, AT&T, Huawei (UK)*

GS NFV-IFA 008 v2.3.1 Ve-Vnfm ref point Spec	Rapporteur:	Shitao Li

Full Title: Network Functions Virtualisation (NFV) Release 2;
Management and Orchestration;
Ve-Vnfm reference point - Interface and Information Model Specification

Current status: **PUBLICATION** since 8/21/2017

Scope: *This revision of IFA008 is created to conduct NFV Release 2 maintenance, i.e. apply corrections of Category F and D as defined in Annex L, clause L3 of ETSI Technical Working Procedures. This revision does not extend the scope of IFA008 v2.1.1.*

Support Companies: *PT PORTUGAL, HPE, Orange, Huawei, Docomo, Ericsson, Telefonica, ZTE, Telecom Italia, Nokia, NTT, Ericsson*

GS NFV-IFA 008 v2.4.1 Ve-Vnfm ref point Spec	Rapporteur:	Xu Yang

Full Title: Network Functions Virtualisation (NFV) Release 2;
Management and Orchestration;
Ve-Vnfm reference point - Interface and Information Model Specification

Current status: **PUBLICATION** since 2/13/2018

Scope: *This revision of NFV-IFA 008 conducts NFV Release 2 maintenance: it corrects errors, ambiguities, misalignments, and applies editorial modifications (i.e. Corrections of category F and D as described in ETSI TWPs Annex L). This edition does not add or modify features, nor does it extend the scope of the former Release 2 edition summarized hereafter:*
IFA 008 specifies the interfaces supported over the Ve-Vnfm-em and Ve-Vnfm-vnf reference points of the NFV-MANO architectural framework ETSI GS NFV-MAN 001 as well as the information elements exchanged over those interfaces.

Support Companies: *Huawei, PT Portugal, Orange, Docomo, Telefonica, Ericsson*

GS NFV-IFA 008 v3.1.1 Ve-Vnfm ref point Spec	Rapporteur:	Xu Yang

Full Title: Network Functions Virtualisation (NFV) Release 3;
Management and Orchestration;
Ve-Vnfm reference point - Interface and Information Model Specification

Current status: **PUBLICATION** since 8/10/2018

Scope: *This revision of NFV-IFA 008 propagates the deliverable into NFV Release 3.*

This edition will add requirements and specification of interfaces and associated information model to support the Release 3 features, and it will extend the scope of the former Release 2 edition summarized hereafter:

The reference point Ve-Vnfm described as part of the NFV architecture framework in GS NFV002 is actually further split in the informative GS NFV MAN001 in two reference points - one between the VNF Manager and a VNF (Ve-Vnfm-vnf) and one between the VNF Manager and an EM associated with that VNF (Ve-Vnfm-em); these reference points are mainly used for the lifecycle management of that VNF. The scope of the Work Item will include the functional and information requirements of all VNF management interfaces over the reference points between the VNFM and theVNF/EM, based on which complete interfaces technical specifications can subsequently be defined, for interoperability purposes.

The results of the work item will include:

• Detailed description of interfaces and its operations functionality.

• Detailed information model requirements of related VNF lifecycle management interfaces, for:

- Lifecycle management of VNFs, including the instantiation, modification, update, scaling, healing and termination of VNFs.

- Lifecycle change notifications of VNFs.

• Detailed information model requirements of other related generic VNF management interfaces, for:

- VNF fault management.

- VNF performance management.

- VNF configuration

• Detailed information model requirements of any other generic VNF management interfaces (new and/or previously described in GS NFV MAN 001) needed to be exposed between in support of VNF/EM and VNFM, in support of necessary VNF-related management operations.

• Validation of interface operations and information model requirements against end-to-end flows. Data models/schemas and protocols needed to implement the detailed functional requirements are not covered in this deliverable.

The WI will leverage GS NFV MAN001 and will consider any applicable other guidelines, studies and requirements as appropriate, in close collaboration with the other organizations working on these aspects, such as 3GPP SA5 and TMF. The deliverable will contain normative provisions.

This revision of NFV-IFA 008 will address the Release 3 candidate features listed in Annex B of the Release 3 Definition (v0.8.0).

This revision will also reflect the maintenance performed to NFV Release 2 documentation.

Support Companies: *Huawei UK Ltd., PT Portugal, DOCOMO Communications Lab, Orange, ZTE*

GS NFV-IFA 008 v2.5.1 Ve-Vnfm ref point Spec	Rapporteur:	Xu Yang

Full Title: Network Functions Virtualisation (NFV) Release 2;
Management and Orchestration;
Ve-Vnfm reference point - Interface and Information Model Specification

Current status: **PUBLICATION** since 8/10/2018

Scope: *This revision of NFV-IFA 008 conducts NFV Release 2 maintenance. It corrects errors, ambiguities, misalignments, and applies editorial modifications (i.e. Corrections of category F and D as described in ETSI TWPs Annex L). This edition does not add or modify features, nor does it extend the scope of the former Release 2 edition summarized hereafter:*

IFA 008 specifies the interfaces supported over the Ve-Vnfm-em and Ve-Vnfm-vnf reference points of the NFV-MANO architectural framework ETSI GS NFV-MAN 001 as well as the information elements exchanged over those interfaces.

Support Companies: *PT Portugal, Orange, Huawei, Telefonica, Ericsson, Telefonica*

GS NFV-IFA 009 v1.1.1	**MANO architectural options report**	Rapporteur: Peter Worndle

Full Title:	Network Functions Virtualisation (NFV); Management and Orchestration; Report on Architectural Options

Current status: **PUBLICATION** since 7/5/2016

Scope: *The WI is an architecture study that shall:*
- *outline clearly a set of possible functional/architectural options*
- *analyse the impact of different interactions between some functional blocks in the NFV architectural framework (EM, VNF, OSS) and NFV-MANO functional blocks (NFVO, VNFM, VIM) on the functional partitioning/distribution/consolidation of functionality amongst NFV-MANO functional blocks*
- *analyse the scope of the VNFM and NFVO and clarify the difference and impact, if any, of separating VNFM from the NFVO versus having those functionalities combined*
- *analyse the impact of centralized versus distributed VNFM functionality*
- *analyze and outline functional/architectural impact of separating versus combining the two broad functions of the NFVO (Network Service Orchestration and Resource Orchestration);*
- *analyze and outline functional/architectural options of VNFM, NFVO, VIM to support operations across administrative domains boundaries and identify the necessary interfaces.*
- *identify for each architectural option views of usage of the interfaces and functional blocks, and which management interfaces are significant*
- *provide valuable insights for consideration by other normative work on NFV architecture and interfaces*
The WI deliverable shall be informative.

Support Companies:	*ORANGE, Alcatel-Lucent, Hewlett-Packard, NEC, TELEFONICA, KPN N.V., DT, Cisco, Sonus Networks Limited, Juniper, Amdocs Software Systems Ltd, Oracle Corporation, SPRINT, AT&T, Huawei (UK)*

GS NFV-IFA 010 v2.1.1	**MANO Functional Rqmts Spec**	Rapporteur: Amanda Xiang

Full Title:	Network Functions Virtualisation (NFV); Management and Orchestration; Functional requirements specification

Current status: **PUBLICATION** since 4/6/2016

Scope: *This WI aims for a NFV Phase 2 deliverable containing all the normative functional requirements for NFV management and orchestration e.g. to support VNF migration, VNF Healing, Health-check.*
The following aspects need to be considered (in-scope) while developing such a deliverable
- Consolidating all the functional requirements scattered in various phase 1 GSs (SWA GS, REL GS, INF GSs, MAN GS, NFV004) for management and orchestration. ISG level requirements from NFV004 should be considered as default requirement for phase 2 unless specific corrections to certain requirements are agreed in ISG level.
- Refining functional requirements for concepts defined in Phase 1
The target deliverable is a requirement GS which will be fulfilled by NFV management and orchestration interface normative work. The other interface normative WI can progress in parallel. The functional requirements on interfaces and models related to interfaces are not in scope of this WI. The final deliverable will contain normative provisions.

Support Companies:	*Alcatel-Lucent, Hewlett-Packard, DT, Oracle Corporation, ZTE, SPRINT, Huawei (UK)*

GS NFV-IFA 010 v2.2.1	**MANO Functional Rqmts Spec**	Rapporteur: Amanda Xiang

Full Title:	Network Functions Virtualisation (NFV); Management and Orchestration; Functional requirements specification

Current status: **PUBLICATION** since 9/27/2016

Scope: *The scope of this work is the revision of IFA10 specification in order to conduct maintenance and add new functional requirements that may be identified during the continued development of the release 2 interface specifications.*
The resulting specification will contain a complete set of normative functional requirements for NFV management and orchestration. The requirements on interfaces related to reference points are not in scope of this WI.

Support Companies:	*ORANGE, HPE, China Telecommunications, SPRINT, Huawei*

GS NFV-IFA 010 v2.3.1 **MANO Functional Rqmts Spec**	Rapporteur: Amanda Xiang

Full Title:	Network Functions Virtualisation (NFV) Release 2; Management and Orchestration; Functional requirements specification

Current status: **PUBLICATION** since 8/4/2017

Scope: *This revision of IFA010 is created to conduct NFV Release 2 maintenance, i.e. apply corrections of Category F and D as defined in Annex L, clause L3 of ETSI Technical Working Procedures. This revision does not extend the scope of IFA010 v2.2.1.*

Support Companies: *PT PORTUGAL, HPE, Orange, Huawei, Telefonica, ZTE, Telecom Italia*

GS NFV-IFA 010 v2.4.1 **MANO Functional Rqmts Spec**	Rapporteur: Ulrich Kleber

Full Title:	Network Functions Virtualisation (NFV) Release 2; Management and Orchestration; Functional requirements specification

Current status: **PUBLICATION** since 2/13/2018

Scope: *This revision of NFV-IFA 010 conducts NFV Release 2 maintenance: it corrects errors, ambiguities, misalignments, and applies editorial modifications (i.e. Corrections of category F and D as described in ETSI TWPs Annex L). This edition does not add or modify features, nor does it extend the scope of the former Release 2 edition summarized hereafter:*
IFA 010 specifies functional requirements for NFV management and orchestration, and general guidelines and requirements for NFV management and orchestration interface design.
IFA 010 does not cover the functional requirements on interfaces.

Support Companies: *Huawei, PT Portugal, Orange, Telefonica*

GS NFV-IFA 010 v3.1.1 **MANO Functional Rqmts Spec**	Rapporteur: Ulrich Kleber

Full Title:	Network Functions Virtualisation (NFV) Release 3; Management and Orchestration; Functional requirements specification

Current status: **PUBLICATION** since 8/10/2018

Scope: *This revision of NFV-IFA 010 propagates the deliverable into NFV Release 3.*
This edition will add functional requirements for NFV-MANO to support the Release 3 features, and it will extend the scope of the former Release 2 edition summarized hereafter:
This WI aims for a NFV Phase 2 deliverable containing all the normative functional requirements for NFV management and orchestration e.g. to support VNF migration, VNF Healing, Health-check.
The following aspects need to be considered (in-scope) while developing such a deliverable
- Consolidating all the functional requirements scattered in various phase 1 GSs (SWA GS, REL GS, INF GSs, MAN GS, NFV004) for management and orchestration. ISG level requirements from NFV004 should be considered as default requirement for phase 2 unless specific corrections to certain requirements are agreed in ISG level.
- Refining functional requirements for concepts defined in Phase 1
The target deliverable is a requirement GS which will be fulfilled by NFV management and orchestration interface normative work. The other interface normative WI can progress in parallel. The functional requirements on interfaces and models related to interfaces are not in scope of this WI. The final deliverable will contain normative provisions.
This revision of NFV-IFA 010 will address the Release 3 candidate features listed in Annex B of the Release 3 Definition (v0.8.0).
This revision will also reflect the maintenance performed to NFV Release 2 documentation.

Support Companies: *Huawei UK Ltd., PT Portugal, Orange, DOCOMO Communications Lab, NEC Europe, ZTE, NTT Corp*

GS NFV-IFA 010 v2.5.1 MANO Functional Rqmts Spec	Rapporteur: Ulrich Kleber

Full Title:	Network Functions Virtualisation (NFV) Release 2; Management and Orchestration; Functional requirements specification

Current status: **PUBLICATION** since 8/10/2018

Scope: *This revision of NFV-IFA 010 conducts NFV Release 2 maintenance. It corrects errors, ambiguities, misalignments, and applies editorial modifications (i.e. Corrections of category F and D as described in ETSI TWPs Annex L). This edition does not add or modify features, nor does it extend the scope of the former Release 2 edition summarized hereafter:*
IFA 010 specifies functional requirements for NFV management and orchestration, and general guidelines and requirements for NFV management and orchestration interface design.
IFA 010 does not cover the functional requirements on interfaces.

Support Companies: *PT Portugal, Orange, Huawei, Telefonica, DOCOMO*

GS NFV-IFA 011 v2.1.1 VNF Packaging Spec	Rapporteur: Jon Fannar Karlsson-Taylor

Full Title:	Network Functions Virtualisation (NFV); Management and Orchestration; VNF Packaging Specification

Current status: **PUBLICATION** since 10/17/2016

Scope: *This Work Item will develop a specification for packaging VNFs(Virtual Network Functions) to be delivered to service providers.*
This work item will build from the requirements captured in the SWA and MAN Group Specification documents related to the VNF state machine, VNF design patterns, and the VNF Descriptor information elements, among others.
The new work item will consider a holistic end-to-end view of the package lifecycle from design to runtime, thus capturing development as well as operational views.
Analysis for this WI will use and potentially refine End to end VNF Package lifecycle management operations based on use cases, detailing actors and NFV Architectural Framework functional blocks impacted. This new work item will also use other industry developments related to software procurement as input into the analysis.
Deliverables for this work item will be an informative GS document addressing:
- Requirements for the structure and format of the VNF archive, list of mandatory and optional files and authorized formats
-Extensible language independent meta-model for describing the VNF properties and resource requirements buiding on existing work on VNFD. This will require using consistent terminology and refinement of the existing VNF model
-Recommendation for Implementation ready packaging structure by selecting and reusing (e.g., profiling or identifying requirements for extension of) existing cloud services (e.g. TOSCA) and network configuration specifications (e.g. DMTF, MEF).
This work item will benefit from the SDO gap analysis and it will be used as input to open source activities related to packaging tools, runtime package interpretors and execution environments.
The output of this work should be used as formal requirements for extensions into normative specifications developed by other SDOs identified in the analysis.

Support Companies: *Alcatel-Lucent, Hewlett-Packard, TELEFONICA, Intel, Amdocs Software Systems Ltd, AT&T*

GS NFV-IFA 011 v2.3.1 VNF Packaging Spec	Rapporteur: Jon Fannar Karlsson-Taylor

Full Title:	Network Functions Virtualisation (NFV) Release 2; Management and Orchestration; VNF Packaging Specification

Current status: **PUBLICATION** since 8/21/2017

Scope: *This revision of IFA011 is created to conduct NFV Release 2 maintenance, i.e. apply corrections of Category F and D as defined in Annex L, clause L3 of ETSI Technical Working Procedures. This revision does not extend the scope of IFA011 v2.1.1.*

Support Companies: *PT PORTUGAL, HPE, Orange, Amdocs, Verizon, Telefonica, ZTE, Telecom Italia, Ericsson*

GS NFV-IFA 011 v2.4.1 VNF Packaging Spec	Rapporteur:	Haibin Chu

Full Title:	Network Functions Virtualisation (NFV) Release 2; Management and Orchestration; VNF Descriptor and Packaging Specification

Current status: **PUBLICATION** since 2/13/2018

Scope: *This revision of NFV-IFA 011 conducts NFV Release 2 maintenance: it corrects errors, ambiguities, misalignments, and applies editorial modifications (i.e. Corrections of category F and D as described in ETSI TWPs Annex L). This edition does not add or modify features, nor does it extend the scope of the former Release 2 edition summarized hereafter:*
IFA 011 provides requirements for the structure and format of a VNF Package to describe the VNF properties and associated resource requirements in an interoperable template.
The focus is on VNF packaging, meta-model descriptors (e.g. VNFD) and package integrity and security considerations.

Support Companies: *PT Portugal, Orange, Huawei, Telefonica, Ericsson*

GS NFV-IFA 011 v3.1.1 VNF Packaging Spec	Rapporteur:	Haibin Chu

Full Title:	Network Functions Virtualisation (NFV) Release 3; Management and Orchestration; VNF Descriptor and Packaging Specification

Current status: **PUBLICATION** since 8/10/2018

Scope: *This revision of NFV-IFA 011 propagates the deliverable into NFV Release 3.*
This edition will add functional requirements and specification of the information model to support the Release 3 features, and it will extend the scope of the former Release 2 edition summarized hereafter:
This Work Item will develop a specification for packaging VNFs(Virtual Network Functions) to be delivered to service providers. This work item will build from the requirements captured in the SWA and MAN Group Specification documents related to the VNF state machine, VNF design patterns, and the VNF Descriptor information elements, among others.
The new work item will consider a holistic end-to-end view of the package lifecycle from design to runtime, thus capturing development as well as operational views.
Analysis for this WI will use and potentially refine End to end VNF Package lifecycle management operations based on use cases, detailing actors and NFV Architectural Framework functional blocks impacted. This new work item will also use other industry developments related to software procurement as input into the analysis.
Deliverables for this work item will be an informative GS document addressing:
- Requirements for the structure and format of the VNF archive, list of mandatory and optional files and authorized formats
-Extensible language independent meta-model for describing the VNF properties and resource requirements buiding on existing work on VNFD. This will require using consistent terminology and refinement of the existing VNF model
-Recommendation for Implementation ready packaging structure by selecting and reusing (e.g., profiling or identifying requirements for extension of) existing cloud services (e.g. TOSCA) and network configuration specifications (e.g. DMTF, MEF).
This work item will benefit from the SDO gap analysis and it will be used as input to open source activities related to packaging tools, runtime package interpretors and execution environments.
The output of this work should be used as formal requirements for extensions into normative specifications developed by other SDOs identified in the analysis.
This revision of NFV-IFA 011 will address the Release 3 candidate features listed in Annex B of the Release 3 Definition (v0.8.0).
This revision will also reflect the maintenance performed to NFV Release 2 documentation.

Support Companies: *HPE, PT Portugal, Docomo, CableLabs, NEC Europe*

GS NFV-IFA 011 v2.5.1 VNF Packaging Spec	Rapporteur:	Haibin Chu

Full Title: Network Functions Virtualisation (NFV) Release 2;
Management and Orchestration;
VNF Descriptor and Packaging Specification

Current status: **PUBLICATION** since 8/10/2018

Scope: *This revision of NFV-IFA 011 conducts NFV Release 2 maintenance. It corrects errors, ambiguities, misalignments, and applies editorial modifications (i.e. Corrections of category F and D as described in ETSI TWPs Annex L). This edition does not add or modify features, nor does it extend the scope of the former Release 2 edition summarized hereafter:*
IFA 011 provides requirements for the structure and format of a VNF Package to describe the VNF properties and associated resource requirements in an interoperable template.
The focus is on VNF packaging, meta-model descriptors (e.g. VNFD) and package integrity and security considerations.

Support Companies: *Ericsson, PT Portugal, Orange, Huawei, Telefonica, DOCOMO*

GS NFV-IFA 013 v2.1.1 Os-Ma-Nfvo ref point Spec - info model	Rapporteur:	Marc Flauw

Full Title: Network Functions Virtualisation (NFV);
Management and Orchestration;
Os-Ma-Nfvo reference point - Interface and Information Model Specification

Current status: **PUBLICATION** since 10/17/2016

Scope: *As described in the informative GS NFV MAN 001, Os-Ma-nfvo is a reference point between the OSS and the NFV Orchestrator. This reference point is used for all management interactions between OSS and the NFV-specific management framework, and mainly used for the lifecycle management Network Services (a group of VNFs with defined relationship between them).The scope of the Work Item will include the detailed functional and information requirements of all NFV management interfaces over the reference point Os-Ma-nfvo, based on which complete interfaces technical specifications can subsequently be defined, for interoperability purposes. The results of the work item will include:*
• Detailed description of interfaces and its operations functionality.
• Detailed information model requirements of related NS lifecycle management interfaces, for:
- Management of NS Descriptor and VNF Packages;
- Lifecycle management of Network Services, including the instantiation, modification, update, scaling, and termination, testing of NSs.
- Lifecycle change notifications of NSs.
• Complete and detailed information model requirements of other related NFV management interfaces, for:
- NS monitoring (e.g. NS fault information retrieval and management, NS performance information retrieval and management).
- Policy Management
• Detailed information model requirements of any other NFV management interfaces (new and/or previously described in GS NFV MAN 001) needed to be exposed between OSS and NFVO in support of necessary OSS-driven E2E operations.
• Validation of interface operations and information model requirements against end-to-end flows.
Data models/schemas and protocols needed to implement the detailed functional requirements are not covered in this deliverable. The WI will leverage GS NFV MAN001, and will consider any applicable other guidelines, studies and requirements as appropriate. The deliverable will contain normative provisions.

Support Companies: *ORANGE, Alcatel-Lucent, Hewlett-Packard, Ericsson, NEC, TELEFONICA, KPN N.V., DT, Cisco, Juniper, Amdocs Software Systems Ltd, Oracle Corporation, SPRINT, Huawei (UK)*

GS NFV-IFA 013 v2.3.1 Os-Ma-Nfvo ref point Spec - info model	Rapporteur:	Marc Flauw

Full Title: Network Functions Virtualisation (NFV) Release 2;
Management and Orchestration;
Os-Ma-Nfvo reference point - Interface and Information Model Specification

Current status: **PUBLICATION** since 8/21/2017

Scope: *This revision of IFA013 is created to conduct NFV Release 2 maintenance, i.e. apply corrections of Category F and D as defined in Annex L, clause L3 of ETSI Technical Working Procedures. This revision does not extend the scope of IFA013 v2.1.1.*

Support Companies: *PT PORTUGAL, HPE, Orange, Docomo, Telefonica, ZTE*

GS NFV-IFA 013 v2.4.1 Os-Ma-Nfvo ref point Spec - info model	Rapporteur: Marc Flauw

Full Title:	Network Functions Virtualisation (NFV) Release 2; Management and Orchestration; Os-Ma-Nfvo reference point - Interface and Information Model Specification

Current status: **PUBLICATION** since 2/13/2018

Scope: *This revision of NFV-IFA 013 conducts NFV Release 2 maintenance: it corrects errors, ambiguities, misalignments, and applies editorial modifications (i.e. Corrections of category F and D as described in ETSI TWPs Annex L). This edition does not add or modify features, nor does it extend the scope of the former Release 2 edition summarized hereafter:*
IFA 013 defines the interfaces supported over the Os-Ma-nfvo reference point of the NFV-MANO architectural framework ETSI GS NFV-MAN 001 as well as the information elements exchanged over those interfaces. Applications and end-to-end services on top of network services are out of scope of IFA 013 and are addressed in Application and Service Management Interface and Information Model Specification ETSI Draft DGS/NFV-IFA012.

Support Companies: *HPE, PT Portugal, Orange, Docomo, Huawei, Telefonica*

GS NFV-IFA 013 v3.1.1 Os-Ma-Nfvo ref point Spec - info model	Rapporteur: Marc Flauw

Full Title:	Network Functions Virtualisation (NFV) Release 3; Management and Orchestration; Os-Ma-Nfvo reference point - Interface and Information Model Specification

Current status: **PUBLICATION** since 8/10/2018

Scope: *This revision of NFV-IFA 013 propagates the deliverable into NFV Release 3.*
This edition will add requirements and specification of interfaces and associated information model to support the Release 3 features, and it will extend the scope of the former Release 2 edition summarized hereafter:
As described in the informative GS NFV MAN 001, Os-Ma-nfvo is a reference point between the OSS and the NFV Orchestrator. This reference point is used for all management interactions between OSS and the NFV-specific management framework, and mainly used for the lifecycle management Network Services (a group of VNFs with defined relationship between them).The scope of the Work Item will include the detailed functional and information requirements of all NFV management interfaces over the reference point Os-Ma-nfvo, based on which complete interfaces technical specifications can subsequently be defined, for interoperability purposes. The results of the work item will include:
• Detailed description of interfaces and its operations functionality.
• Detailed information model requirements of related NS lifecycle management interfaces, for:
- Management of NS Descriptor and VNF Packages;
- Lifecycle management of Network Services, including the instantiation, modification, update, scaling, and termination, testing of NSs.
- Lifecycle change notifications of NSs.
• Complete and detailed information model requirements of other related NFV management interfaces, for:
- NS monitoring (e.g. NS fault information retrieval and management, NS performance information retrieval and management).
- Policy Management
• Detailed information model requirements of any other NFV management interfaces (new and/or previously described in GS NFV MAN 001) needed to be exposed between OSS and NFVO in support of necessary OSS-driven E2E operations.
• Validation of interface operations and information model requirements against end-to-end flows.
Data models/schemas and protocols needed to implement the detailed functional requirements are not covered in this deliverable. The WI will leverage GS NFV MAN001, and will consider any applicable other guidelines, studies and requirements as appropriate. The deliverable will contain normative provisions.
This revision of NFV-IFA 013 will address the Release 3 candidate features listed in Annex B of the Release 3 Definition (v0.8.0).
This revision will also reflect the maintenance performed to NFV Release 2 documentation.

Support Companies: *HPE, PT Portugal, DOCOMO Communications Lab, Orange, NEC Europe, ZTE, NTT Corp*

GS **NFV-IFA 013** **v2.5.1** Os-Ma-Nfvo ref point Spec - info model	Rapporteur: Marc Flauw

Full Title:	Network Functions Virtualisation (NFV) Release 2; Management and Orchestration; Os-Ma-Nfvo reference point - Interface and Information Model Specification

Current status: **PUBLICATION** since 8/10/2018

Scope: *This revision of NFV-IFA 013 conducts NFV Release 2 maintenance. It corrects errors, ambiguities, misalignments, and applies editorial modifications (i.e. Corrections of category F and D as described in ETSI TWPs Annex L). This edition does not add or modify features, nor does it extend the scope of the former Release 2 edition summarized hereafter:*
IFA 013 defines the interfaces supported over the Os-Ma-nfvo reference point of the NFV-MANO architectural framework ETSI GS NFV-MAN 001 as well as the information elements exchanged over those interfaces. Applications and end-to-end services on top of network services are out of scope of IFA 013 and are addressed in Application and Service Management Interface and Information Model Specification ETSI Draft DGS/NFV-IFA012.

Support Companies: *HPE, PT Portugal, Orange, Huawei, Telefonica, DOCOMO*

GS **NFV-IFA 014** **v2.1.1** **Network Service Templates Specification**	Rapporteur: Bruno Chatras

Full Title:	Network Functions Virtualisation (NFV); Management and Orchestration; Network Service Templates Specification

Current status: **PUBLICATION** since 10/17/2016

Scope: *This Work Item will develop a specification for describing Network Service meta-data requirements and meta-data templates used to decribe Network Services.*
Examples of Network Service meta-data templates are Network Service Descriptor, VNF Forwarding Graph Descriptor, Virtual Link Descriptor and PNF Descriptor.
This work item will build from the information captured in the MAN Group Specification documents related to information elements.
Standardized meta-data templates are required for Network Services to:
•   describe the relationships between NS and VNFs and/or connectivity to PNFs that are part of the NS, along with dependencies and other constraints, such as those imposed by the scope of the MANO GS MAN 001,
•   describe the NFV infrastructure resource requirements for a NS in a service provider environment
•   describe NS operational behaviour within the scope of NFV including NS lifecycle events (eg. scaling, upgrading).
Deliverable for this work item will be an normative GS document addressing:
-   Requirements for the structure and format of the various NS meta-data templates,
-   A consistent meta-model, describing the NS properties and resource requirements building,
?   A consistent meta-model, describing the NS networking properties and resource requirements building,.
The output of this work should be used as formal requirements for extensions into normative specifications developed by other SDOs.

Support Companies: *ORANGE, Alcatel-Lucent, Hewlett-Packard, ITALTEL SpA, NEC, Ericsson AB, Cisco, Huawei, Amdocs Software Systems Ltd, Oracle Corporation, SPRINT*

GS **NFV-IFA 014** **v2.3.1** **Network Service Templates Specification**	Rapporteur: Janusz Pieczerak

Full Title:	Network Functions Virtualisation (NFV) Release 2; Management and Orchestration; Network Service Templates Specification

Current status: **PUBLICATION** since 8/21/2017

Scope: *This revision of IFA014 is created to conduct NFV Release 2 maintenance, i.e. apply corrections of Category F and D as defined in Annex L, clause L3 of ETSI Technical Working Procedures. This revision does not extend the scope of IFA014 v2.1.1.*

Support Companies: *PT PORTUGAL, HPE, Orange, Verizon, Telefonica, ZTE, Telecom Italia, Ericsson*

GS NFV-IFA 014 v2.4.1 Network Service Templates Spec	Rapporteur:	Janusz Pieczerak

Full Title: Network Functions Virtualisation (NFV) Release 2;
Management and Orchestration;
Network Service Templates Specification

Current status: **PUBLICATION** since 2/13/2018

Scope: *This revision of NFV-IFA 014 conducts NFV Release 2 maintenance: it corrects errors, ambiguities, misalignments, and applies editorial modifications (i.e. Corrections of category F and D as described in ETSI TWPs Annex L). This edition does not add or modify features, nor does it extend the scope of the former Release 2 edition summarized hereafter:*
IFA 014 specifies requirements and templates for describing Network Functions Virtualisation (NFV) Network Services (NSs) in the form of meta-data.

Support Companies: *Orange, PT Portugal, Huawei, Telefonica, Ericsson*

GS NFV-IFA 014 v3.1.1 Network Service Templates Spec	Rapporteur:	Janusz Pieczerak

Full Title: Network Functions Virtualisation (NFV) Release 3;
Management and Orchestration;
Network Service Templates Specification

Current status: **PUBLICATION** since 8/10/2018

Scope: *This revision of NFV-IFA 014 propagates the deliverable into NFV Release 3.*
This edition will add functional requirements and specification of the information model to support the Release 3 features, and it will extend the scope of the former Release 2 edition summarized hereafter:
This Work Item will develop a specification for describing Network Service meta-data requirements and meta-data templates used to decribe Network Services.
Examples of Network Service meta-data templates are Network Service Descriptor, VNF Forwarding Graph Descriptor, Virtual Link Descriptor and PNF Descriptor.
This work item will build from the information captured in the MAN Group Specification documents related to information elements.
Standardized meta-data templates are required for Network Services to:
•describe the relationships between NS and VNFs and/or connectivity to PNFs that are part of the NS, along with dependencies and other constraints, such as those imposed by the scope of the MANO GS MAN 001,
•describe the NFV infrastructure resource requirements for a NS in a service provider environment
•describe NS operational behaviour within the scope of NFV including NS lifecycle events (eg. scaling, upgrading).
Deliverable for this work item will be an normative GS document addressing:
-Requirements for the structure and format of the various NS meta-data templates,
-A consistent meta-model, describing the NS properties and resource requirements building,
-A consistent meta-model, describing the NS networking properties and resource requirements building,.
The output of this work should be used as formal requirements for extensions into normative specifications developed by other SDOs.
This revision of NFV-IFA 014 will address the Release 3 candidate features listed in Annex B of the Release 3 Definition (v0.8.0).
This revision will also reflect the maintenance performed to NFV Release 2 documentation.

Support Companies: *Orange, PT Portugal, DOCOMO Communications Lab, ZTE, HPE, NEC Europe, NTT Corp*

GS NFV-IFA 014 v2.5.1 Network Service Templates Spec	Rapporteur:	Janusz Pieczerak

Full Title: Network Functions Virtualisation (NFV) Release 2;
Management and Orchestration;
Network Service Templates Specification

Current status: **PUBLICATION** since 8/10/2018

Scope: *This revision of NFV-IFA 014 conducts NFV Release 2 maintenance. It corrects errors, ambiguities, misalignments, and applies editorial modifications (i.e. Corrections of category F and D as described in ETSI TWPs Annex L). This edition does not add or modify features, nor does it extend the scope of the former Release 2 edition summarized hereafter:*
IFA 014 specifies requirements and templates for describing Network Functions Virtualisation (NFV) Network Services (NSs) in the form of meta-data.

Support Companies: *Orange, PT Portugal, Orange, Huawei, DOCOMO, Ericsson, Telefonica,*

GR **NFV-IFA 015** v2.1.1 **Info Model Report**	Rapporteur: Marc Flauw

Full Title:	Network Functions Virtualisation (NFV) Release 2; Management and Orchestration; Report on NFV Information Model

Current status: **PUBLICATION** since 1/11/2017

Scope: *This Work Item will build upon the Information Elements developed in IFA Work Items IFA004, IFA005, IFA006, IFA007, IFA008, IFA011, IFA012, IFA013 and IFA014 and translate them into a UML NFV Information Model. The NFV Information Model will present a consolidated view of NFV Management and Orchestration model. It will use information from: • Network Service Templates information elements, produced by IFA014 • VNF Descriptor information elements produced by IFA011 • Informatiom elements related to acceleration resource management produced by IFA004 • Information elements produced by IFA005, IFA006, IFA007, IFA008, IFA012 and IFA013. The WI deliverable shall be informative even it consolidates the normative information elements from the Work Items listed above. The output deliverable will include the UML NFV Information Model as an electronic attachment. The format of the model will be the Papyrus Open Source format.*

Support Companies: *Nokia, Hewlett-Packard, Ericsson AB, Huawei, Wipro Limited, Oracle Corporation, Verizon, EANTC AG*

GR **NFV-IFA 015** v2.3.1 **Info Model Report**	Rapporteur: Marc Flauw

Full Title:	Network Functions Virtualisation (NFV) Release 2; Management and Orchestration; Report on NFV Information Model

Current status: **PUBLICATION** since 8/4/2017

Scope: *This revision of IFA015 is created to conduct NFV Release 2 maintenance, i.e. apply corrections of Category F and D as defined in Annex L, clause L3 of ETSI Technical Working Procedures. This revision does not extend the scope of IFA015 v2.1.1.*

Support Companies: *PT PORTUGAL, HPE, Verizon, Orange, Telefonica, ZTE, Telecom Italia, Nokia, Ericsson*

GR **NFV-IFA 015** v2.1.2 **Info Model Report**	Rapporteur: Marc Flauw

Full Title:	Network Functions Virtualisation (NFV) Release 2; Management and Orchestration; Report on NFV Information Model

Current status: **PUBLICATION** since 1/13/2017

Scope: *This Work Item will build upon the Information Elements developed in IFA Work Items IFA004, IFA005, IFA006, IFA007, IFA008, IFA011, IFA012, IFA013 and IFA014 and translate them into a UML NFV Information Model. The NFV Information Model will present a consolidated view of NFV Management and Orchestration model. It will use information from: • Network Service Templates information elements, produced by IFA014 • VNF Descriptor information elements produced by IFA011 • Informatiom elements related to acceleration resource management produced by IFA004 • Information elements produced by IFA005, IFA006, IFA007, IFA008, IFA012 and IFA013. The WI deliverable shall be informative even it consolidates the normative information elements from the Work Items listed above. The output deliverable will include the UML NFV Information Model as an electronic attachment. The format of the model will be the Papyrus Open Source format.*

Support Companies: *Nokia, Hewlett-Packard, Ericsson AB, Huawei, Wipro Limited, Oracle Corporation, Verizon, EANTC AG*

GR **NFV-IFA 015** v2.4.1 **Info Model Report**	Rapporteur: Marc Flauw

Full Title:	Network Functions Virtualisation (NFV) Release 2; Management and Orchestration; Report on NFV Information Model

Current status: **PUBLICATION** since 2/23/2018

Scope: *This revision of NFV-IFA 015 conducts NFV Release 2 maintenance: it corrects errors, ambiguities, misalignments, and applies editorial modifications (i.e. Corrections of category F and D as described in ETSI TWPs Annex L). This edition does not add or modify features, nor does it extend the scope of the former Release 2 edition summarized hereafter:*

IFA 015 provides an NFV Information Model consolidating information elements from the ETSI NFV IFA specifications listed in the reference section.

Support Companies: *HPE, PT Portugal, Orange, Huawei, Telefonica, Ericsson*

GR NFV-IFA 015 v3.1.1 Info Model Report	Rapporteur: Marc Flauw

Full Title:	Network Functions Virtualisation (NFV) Release 3; Management and Orchestration; Report on NFV Information Model

Current status: **PUBLICATION** since 9/4/2018

Scope: *This revision of NFV-IFA 015 propagates the deliverable into NFV Release 3.*
This edition will add the information model to support the Release 3 features, and it will extend the scope of the former Release 2 edition summarized hereafter:
This Work Item will build upon the Information Elements developed in IFA Work Items IFA004, IFA005, IFA006, IFA007, IFA008, IFA011, IFA012, IFA013 and IFA014 and translate them into a UML NFV Information Model. The NFV Information Model will present a consolidated view of NFV Management and Orchestration model. It will use information from:
• Network Service Templates information elements, produced by IFA014
• VNF Descriptor information elements produced by IFA011
• Informatiom elements related to acceleration resource management produced by IFA004
• Information elements produced by IFA005, IFA006, IFA007, IFA008, IFA012 and IFA013.
The WI deliverable shall be informative even it consolidates the normative information elements from the Work Items listed above.   The output deliverable will include the UML NFV Information Model as an electronic attachment. The format of the model will be the Papyrus Open Source format.
This revision of NFV-IFA 015 will address the Release 3 candidate features listed in Annex B of the Release 3 Definition (v0.8.0).
This revision will also reflect the maintenance performed to NFV Release 2 documentation.

Support Companies: *HPE, PT Portugal, DOCOMO Communications Lab, CableLabs, NEC Europe*

GR NFV-IFA 015 v2.5.1 Info Model Report	Rapporteur: Marc Flauw

Full Title:	Network Functions Virtualisation (NFV) Release 2; Management and Orchestration; Report on NFV Information Model

Current status: **PUBLICATION** since 8/10/2018

Scope: *This revision of NFV-IFA 015 conducts NFV Release 2 maintenance. It corrects errors, ambiguities, misalignments, and applies editorial modifications (i.e. Corrections of category F and D as described in ETSI TWPs Annex L). This edition does not add or modify features, nor does it extend the scope of the former Release 2 edition summarized hereafter:*
IFA 015 provides an NFV Information Model consolidating information elements from the ETSI NFV IFA specifications listed in the reference section.

Support Companies: *HPE, PT Portugal, Orange, Huawei, Telefonica, DOCOMO*

GR NFV-IFA 016 v2.1.1 Papyrus Guidelines	Rapporteur: Marc Flauw

Full Title:	Network Functions Virtualisation (NFV) Release 2; Information Modeling; Papyrus Guidelines

Current status: **PUBLICATION** since 3/1/2017

Scope: *This Work Item will produce guidelines for the development of a protocol-neutral UML (Unified Modeling Language) information model for ETSI NFV.*
This Work Item will build upon the internal document NFV Papyrus Guidelines developed as part of IFA015. This Work Item will address closer alignment with corresponding UML modelling guidelines from ONF and may be influenced by other partners cooperating with NFV.
The deliverable will be informative.

Support Companies: *Nokia, Alcatel-Lucent, HPE, TELEFONICA, Ericsson AB, Oracle Corporation, Verizon, ClearPath Networks, NetCracker*

GR NFV-IFA 016 v2.4.1 **Papyrus Guidelines**	Rapporteur: Marc Flauw

Full Title:	Network Functions Virtualisation (NFV) Release 2; Information Modeling; Papyrus Guidelines

Current status: **PUBLICATION** since 2/13/2018

Scope: *This revision of NFV-IFA 016 conducts NFV Release 2 maintenance: it corrects errors, ambiguities, misalignments, and applies editorial modifications (i.e. Corrections of category F and D as described in ETSI TWPs Annex L). This edition does not add or modify features, nor does it extend the scope of the former Release 2 edition summarized hereafter:*

IFA 016 defines the guidelines that are recommended to be taken into account during the creation of a protocol-neutral Unified Modeling Language (UML) information model using the Open Source tool Papyrus. These guidelines are informative for the general reader, but need to be followed when designing models for the ETSI NFV Information Model.

Support Companies: *HPE, PT Portugal, Orange, Huawei, Telefonica*

GR NFV-IFA 016 v3.1.1 **Papyrus Guidelines**	Rapporteur: Marc Flauw

Full Title:	Network Functions Virtualisation (NFV) Release 3; Information Modeling; Papyrus Guidelines

Current status: **PUBLICATION** since 8/10/2018

Scope: *This revision of NFV-IFA 016 propagates the deliverable into NFV Release 3.*

This edition will add guidelines for information modeling to support the Release 3 features, and it will extend the scope of the former Release 2 edition summarized hereafter:

This Work Item will produce guidelines for the development of a protocol-neutral UML (Unified Modeling Language) information model for ETSI NFV.

This Work Item will build upon the internal document NFV Papyrus Guidelines developed as part of IFA015. This Work Item will address closer alignment with corresponding UML modelling guidelines from ONF and may be influenced by other partners cooperating with NFV.

The deliverable will be informative.

This revision of NFV-IFA 016 will address the Release 3 candidate features listed in Annex B of the Release 3 Definition (v0.8.0).

This revision will also reflect the maintenance performed to NFV Release 2 documentation.

Support Companies: *HPE, PT Portugal, DOCOMO Communications Lab, CableLabs*

GR NFV-IFA 016 v2.5.1 **Papyrus Guidelines**	Rapporteur: Marc Flauw

Full Title:	Network Functions Virtualisation (NFV) Release 2; Information Modeling; Papyrus Guidelines

Current status: **PUBLICATION** since 8/10/2018

Scope: *This revision of NFV-IFA 016 conducts NFV Release 2 maintenance. It corrects errors, ambiguities, misalignments, and applies editorial modifications (i.e. Corrections of category F and D as described in ETSI TWPs Annex L). This edition does not add or modify features, nor does it extend the scope of the former Release 2 edition summarized hereafter:*

IFA 016 defines the guidelines that are recommended to be taken into account during the creation of a protocol-neutral Unified Modeling Language (UML) information model using the Open Source tool Papyrus. These guidelines are informative for the general reader, but need to be followed when designing models for the ETSI NFV Information Model.

Support Companies: *HPE, PT Portugal, Orange, Huawei, Telefonica,*

GR **NFV-IFA 017** v2.1.1 **UML Modeling Guidelines**	Rapporteur: Marc Flauw

Full Title: Network Functions Virtualisation (NFV) Release 2; Information Modeling; UML Modeling Guidelines

Current status: **PUBLICATION** since 2/28/2017

Scope: *This Work Item will produce guidelines for the development of a protocol-neutral UML (Unified Modeling Language) information model for ETSI NFV. This Work Item will build upon the internal document NFV UML Modeling Guidelines developed as part of IFA015. This Work Item will address closer alignment with corresponding UML modelling guidelines from ONF and may be influenced by other partners cooperating with NFV. The deliverable will be informative*

Support Companies: *Nokia; Alcatel-Lucent; HPE; TELEFONICA; Ericsson AB; Oracle Corporation; Verizon; ClearPath Networks; NetCracker*

GR **NFV-IFA 017** v2.4.1 **UML Modeling Guidelines**	Rapporteur: Marc Flauw

Full Title: Network Functions Virtualisation (NFV) Release 2; Information Modeling; UML Modeling Guidelines

Current status: **PUBLICATION** since 2/12/2018

Scope: *This revision of NFV-IFA 017 conducts NFV Release 2 maintenance: it corrects errors, ambiguities, misalignments, and applies editorial modifications (i.e. Corrections of category F and D as described in ETSI TWPs Annex L). This edition does not add or modify features, nor does it extend the scope of the former Release 2 edition summarized hereafter:*
IFA 017 defines the guidelines that have to be taken into account during the creation of a protocol-neutral Unified Modeling Language (UML) information model. These guidelines are informative for the general reader, but need to be followed when designing models for the ETSI NFV Information Model.

Support Companies: *HPE, PT Portugal, Orange, Huawei, Telefonica*

GR **NFV-IFA 017** v3.1.1 **UML Modeling Guidelines**	Rapporteur: Marc Flauw

Full Title: Network Functions Virtualisation (NFV) Release 3; Information Modeling; UML Modeling Guidelines

Current status: **PUBLICATION** since 8/10/2018

Scope: *This revision of NFV-IFA 017 propagates the deliverable into NFV Release 3.*
This edition will add guidelines for information modeling to support the Release 3 features, and it will extend the scope of the former Release 2 edition summarized hereafter:
This Work Item will produce guidelines for the development of a protocol-neutral UML (Unified Modeling Language) information model for ETSI NFV. This Work Item will build upon the internal document NFV UML Modeling Guidelines developed as part of IFA015. This Work Item will address closer alignment with corresponding UML modelling guidelines from ONF and may be influenced by other partners cooperating with NFV. The deliverable will be informative.
This revision of NFV-IFA 017 will address the Release 3 candidate features listed in Annex B of the Release 3 Definition (v0.8.0).
This revision will also reflect the maintenance performed to NFV Release 2 documentation.

Support Companies: *HPE, PT Portugal, DOCOMO Communications Lab, CableLabs*

GR **NFV-IFA 017** v2.5.1 **UML Modeling Guidelines**	Rapporteur: Marc Flauw

Full Title: Network Functions Virtualisation (NFV) Release 2; Information Modeling; UML Modeling Guidelines

Current status: **PUBLICATION** since 8/10/2018

Scope: *This revision of NFV-IFA 017 conducts NFV Release 2 maintenance. It corrects errors, ambiguities, misalignments, and applies editorial modifications (i.e. Corrections of category F and D as described in ETSI TWPs Annex L). This edition does not add or modify features, nor does it extend the scope of the former Release 2 edition summarized hereafter:*
IFA 017 defines the guidelines that have to be taken into account during the creation of a protocol-neutral Unified Modeling Language (UML) information model. These guidelines are informative for the general reader, but need to be followed when designing models for the ETSI NFV Information Model.

Support Companies: *HPE, PT Portugal, Orange, Huawei, Telefonica,*

GS NFV-IFA 018 v3.1.1 Acceleration Intface Spec	Rapporteur:	Jinwei Xia

Full Title: Network Functions Virtualisation (NFV);
Acceleration Technologies;
Network Acceleration Interface Specification; Release 3

Current status: **PUBLICATION** since 7/25/2017

Scope: *This WI will specify the message flows and information elements on the interface between the VNF and an allocated switch controlled by the VNF.*
This WI is built on the DOPFR (Dynamic Optimization of Packet Flow Routing) use case in IFA001, it will analyze the position of the interface in the NFVI, and identify the VNF types.
The work will consider the cases where the switch is a physical switch, a virtual switch and/or a switching accelerator.
For DOPFR, this WI aims to using a common language to define the semantics of the VNF while IFA002 continuation will cover the EPD (Extensible Para-virtualized Device) specification.
The deliverable will be a normative specification.

Support Companies: *ORANGE, China Telecommunications, Huawei, 6WIND, Wind River*

GS NFV-IFA 019 v3.1.1 Resource Mgmt Acceleration @ Nf-Vi - Spec	Rapporteur:	Zhipeng Huang

Full Title: Network Functions Virtualisation (NFV);
Acceleration Technologies;
Acceleration Resource Management Interface Specification; Release 3

Current status: **PUBLICATION** since 7/25/2017

Scope: *This Work Item will specify the interfaces in a form of message flows and information elements used for acceleration resource management on the Nf-Vi reference point.*
The related information model will be defined in IFA015.
The work will include
1) discovery of acceleration resources.
2) lifecycle management of acceleration resources.
The work will be based on the requirements contained in IFA004.
The deliverable will be a normative specification.

Support Companies: *Nokia, Intel, China Telecommunications, Huawei, 6WIND*

GR NFV-IFA 021 v3.1.1 MANO and automated deployment report	Rapporteur:	Joan Triay

Full Title: Network Functions Virtualisation (NFV) Release 3;
Management and Orchestration;
Report on management of NFV-MANO and automated deployment of EM and other OSS functions

Current status: **PUBLICATION** since 1/19/2018

Scope: *This Work Item will report on management of NFV-MANO functions and automated deployment of Element Management (EM) and other Operations Support System (OSS) functions, with the following objectives:*
a) Report on deployment options of EM and other service-dependent OSS functions, and provide recommendations on preferred options.
b) Define use cases, possible information flows and recommendations to support the management of NFV-MANO functions, including: update, configuration, automation of deployment and decomission, and reliability aspects.
The resulting deliverable will be informative.

Support Companies: *ORANGE, PT PORTUGAL, HPE, Ericsson, TeliaSonera AB, NTT, ZTE, DOCOMO, Fujitsu Limited*

GR NFV-IFA 022 v3.1.1   Multi-Site Services report

Rapporteur: Zarrar Yousaf

Full Title: Network Functions Virtualisation (NFV) Release 3;
Management and Orchestration;
Report on Management and Connectivity for Multi-Site Services

Current status: **PUBLICATION** since 4/19/2018

Scope: *This Work Item will report on the functional architecture necessary to manage and provision connectivity for multi-site NFV services (i.e. over WANs, access networks). A set of multi-site use cases will be described, analyzed and used to produce a set of recommendations regarding: 1) multi-site services in terms of their supporting VNFFGs, VNFs, VLinks, CPs, etc., 2) multi-network connectivity at the infrastructure layer, and 3) mappings from the infrastructure connectivity to support the multi-site services and their associated functional entities. The report will also examine MANO support for multi-site services, and identify the role of the WIM (ref. MAN001) and possible ramifications for other MANO functional entities and reference points. Concepts and terminology defined in current IFA012 and IFA009 documents will serve as a basis. EVE005 recommendations for WAN connectivity, #8-11, 20, 21, will be evaluated. VNF application specific functionality will not be considered. The connectivity study and recommendations will include endpoint discovery and management. The deliverable will be informative.*

Support Companies: *ORANGE, PT PORTUGAL, Nokia, HPE, Ericsson, NEC, TeliaSonera AB, DT, NTT, Hitachi Europe Ltd., ZTE, AT&T, NetCracker*

GR NFV-IFA 023 v3.1.1   Policy Mgmt in MANO report

Rapporteur: Haitao Xia

Full Title: Network Functions Virtualisation (NFV);
Management and Orchestration;
Report on Policy Management in Mano; Release 3

Current status: **PUBLICATION** since 7/26/2017

Scope: *This informative work aims at developing the use cases of applying policy framework in the NFV MANO functionality and identifying & analysis of potential MANO architecture, interface and work flow impacts introduced by policy management.*

Support Companies: *HPE, China Telecommunications, Hitachi Europe Ltd., SPRINT, Comptel Corporation, Huawei*

GR NFV-IFA 024 v2.1.1   NFV IM External touchpoints

Rapporteur: Marc Flauw

Full Title: Network Function Virtualisation (NFV) Release 2;
Information Modeling;
Report on External Touchpoints related to NFV Information Model

Current status: **PUBLICATION** since 3/1/2017

Scope: *This Work Item defines the touchpoints/ relations between the NFV Information Model (IFA015) and the models from other organisations including but not limited to: ONF, 3GPP, MEF, TM Forum.*
This Work Item does not change the NFV Information Model (IFA015).
The WI deliverable will be informative.
The output deliverable will include the UML Information Model describing the touchpoints as an electronic attachment. The format of the model will be the Papyrus Open Source format.

Support Companies: *ORANGE, HPE, TELEFONICA, DT, Verizon*

GS NFV-IFA 027 v2.4.1   Perf. Measurements Spec

Rapporteur: Joey Chou

Full Title: Network Functions Virtualisation (NFV) Release 2;
Management and Orchestration;
Performance Measurements Specification

Current status: **PUBLICATION** since 5/25/2018

Scope: *Specify the performance measurements (i.e. performance metrics, performance values) and use cases for descriptors and interfaces, including Or-Vnfm reference point, Ve-Vnfm reference point, Vi-Vnfm reference point, Or-Vi reference point, and Os-Ma-nfvo reference point, based on the performance metrics collected from NFVI.*

Support Companies: *ORANGE, Nokia, Intel, ZTE*

GR NFV-IFA 028 v3.1.1 **Multi admin domain support -report**	Rapporteur: Haitao Xia

Full Title:	Network Functions Virtualisation (NFV) Release 3; Management and Orchestration; Report on architecture options to support multiple administrative domains

Current status: **PUBLICATION** since 1/24/2018

Scope: *This work item will report on architecture options to support the offering of NFV MANO services across multiple administrative domains.*
Initial use cases to be considered are: NFVIaaS and NS over multiple administrative domains.
The report will examine:
(1)   Interactions between functional blocks belonging to different administrative domains.
(2)   The need for potential extensions to the MANO architecture. Different architecture options may be analysed.
(3)   Identification of the functional blocks involved in the use cases and analysis of potential functional enhancements.
(4)   The need for new reference points and interfaces between the functional blocks involved in the use cases. The need for potential changes to existing interfaces will be studied.
Recommendations for preferred options are provided and potential impact to existing IFA specifications is identified.
Multi-site connectivity and its management will not be covered by this WI but is covered by IFA022. Security and trust domains will not be considered in this WI but is covered by IFA026.
The resulting work item deliverable will be informative.

Support Companies: *ORANGE, HPE, Telecom Italia, Huawei*

GS NFV-IFA 030 v3.1.1 **Multi Domain MANO spec**	Rapporteur: Haitao Xia

Full Title:	Network Functions Virtualisation (NFV) Release 3; Management and Orchestration; Multiple Administrative Domain Aspect Interfaces Specification

Current status: **PUBLICATION** since 9/6/2018

Scope: *This work item will specify functional requirements, interfaces and operations to support the provision of NFV MANO services across multiple administrative domains.*
Work will be based on GR NFV-IFA028.
The work will consider management interactions between NFVOs in different administrative domains for:
1) Management of composite Network Service (NS) and its constituent nested NSs in different administrative domains.
2) NFVIaaS when the SLPOC (Single Logical Point of Contact) is integrated in the NFVO.
In addition, the work item will consider the interactions between VIMs of the same administrative domain for NFVIaaS when the SLPOC is integrated in VIMs.
The resulting work item deliverable will contain normative provisions.

Support Companies: *HPE, TELEFONICA, ZTE, Huawei, Ericsson Limited*

GS NFV-IFA 031 v3.1.1 **NFV-MANO_mgmt_spec**	Rapporteur: Yusuke Okazaki

Full Title:	Network Functions Virtualisation (NFV) Release 3; Management and Orchestration; Requirements and interfaces specification for management of NFV-MANO

Current status: **PUBLICATION** since 9/6/2018

Scope: *This Work Item will describe the framework to support the management of NFV-MANO functional entities. The WI will specify the interface requirements, the interfaces and necessary information elements enabling the fault, configuration and information, performance, state and log management of NFV-MANO functional entities.*
The work item will use the outcomes from ETSI GR NFV-IFA 021 as baseline.
The resulting deliverable will contain normative provisions.

Support Companies: *PT PORTUGAL, Ericsson, NEC, China Telecommunications, ZTE, DOCOMO, Huawei*

GS NFV-INF 001 v1.1.1 Infrastructure Overview	Rapporteur: Andy Reid

Full Title: Network Functions Virtualisation (NFV);
Infrastructure Overview

Current status: **PUBLICATION** since 1/13/2015

Scope: *This Work Item presents an overview of the architecture of the virtualization infrastructure and places into context all the infrastructure architecture documents.*
This Work Item will also give guidance an on the scope of each the infrastructure architecture domains and some of the issues in developing the performance, reliability, security, and interoperability needed to support virtualisation network functions.

Support Companies: *Telefon AB LM Ericsson, BT, Cisco, AT&T, Huawei (UK)*

GS NFV-INF 003 v1.1.1 Infrastructure Compute Domain	Rapporteur: Nabil Damouny

Full Title: Network Functions Virtualisation (NFV);
Infrastructure;
Compute Domain

Current status: **PUBLICATION** since 12/23/2014

Scope: *This WI specifies the requirements and interfaces of the "Compute Domain" of the architecture infrastructure which supports virtualized network functions. It also addresses the interfaces within the functional blocks of the compute domain, and the interfaces between this domain and the Hypervisor and infrastructure network domains.*

Support Companies: *Telefon AB LM Ericsson, BT, Cisco, AT&T, Huawei (UK)*

GS NFV-INF 004 v1.1.1 Infrastructure Hypervisor Domain	Rapporteur: Valerie Young

Full Title: Network Functions Virtualisation (NFV);
Infrastructure;
Hypervisor Domain

Current status: **PUBLICATION** since 1/7/2015

Scope: *This WI specifies the requirements and interfaces of the "Hypervisor Domain" of the architecture infrastructure which supports virtualized network functions. It also addresses the interfaces within the functional blocks of the hypervisor domain, and the interfaces between this domain and the compute and infrastructure network domains.*

Support Companies: *Telefon AB LM Ericsson, BT, Cisco, AT&T, Huawei (UK)*

GS NFV-INF 005 v1.1.1 Infrastructure Network Domain	Rapporteur: Evelyne Roch

Full Title: Network Functions Virtualisation (NFV);
Infrastructure;
Network Domain

Current status: **PUBLICATION** since 12/23/2014

Scope: *The WI specifies an architectural description of the Infrastructure Network domain of the virtualisation infrastructure which supports virtualised network functions. It sets out the scope of the infrastructure network domain acknowledging the potential for overlap between virtualisation infrastructure domains, and between the infrastructure networkdomain and the virtualised network functions. Its also sets out the nature of interfaces needed between infrastructure domains and within the infrastructure network domain.*

Support Companies: *Telefon AB LM Ericsson, BT, Cisco, AT&T, Huawei (UK)*

GS NFV-INF 007 v1.1.1 Meth. to desc. Interfaces and Abstractions	Rapporteur: Johann Tonsing

Full Title: Network Functions Virtualisation (NFV);
Infrastructure;
Methodology to describe Interfaces and Abstractions

Current status: **PUBLICATION** since 10/10/2014

Scope: *This WI presents a cross---cutting framework (covering compute, hypervisor and infrastructure network domains, also data, control, and management planes) which describes how NFV interfaces and abstractions are to be derived and specified.*

The WI describes the concepts associated with interfaces and abstractions. It covers the specification process / methodology in general. Provision is made for exposing a subset of an interface and for translating between interfaces to facilitate interworking.

Note that this WI does not specify all the interfaces and abstractions as these are covered by the domain specific documents. Examples of interfaces and abstractions are nevertheless supplied to illustrate the methodology. As the framework may also be of interest to the SA and MANO WGs, they need to be consulted and kept abreast. This document does not provide or standardize detailed specifications. Where appropriate it refers to existing or potential future specifications developed by other bodies.

Support Companies: *Telefon AB LM Ericsson, BT, Cisco, AT&T, Huawei (UK)*

GS NFV-INF 010 v1.1.1 NFV Service Quality Metrics	Rapporteur: Julien Maisonneuve

Full Title: Network Functions Virtualisation (NFV);
Service Quality Metrics

Current status: **PUBLICATION** since 12/23/2014

Scope: *This work item defines objective and quantitative metrics for the service qualities delivered by NFV service providers to the VNFs hosted on NFV infrastructure which can impact end user service qualities. These objective metrics are useful when setting service level objectives between organizations operating VNFs (e.g., voice-over-LTE service delivered to end users) and organizations operating NFV infrastructure (e.g., virtual compute, virtual networking) and functional blocks offered as-a-service (e.g., database-as-a-service). These metrics are designed to be included in industry standard service level agreement frameworks (e.g., TMForum, NIST) and service assurance offerings*

Support Companies: *Alcatel-Lucent, TELEFONICA, BT, AT&T, Verizon, Huawei (UK)*

GS NFV-MAN 001 v1.1.1 Management and Orchestration	Rapporteur: Jürgen Quittek

Full Title: Network Functions Virtualisation (NFV);
Management and Orchestration

Current status: **PUBLICATION** since 12/23/2014

Scope: *Define the issues and analyze the existing standards for the management and orchestration of network services based on NFV infrastructures. Identify the gaps between those issues and the current standards, and propose actions to fill these gaps*

Support Companies: *Alcatel-Lucent, NEC, TELEFONICA, Verizon*

GS NFV-PER 001 v1.1.1 NFV Performance & Portability Best Practises	Rapporteur: Gerardo Garcia de Blas

Full Title: Network Functions Virtualisation (NFV);
NFV Performance & Portability Best Practises

Current status: **PUBLICATION** since 6/30/2014

Scope: *White paper on performance evaluation methodology for selected virtual network functions representative of different kinds of workloads, and best practices to optimise performance of different workloads while achieving predictable performance and isolation in non-vertically integrated servers.*

Support Companies: *Alcatel-Lucent, TELEFONICA, BT, DT, Intel, ORANGE SA, Verizon, Huawei (UK)*

GS **NFV-PER 001** v1.1.2 **NFV Performance & Portability Best Practises**	Rapporteur: Gerardo Garcia de Blas

Full Title:	Network Functions Virtualisation (NFV); NFV Performance & Portability Best Practises

Current status: **PUBLICATION** since 12/8/2014

Scope: *Quick re-publication of NFV PER 001 following an editorial error found during NFV#8.*

Support Companies: *Alcatel-Lucent, TELEFONICA, BT, DT, Intel, ORANGE SA, Verizon, Huawei (UK)*

GS **NFV-PER 002** v1.1.1 **NFV PoC Framework**	Rapporteur: Steven Wright

Full Title:	Network Functions Virtualisation (NFV); Proofs of Concepts; Framework

Current status: **PUBLICATION** since 10/10/2013

Scope: *This WI is to develop a framework to coordinate and promote public demonstrations of Proofs of Concept (PoC) platforms illustrating key aspects of NFV. The objective for the PoCs is to build commercial awareness and confidence and encourage development of an open ecosystem by integrating components from different players. The PoCs need to be scoped around the agreed ISG use cases and address the technical challenges and approaches being progressed by the WGs. PoCs are envisaged to be initially focused on feasibilty and interoperability issues, incorporating additional aspects (performance, reliability,security, integrability…) as the different WGs and EGs progress in defining a common understanding of these aspects.*
This WI is to
(i)   define a process for calling for PoCs and adjudicating proposals (e.g., where/what to submit, response times)
(ii)   outline the acceptance criteria for a PoC proposal, (e.g., participation, reporting, exhibition dates, etc.)
(iii)   document the objectives for the approved PoCs, (e.g., identification of the NFV use cases and Work Items impacted by the PoC)
(iv)   define the reporting requirements from the approved PoCs
(v)   aggregate the approved PoC proposals & reports into a deliverable document.
It should also issue guidance on timescales and under what conditions the PoC can be demonstrated to the wider industry. It can be useful to have timescales driven by a particular conference demonstration opportunity.

Support Companies: *Telefon AB LM Ericsson, TELEFONICA, Telecom Italia, BT, DT, ORANGE SA, SPRINT, AT&T, Verizon, Huawei (UK)*

GS **NFV-PER 002** v1.1.2 **NFV PoC Framework revision**	Rapporteur: Francisco-Javier Ramón Salguero

Full Title:	Network Functions Virtualisation (NFV); Proofs of Concept; Framework

Current status: **PUBLICATION** since 12/8/2014

Scope: *As NFV transitions to phase 2, the current PoC Framework, which includes references to NFV phase 1 WGs, will become outdated.*
The goal of this WI is to make an editorial revision of the NFV PoC Framework (NFV-PER002) in order to align it with the NFV Phase 2 WG structure, as well as to ensure the continuity of the PoC activity during the transition phase (NFV#8 to NFV#9)

Support Companies: *TELEFONICA, DT, CableLabs, DOCOMO, AT&T*

GS **NFV-REL 001** v1.1.1 **Resiliency Requirements**	Rapporteur: Marcus Schoeller

Full Title:	Network Functions Virtualisation (NFV); Resiliency Requirements

Current status: **PUBLICATION** since 1/7/2015

Scope: *This work will be focused on the unique aspects related to providing robustness and resiliency in a virtualized network architecture. Items like application portability, fault monitoring, isolation and recovery, and other mechanisms necessary to maintain service sustainability will be considered as part of this effort. This work will also identify the requirements for resiliency of the network comprised of virtualized network functions.*

Support Companies: *Alcatel-Lucent, NEC, DT, Verizon*

GS **NFV-REL 002** v1.1.1 **Scalable Arch for Reliability Report**	Rapporteur: Percy Tarapore

Full Title:	Network Functions Virtualisation (NFV); Reliability; Report on Scalable Architectures for Reliability Management

Current status: **PUBLICATION** since 9/3/2015

Scope: *This WI proposes a study of how one designs processing components to achieve scalabiity, efficiency, and reliability in NFV environments. To meet the low-latency and high-availability requirements, this will require new techniques and abstractions for managing shared processing state. The hope is to identify application-independent techniques that can be applied generally, rather than have each VNF use its own idiosyncratic method for meeting these goals.*

Although an individual VNF could manage its own scale and replication, it is envisioned that an end-to-end service composed of many disparate VNFs would require a a single coherent manager, such as an orchestrator that would manage the scale and capacity of the VNFs.

To illustrate our intentions, consider how one might achieve scalable reliability when there is no state shared between flows and the failure of a small number of flows is acceptable. Today's IT/Cloud Data Centers exhibit very high availability levels by limiting the amount of unique state in a single element and creating a virtual network function from a number of small replicated components whose functional capacity can be scaled in and out by adjusting the running number of components. Reliability and availability for these type of VNFs is provided by a number of small replicated components. When an individual component fails, little state is lost and the overall VNF experiences minimal change in functional capacity. Capacity failures can be recovered by instantiating additional components. Adjustments to load balancing across the active instances may be required.

We offer this as an initial example of how scalable reliability might be achieved. We anticipate the resulting document will consider a wide variety of use cases, involving differing levels of shared state and different reliability requirements, and these will each require their own application-independent way of how to manage state, react to failures, and respond to increased load.

Accordingly, the deliverable from this proposed WID is an Informative Report. The intent is to provide guidance on Best Practices for scale out system architectures for the management of reliability.

External dependencies of this work item are: - MANO VNFD - SWA Design Patterns and Trusted Computing - REL Documents.

Support Companies:	*Alcatel-Lucent, NTT, Intel, AT&T*

GS **NFV-REL 003** v1.1.1 **E2E reliability models report**	Rapporteur: Hidefumi Nakamura

Full Title:	Network Functions Virtualisation (NFV); Reliability; Report on Models and Features for End-to-End Reliability

Current status: **PUBLICATION** since 4/27/2016

Scope: *This document will study software reliability estimation models, reliability/availability methods and software upgrade mechanisms for E2E resiliency. It will then propose guidelines and procedures that describe how to realise services of different resiliency levels.*

Support Companies:	*ORANGE, CableLabs, NTT, AT&T, Huawei (UK)*

GS **NFV-REL 003** v1.1.2 **E2E reliability models report**	Rapporteur: Hidefumi Nakamura

Full Title:	Network Functions Virtualisation (NFV); Reliability; Report on Models and Features for End-to-End Reliability

Current status: **PUBLICATION** since 7/4/2016

Scope: *This document will study software reliability estimation models, reliability/availability methods and software upgrade mechanisms for E2E resiliency. It will then propose guidelines and procedures that describe how to realise services of different resiliency levels.*

- IMMEDIATE ReE-PUBLICATION - This version (v1.1.2) was created to fix an error on page 70 of v1.1.1, see remark.

Support Companies:	*ORANGE, CableLabs, NTT, AT&T, Huawei (UK)*

GS NFV-REL 004 v1.1.1 **Active monitoring & failure detection report**	Rapporteur: Gurpreet Singh

Full Title: Network Functions Virtualisation (NFV);
Assurance;
Report on Active Monitoring and Failure Detection

Current status: **PUBLICATION** since 4/15/2016

Scope: *This deliverable will describe methods for active monitoring and failure detection.*
It will address the following aspects:
1)   Periodic testing of VNFs and service chains to ensure adherence to SLAs.
2)   Proactive failure detection and recovery.
The deliverable will propose potential enhancements to the ETSI NFV architecture to better support active monitoring.

Support Companies: *CableLabs, Spirent Communications, Intel, Verizon*

GS NFV-REL 005 v1.1.1 **Quality Accountability Framework**	Rapporteur: Julien Maisonneuve

Full Title: Network Functions Virtualisation (NFV);
Accountability;
Report on Quality Accountability Framework

Current status: **PUBLICATION** since 1/4/2016

Scope: *This work item will apply QuEST Forum quality management best practices (especially TL 9000 Measurements Handbook) and TM Forum SLA management standards (especially GB917 and TR178) to the ETSI NFV architecture.*
The intent of this framework is to promote the development of capabilities by which VNFs, NFV infrastructure and MANO can eventually enable rapid and reliable root cause analysis of service quality impairments, corrective action, and SLA management. This document will:
1.   Define high level roles, service boundaries and identify associated NFV reference points; and their quality-related responsibilities to enable rapid root cause analysis and corrective actions
2.   align high level roles with TMForum's SLA management service delivery relationships
3.   frame how traditional PNF quality measurements (e.g., TL 9000 Service Outage measurements) will be applied to VNFs to permit side-by-side quality comparions, and enable traditional quality measurement (e.g., service outage downtime) for new NFV architectural elements
The resulting deliverable will reuse work performed in other relevant NFV Work Items, and collaborate with the corresponding WGs.

Support Companies: *ORANGE, Alcatel-Lucent, Hewlett-Packard, TELEFONICA*

GS NFV-REL 006 v3.1.1 **SW Upgrade spec**	Rapporteur: Percy Tarapore

Full Title: Network Functions Virtualisation (NFV) Release 3;
Reliability;
Maintaining Service Availability and Continuity Upon Software Modification

Current status: **PUBLICATION** since 2/13/2018

Scope: *This Work Item specifies requirements for the purpose of Software Updates/ Upgrades, such that service availability and continuity is maintained.*
All types of software related to Network Function Virtualisation (NFV) - e.g., Virtual Network Functions (VNF), Management and Orchestration (MANO) and Network Function Virtualisation Infrastructure (NFVI) - as well as required controlling and supporting functionality will be addressed.
The final deliverable will contain normative provisions.

Support Companies: *NEC, Intel, AT&T, Huawei*

GR NFV-REL 007 v1.1.1   MANO resilience report

Rapporteur: Chidung Lac

Full Title: Network Functions Virtualisation (NFV);
Reliability;
Report on the resilience of NFV-MANO critical capabilities

Current status: **PUBLICATION** since 9/28/2017

Scope: *This WI will report on how to build a resilient NFV-MANO functional block from the reliability/availability perspective.*
It will:
1) Identify critical NFV-MANO capabilities required to provide reliable services to the VNFs and the NSs.
2) Map the resilience requirements, e.g., established in REL001, with existing NFV-MANO capabilities as listed in up to release 2 GSs.
3) Study specific needs and constraints for the identified capabilities.
The work will report on possible mechanisms that enable high-availability within the different entities of NFV-MANO to render the identified capabilities dependable and trustworthy.

Support Companies: *ORANGE, NEC, NTT, Intel, AT&T*

GR NFV-REL 007 v1.1.2   MANO resilience report

Rapporteur: Chidung Lac

Full Title: Network Functions Virtualisation (NFV);
Reliability;
Report on the resilience of NFV-MANO critical capabilities

Current status: **PUBLICATION** since 10/2/2017

Scope: *This WI will report on how to build a resilient NFV-MANO functional block from the reliability/availability perspective.*
It will:
1) Identify critical NFV-MANO capabilities required to provide reliable services to the VNFs and the NSs.
2) Map the resilience requirements, e.g., established in REL001, with existing NFV-MANO capabilities as listed in up to release 2 GSs.
3) Study specific needs and constraints for the identified capabilities.
The work will report on possible mechanisms that enable high-availability within the different entities of NFV-MANO to render the identified capabilities dependable and trustworthy.

Support Companies: *ORANGE, NEC, NTT, Intel, AT&T*

GS NFV-SEC 001 v1.1.1   Security Problem Statement

Rapporteur: Bob Briscoe

Full Title: Network Functions Virtualisation (NFV);
NFV Security; Problem Statement

Current status: **PUBLICATION** since 10/6/2014

Scope: ** Define NFV sufficiently to understand its security impact*
* Provide a reference list of deployment scenarios
* Identify new security vulnerabilities resulting from NFV
* Identify candidate NFV working groups responsible for addressing each vulnerability

Support Companies: *Alcatel-Lucent, TELEFONICA, BT, Intel*

GS NFV-SEC 002 v1.1.1   Security features in mgmt sofware report

Rapporteur: Huilan Lu

Full Title: Network Functions Virtualisation (NFV);
NFV Security;
Cataloguing security features in management software

Current status: **PUBLICATION** since 8/17/2015

Scope: *The work item aims to catalogue security features in management software relevant to NFV. It covers OpenStack as the first case study. The initial deliverable is a catalogue of OpenStack modules that provide security services (such as authentication, authorization, confidentiality, integrity protection, logging, and auditing) with the full graphs of their respective dependencies down to the modules that implement cryptographic protocols and algorithms. Once the dependency graph is established, recommendations could be made on which options are appropriate for NFV deployment.*

Support Companies: *Alcatel-Lucent, BT, AT&T, Verizon, Huawei (UK)*

GS NFV-SEC 003 v1.1.1 **Security and Trust Guidance**	Rapporteur: Kurt Roemer

Full Title: Network Functions Virtualisation (NFV); NFV Security; Security and Trust Guidance	
Current status: **PUBLICATION** since 12/23/2014	
Scope: *Define areas of consideration where security and trust technologies, practices and processes have different requirements than non-NFV systems and operations.* *Supply guidance for the environment that supports and interfaces with NFV systems and operations, but avoid redefining any security considerations that are not specific to NFV.*	
Support Companies: *Alcatel-Lucent, BT, Intel, Citrix.*	

GR NFV-SEC 003 v1.2.1 **Security and Trust Guidance**	Rapporteur: Mihai Serb

Full Title: Network Functions Virtualisation (NFV); NFV Security; Security and Trust Guidance	
Current status: **PUBLICATION** since 8/26/2016	
Scope: *Changes to clause 4.4.5.1 of GS NFV-SEC003 v1.1.1: replace Secured Boot with Trustworthy Boot and add a new description to clarify its coverage.*	
Support Companies: *TELEFONICA, BT, Intel, Huawei*	

GS NFV-SEC 004 v1.1.1 **LI report**	Rapporteur: Scott Cadzow

Full Title: Network Functions Virtualisation (NFV); NFV Security; Privacy and Regulation; Report on Lawful Interception Implications	
Current status: **PUBLICATION** since 9/3/2015	
Scope: *The aim of this work item is to expand the problem statement for application of Lawful Interception (LI) in NFV. The report shall identify the security and architecture pre-conditions for the provision of LI in an NVF based network. The report shall identify the requirements for provision of the points of interception for each of Intercept Related Information (IRI) and Content of Communication (CC) with respect to the handover requirements defined by ETSI TC LI.*	
Support Companies: *ORANGE, Alcatel-Lucent, Ericsson, TELEFONICA, BT, Cadzow Communications*	

GS NFV-SEC 006 v1.1.1 **Sec & Regulation report**	Rapporteur: Scott Cadzow

Full Title: Network Functions Virtualisation (NFV); Security Guide; Report on Security Aspects and Regulatory Concerns	
Current status: **PUBLICATION** since 4/18/2016	
Scope: *This deliverable will develop a guide to assist with addressing the security aspects and regulatory concerns of NFV related documents and applications.* *This will include a template to assist the development of ETSI NFV deliverables and broader guidance for developers, architects and designers of hardware and software.*	
Support Companies: *TELEFONICA, Cadzow Communications, British Telecommunications plc, OTD, AT&T, Citrix.*	

GR NFV-SEC 007 v1.1.1 NFV Attestation report	Rapporteur: Diego Lopez

Full Title:	Network Functions Virtualisation (NFV); Trust; Report on Attestation Technologies and Practices for Secure Deployments

Current status: **PUBLICATION** since 10/19/2017

Scope: *This report will identify gaps in existing attestation technologies and practices, as applicable to NFV sytsem. These will include, but not limited to:*
- Levels of assurance
- Assumed capabilities from the NFVI
- Operational procedures
- Requirements for interoperability
-A gap analysis of current (established or newly proposed) attestation technology
-Recommendations for follow-on PoCs to demonstrate feasibility of such attestation procedures

Support Companies: *Alcatel-Lucent, Hewlett-Packard, TELEFONICA, Intel, AT&T*

GS NFV-SEC 009 v1.1.1 UCs for multi-layer host admin	Rapporteur: Mike Bursell

Full Title:	Network Functions Virtualisation (NFV); NFV Security; Report on use cases and technical approaches for multi-layer host administration

Current status: **PUBLICATION** since 12/18/2015

Scope: *One of the enduring issues within complex administration domains is the provision of multi-layer administration within a single virtualisation host. Multi-layer administration seeks to provide assurances that Virtual Machines or Containers running on a virtualisation host ("hosted applications") – are not vulnerable to interference (of various types) by the host system or platform ("hosting service"). This Work Item will list use cases for multi-layer administration and discuss possible technical approaches.*

Support Companies: *NEC, TELEFONICA, BT, VODAFONE Group Plc, Intel, OTD, National Technical Assistance*

GR NFV-SEC 009 v1.2.1 UCs for multi-layer host admin	Rapporteur: Anne-Marie Praden

Full Title:	Network Functions Virtualisation (NFV); NFV Security; Report on use cases and technical approaches for multi-layer host administration

Current status: **PUBLICATION** since 1/20/2017

Scope: *One of the enduring issues within complex administration domains is the provision of multi-layer administration within a single virtualisation host. Multi-layer administration seeks to provide assurances that Virtual Machines or Containers running on a virtualisation host ("hosted applications") - are not vulnerable to interference (of various types) by the host system or platform ("hosting service"). This Work Item will list use cases for multi-layer administration and discuss possible technical approaches.*

Support Companies: *TELEFONICA, Intel, Gemalto N.V., Red Hat Limited*

GS NFV-SEC 010 v1.1.1 Retained Data Report	Rapporteur: Mark Shepherd

Full Title:	Network Functions Virtualisation (NFV); NFV Security; Report on Retained Data problem statement and requirements

Current status: **PUBLICATION** since 4/18/2016

Scope: *The aim of this work item is to provide a problem statement and articulate the existing requirements for Retained Data in the context of NFV.*
The present document examines the core underlying requirements for Retained Data such as those presented by ETSI TC LI (TS 102 656 and TS 102 657).
The present document aims to identify solutions or mitigations to the problems identified.

Support Companies: *VODAFONE Group Plc; National Technical Assistance;Yaana Limited: Tencastle Limited; Cadzow Communications*

GR NFV-SEC 011 v1.1.1	**LI Architecture Report**	Rapporteur:	Alex Leadbeater

Full Title: Network Functions Virtualisation (NFV);
Security;
Report on NFV LI Architecture

Current status: **PUBLICATION** since 4/6/2018

Scope: *NFV virtualised networks are required to be able to support Lawful Interception (LI). In order for virtual functions to support LI, the NFV virtualisation layer must provide a set of capabilities, interfaces, functions and components which can be utilised by the virtualised applications (VNFs) to provide Lawful Interception. This report will identify potential top to bottom (Virtualised Application through NFV layer through hardware platform) LI architectures and identify within the scope of ETSI NFV, capabilities, interfaces, functions and components required to support these architectures.*
The main objectives of this work item are to
•   identify and define 1 or more NFV reference LI architectures, including administration functions, virtual points of interception, mediation functions and other LI functions.
•   Identify potential NFV solutions which provide the capabilities, interfaces, functions and components to meet the identified LI architectures.
•   Document deployment scenarios examples for each of the identified reference LI architectures
This work will build on applicable work already undertaken in NFV SEC 004 & 009.
This work may include collaboration with other work groups, e.g. IFA WG.
This Report is expected to form the basis from which a future normative NFV LI architecture can be developed.

Support Companies: *ORANGE, Ericsson, BT, Ministère Economie Indu. Numer, OTD, Yaana Limited, Tencastle Limited*

GS NFV-SEC 012 v3.1.1	**Arch for sensitive components - Spec**	Rapporteur:	Mike Bursell

Full Title: Network Functions Virtualisation (NFV) Release 3;
Security;
System architecture specification for execution of sensitive NFV components

Current status: **PUBLICATION** since 1/6/2017

Scope: *Many different VNFs include components – VNFCIs, whether VMs or Containers – which contain sensitive data or algorithms. These may need integrity and/or confidentiality protection from a number of different entities, including NFVI administrators. Some elements of the Mangement and Orchestration domain also require such protection. Equally, NFVI hosts must be assured that they are protected from malicious or compromised work loads. This normative Work Item will describe a system architecture for the execution of sensitive NFV components, covering all of these use cases. This system architecture will describe technical measures, software interfaces and hardware and software techniques. The expectation is that for some use cases, sensitive and non-sensitive workloads may have to co-exist on the same platform, and protection one from the other is considered in scope of this WI.*

Support Companies: *BT, Ministère Economie Indu. Numer, Intel, OTD, National Technical Assistance, Yaana Limited*

GS NFV-SEC 013 v3.1.1	**Sec mgmt & Monitoring Spec**	Rapporteur:	Ashutosh Dutta

Full Title: Network Functions Virtualisation (NFV) Release 3;
Security ;
Security Management and Monitoring specification

Current status: **PUBLICATION** since 2/28/2017

Scope: *This WI will study Security Management and Monitoring, as well as use cases and deployment scenarios in an NFV environment.*
It will specify security Management and Monitoring requirements, architecture, protocols, provisioning, and security analytics for secure NFV deployment.
This WI will recommend methodologies for secure placement and provisioning of security functions and policies, including visibility and control elements.
The output of this work will be a normative specification.

Support Companies: *Nokia, Alcatel-Lucent, BT, Cisco, NEC Corporation, AQSACOM S.A.S., Spirent Communications, Intel, AT&T, Yaana Limited, Huawei, Citrix.*

GS **NFV-SEC 014 v3.1.1** **MANO Security Spec**	Rapporteur: Pradheepkumar Singaravelu

Full Title:	Network Functions Virtualisation (NFV) Release 3; NFV Security; Security Specification for MANO Components and Reference points

Current status: **PUBLICATION** since 4/20/2018

Scope: *This work item will perform and document a threat analysis for MANO components (NFVO, VNFM, VIM) and internal interfaces (Or-Vnfm, Vi-Vnfm, Or-Vi). The requirements to counter the identified threats will be specified.*

Support Companies: *NEC, TELEFONICA, Cadzow Communications, Cisco, Intel, SPRINT, AT&T*

GS **NFV-SOL 002 v2.3.1** **Ve-Vnfm RESTful protocols spec**	Rapporteur: Jong-Hwa Yi

Full Title:	Network Functions Virtualisation (NFV) Release 2; Protocols and Data Models; RESTful protocols specification for the Ve-Vnfm Reference Point

Current status: **PUBLICATION** since 8/29/2017

Scope: *The scope of this work item is to develop a set of Restful protocols specifications fulfilling the requirements specified in GS NFV IFA 008 for the interfaces used over the Ve-Vnfm reference point. The type of RESTful protocol may depend on the interface considered (e.g. the VNF configuration interface can be specified based on RESTCONF). The deliverable will contain normative provisions.*

NOTE: RESTful protocols may not be suitable for all interfaces used on the Ve-Vnfm Reference Point. Specification of protocols for such interfaces is outside the scope of this work item.

Support Companies: *ORANGE, PT PORTUGAL, NEC, Ericsson AB, DOCOMO, Huawei*

GS **NFV-SOL 002 v2.4.1** **Ve-Vnfm RESTful protocols spec**	Rapporteur: Jong-Hwa Yi

Full Title:	Network Functions Virtualisation (NFV) Release 2; Protocols and Data Models; RESTful protocols specification for the Ve-Vnfm Reference Point

Current status: **PUBLICATION** since 2/23/2018

Scope: *This revision of NFV-SOL 002 conducts NFV Release 2 maintenance: it corrects errors, ambiguities, misalignments, and applies editorial modifications (i.e. Corrections of category F and D as described in ETSI TWPs Annex L). This edition does not add or modify features, nor does it extend the scope of the former Release 2 edition summarized hereafter:*

SOL 002 specifies a set of Restful protocols fulfilling the requirements specified in GS NFV-IFA 008 for the interfaces used over the Ve-Vnfm reference point.

Support Companies: *ETRI, PT Portugal, Orange, Docomo, Huawei, Telefonica, Ericsson*

GS **NFV-SOL 002 v2.5.1** **Ve-Vnfm RESTful protocols spec**	Rapporteur: Jong-Hwa Yi

Full Title:	Network Functions Virtualisation (NFV) Release 2; Protocols and Data Models; RESTful protocols specification for the Ve-Vnfm Reference Point

Current status: **PUBLICATION** since 9/7/2018

Scope: *This revision of NFV-SOL 002 conducts NFV Release 2 maintenance. It corrects errors, ambiguities, misalignments, and applies editorial modifications (i.e. Corrections of category F and D as described in ETSI TWPs Annex L). This edition does not add or modify features, nor does it extend the scope of the former Release 2 edition summarized hereafter:*

SOL 002 specifies a set of Restful protocols fulfilling the requirements specified in GS NFV-IFA 008 for the interfaces used over the Ve-Vnfm reference point.

Support Companies: *ETRI, PT Portugal, Orange, Ericsson, Huawei, Telefonica, DOCOMO*

GS NFV-SOL 003 v2.3.1 **Or-Vnfm RESTful protocols spec**	Rapporteur: Uwe Rauschenbach

Full Title:	Network Functions Virtualisation (NFV) Release 2; Protocols and Data Models; RESTful protocols specification for the Or-Vnfm Reference Point

Current status: **PUBLICATION** since 7/26/2017

Scope: *The scope of this work item is to produce a Group Specification documenting a set of RESTful Interface Specifications fulfilling the requirements specified in GS NFV IFA 007 for the interfaces used over the Or-Vnfm reference point. The work item deliverable will contain normative provisions.*
When the same interface is produced or consumed on the Or-Vnfm and Ve-Vnfm reference points, one of the deliverables will reference and profile the other one

Support Companies: *ORANGE, Nokia, Ericsson, NEC, Telecom Italia, KPN N.V., VODAFONE Group Plc, Cisco, DOCOMO*

GS NFV-SOL 003 v2.4.1 **Or-Vnfm RESTful protocols spec**	Rapporteur: Uwe Rauschenbach

Full Title:	Network Functions Virtualisation (NFV) Release 2; Protocols and Data Models; RESTful protocols specification for the Or-Vnfm Reference Point

Current status: **PUBLICATION** since 2/22/2018

Scope: *This revision of NFV-SOL 003 conducts NFV Release 2 maintenance: it corrects errors, ambiguities, misalignments, and applies editorial modifications (i.e. Corrections of category F and D as described in ETSI TWPs Annex L). This edition does not add or modify features, nor does it extend the scope of the former Release 2 edition summarized hereafter:*
SOL 003 specifies a set of RESTful protocols and data models fulfilling the requirements specified in ETSI GS NFV-IFA 007 for the interfaces used over the Or-Vnfm reference point, except for the "Virtualised Resources Management interfaces in indirect mode" as defined in clause 6.4 of ETSI GS NFV-IFA 007.

Support Companies: *Nokia, PT Portugal, Orange, Docomo, Huawei, Telefonica, Ericsson*

GS NFV-SOL 003 v2.5.1 **Or-Vnfm RESTful protocols spec**	Rapporteur: Uwe Rauschenbach

Full Title:	Network Functions Virtualisation (NFV) Release 2; Protocols and Data Models; RESTful protocols specification for the Or-Vnfm Reference Point

Current status: **PUBLICATION** since 9/6/2018

Scope: *This revision of NFV-SOL 003 conducts NFV Release 2 maintenance. It corrects errors, ambiguities, misalignments, and applies editorial modifications (i.e. Corrections of category F and D as described in ETSI TWPs Annex L). This edition does not add or modify features, nor does it extend the scope of the former Release 2 edition summarized hereafter:*
SOL 003 specifies a set of RESTful protocols and data models fulfilling the requirements specified in ETSI GS NFV-IFA 007 for the interfaces used over the Or-Vnfm reference point, except for the "Virtualised Resources Management interfaces in indirect mode" as defined in clause 6.4 of ETSI GS NFV-IFA 007.

Support Companies: *Nokia, PT Portugal, Orange, Huawei, Ericsson, Telefonica,*

GS NFV-SOL 004 v2.3.1 **VNF Package Stage 3 spec**	Rapporteur: Andrei Kojukhov

Full Title:	Network Functions Virtualisation (NFV) Release 2; Protocols and Data Models; VNF Package specification

Current status: **PUBLICATION** since 7/3/2017

Scope: *The scope of this work item is to specify the structure and format of a VNF Package and its constituents, fulfilling the requirements specified in GS NFV IFA 011 for a VNF Package. The work item deliverable will contain normative provisions.*

Support Companies: *ORANGE, Amdocs Software Systems Ltd, China Telecommunications, AT&T, Huawei, NetCracker*

| **GS NFV-SOL 004 v2.4.1   VNF Package Stage 3 spec** | Rapporteur: | Andrei Kojukhov |

Full Title: Network Functions Virtualisation (NFV) Release 2;
Protocols and Data Models;
VNF Package specification

Current status: **PUBLICATION** since 2/13/2018

Scope: *This revision of NFV-SOL 004 conducts NFV Release 2 maintenance: it corrects errors, ambiguities, misalignments, and applies editorial modifications (i.e. Corrections of category F and D as described in ETSI TWPs Annex L). This edition does not add or modify features, nor does it extend the scope of the former Release 2 edition summarized hereafter:*
SOL 004 specifies the structure and format of a VNF package file and its constituents, fulfilling the requirements specified in ETSI GS NFV-IFA 011 for a VNF package.

Support Companies: *Amdocs, PT Portugal, Orange, Huawei, Telefonica, Ericsson*

| **GS NFV-SOL 004 v2.5.1   VNF Package Stage 3 spec** | Rapporteur: | Andrei Kojukhov |

Full Title: Network Functions Virtualisation (NFV) Release 2;
Protocols and Data Models;
VNF Package specification

Current status: **PUBLICATION** since 9/6/2018

Scope: *This revision of NFV-SOL 004 conducts NFV Release 2 maintenance. It corrects errors, ambiguities, misalignments, and applies editorial modifications (i.e. Corrections of category F and D as described in ETSI TWPs Annex L). This edition does not add or modify features, nor does it extend the scope of the former Release 2 edition summarized hereafter:*
SOL 004 specifies the structure and format of a VNF package file and its constituents, fulfilling the requirements specified in ETSI GS NFV-IFA 011 for a VNF package.

Support Companies: *Amdocs, PT Portugal, Orange, Huawei, Telefonica,*

| **GS NFV-SOL 005 v2.4.1   Os-Ma-nfvo APIs** | Rapporteur: | Ernest Bayha |

Full Title: Network Functions Virtualisation (NFV) Release 2;
Protocols and Data Models;
RESTful protocols specification for the Os-Ma-nfvo Reference Point

Current status: **PUBLICATION** since 2/13/2018

Scope: *The scope of this work item is to develop a set of Restful protocol specifications fulfilling the requirements specified in GS NFV-IFA 013 for the interfaces used over the Os-Ma-nfvo reference point. The deliverable will contain normative provisions.*

Support Companies: *ORANGE, PT PORTUGAL, HPE, Ericsson, Telecom Italia, BT, Cisco, NetCracker*

| **GS NFV-SWA 001 v1.1.1   Virtual Network Function Architecture** | Rapporteur: | Thinh Nguyenphu |

Full Title: Network Functions Virtualisation (NFV);
Virtual Network Functions Architecture

Current status: **PUBLICATION** since 12/23/2014

Scope: *1) Define requirement categories and their attributes*
2) Decomposition of Network Elements into Functional Blocks + assignment of FBs to requirement categories
3) Specify whether FB can be agnostic or need to be aware of the virtualization infrastructure and what is the level of awareness
4) Assignment of FB to architecture layer (Network Function in Software/application layer vs. infrastructure layer)

Support Companies: *Nokia Siemens Networks Oy, NEC, DT, SPRINT*

GS NFV-TST 001 v1.1.1   Pre-deployment Validation report

Rapporteur: Rajesh Rajamani

Full Title: Network Functions Virtualisation (NFV);
Pre-deployment Testing;
Report on Validation of NFV Environments and Services

Current status: **PUBLICATION** since 4/4/2016

Scope: *This deliverable will develop recommendations for pre-deployment validation of NFV functional blocks in a lab environment.*
The following aspects of lab testing will be addressed:
1)   Functional validation of VNFs interaction with NFV functional blocks.
2)   User and control plane performance validation. Including the assessment of capacity management e.g. during VNF scale-out to ensure that performance levels adhere to SLAs.
3)   Validation of reliability and availability of VNFs, NFVI and services during workload migrations.
The deliverable may propose potential enhancements to the ETSI NFV architecture to better support testing.

Support Companies: *CableLabs, Spirent Communications, Intel, Verizon*

GS NFV-TST 002 v1.1.1   Iop Testing Methodology report

Rapporteur: Carsten Rossenhoevel

Full Title: Network Functions Virtualisation (NFV);
Testing Methodology;
Report on NFV Interoperability Testing Methodology

Current status: **PUBLICATION** since 10/21/2016

Scope: *This work item covers the analysis of the NFV interoperability methodology landscape and suggests a framework to be addressed.*
Specifically, the work item will:
-   Analyze pre-existent work on NFV interoperability testing methodology from NFV ISG work, PoCs, other SDOs, open source projects, general ETSI experience in this area, etc.
-   Review current NFV ISG work for testable interoperability requirements
-   Evaluate the requirements for NFV use case-agnostic interoperability and application-level interoperability for NFV-related use cases
This work item will not deal with performance metrics.
Normative or Informative? Informative.
Deliverables from this WI:
-   Report on NFV interoperability test methodology
External dependencies of this work item are:
-   Testing methodology developed already externally by other industry forums and standards bodies such as, for example, IETF
-   Interface work items by other NFV ISG working groups

Support Companies: *TELEFONICA, Spirent Communications, AT&T, EANTC AG*

GR NFV-TST 004 v1.1.1   NFVI_PATH_TEST report

Rapporteur: Al Morton

Full Title: Network Functions Virtualisation (NFV);
Testing;
Guidelines for Test Plan on Path Implementation through NFVI

Current status: **PUBLICATION** since 5/24/2017

Scope: *This work item provides guidelines for test plans that assess different approaches to defining SDN Applications, different ways of arranging and federating SDN Controllers, and arrangements of network switching/forwarding functions (both physical and virtual) to create the various path-implementations between and among NS Endpoints and VNFs.*
These guidelines support development of detailed test plans, and ultimately influence the NFV framework (when testers share their results from testing arrangements encouraged by these guidelines).
The test plan guidelines should be sufficiently abstract to include all envisioned possibilities, and will also pursue the details of technologies of interest.
Although the primary emphasis of testing is the performance and benchmarking of systems composed of the components above, the attempts to combine different protocols and functions will undoubtedly uncover combinations which are non-interoperable, and these should be noted. (See NFV(15)FTR011r2 for more information, including SDOs/areas of collaboration outside this scope.)

Support Companies: *TELEFONICA, Spirent Communications, AT&T, EANTC AG*

GR NFV-TST 004 v1.1.2 NFVI_PATH_TEST report	Rapporteur:	Al Morton

Full Title:	Network Functions Virtualisation (NFV); Testing; Guidelines for Test Plan on Path Implementation through NFVI

Current status: **PUBLICATION** since 7/28/2017

Scope: *This work item provides guidelines for test plans that assess different approaches to defining SDN Applications, different ways of arranging and federating SDN Controllers, and arrangements of network switching/forwarding functions (both physical and virtual) to create the various path-implementations between and among NS Endpoints and VNFs.*

These guidelines support development of detailed test plans, and ultimately influence the NFV framework (when testers share their results from testing arrangements encouraged by these guidelines).

The test plan guidelines should be sufficiently abstract to include all envisioned possibilities, and will also pursue the details of technologies of interest.

Although the primary emphasis of testing is the performance and benchmarking of systems composed of the components above, the attempts to combine different protocols and functions will undoubtedly uncover combinations which are non-interoperable, and these should be noted. (See NFV(15)FTR011r2 for more information, including SDOs/areas of collaboration outside this scope.)

Support Companies: *TELEFONICA, Spirent Communications, AT&T, EANTC AG*

GR NFV-TST 005 v3.1.1 VNF_snapshot_report	Rapporteur:	Joerg Aelken

Full Title:	Network Functions Virtualisation (NFV); Continuous Development and Integration; Report on use cases and recommendations for VNF Snapshot

Current status: **PUBLICATION** since 3/3/2017

Scope: *This Work Item will report on use cases, recommendations and potential solutions for VNF snapshotting, with the following objectives:*

a) Describing use cases that would benefit from VNF snapshot functionality.

b) Studying the conditions for capturing VNF/VNFC snapshots and VNF data.

c) Analysing recommendations for the support of VNF/VNFC snapshots.

d) Defining end-to-end orchestration procedures and overall framework supporting the capture of VNF data and VNF/VNFC snapshots.

The WI will consider analysing and leveraging available related techniques from Open Source and others.

The resulting deliverable will be informative.

Support Companies: *ORANGE, PT PORTUGAL, Ericsson, TELEFONICA, TeliaSonera AB, NTT, DOCOMO, Fujitsu Limited*

GR NFV-TST 007 v1.1.1 MANO Iop Testing Guidelines	Rapporteur:	Carsten Rossenhoevel

Full Title:	Network Functions Virtualisation (NFV); Testing; Guidelines on Interoperability Testing for MANO

Current status: **PUBLICATION** since 11/28/2017

Scope: *This WI intends to create informative interoperability test guidelines for NFV capabilities requiring interaction among VNF, MANO and VIM-NFVI, such as (but not limited to): NS Lifecycle Management, VNF Lifecycle management, VNF Package Management, Software Image Management,...*

This WI will follow the Interoperability Testing Methodology developed by the NFV TST WG (TST002) and is intended to be applicable for all implementations aligned with ETSI NFV architecture; references to open source implementations may be included as examples.

Support Companies: *HPE, BT, Spirent Communications, Openet Telecom, AT&T, EANTC AG, Ixia Technologies*

GR NFV-TST 007 v2.5.1 MANO Iop Testing Guidelines	Rapporteur:	Carsten Rossenhoevel

Full Title: Network Functions Virtualisation (NFV) Release 2;
Testing;
Guidelines on Interoperability Testing for MANO

Current status: **PUBLICATION** since 8/10/2018

Scope: *This WI intends to create informative interoperability test guidelines for NFV capabilities requiring interaction among VNF, MANO and VIM-NFVI, such as (but not limited to): NS Lifecycle Management, VNF Lifecycle management, VNF Package Management, Software Image Management,...*
This WI will follow the Interoperability Testing Methodology developed by the NFV TST WG (TST002) and is intended to be applicable for all implementations aligned with ETSI NFV architecture; references to open source implementations may be included as examples.

Support Companies: *Keysight Technologies UK Ltd, Spirent Communications, AT&T, EANTC AG*

GS NFV-TST 008 v2.1.1 NFVI Compute & Nwk Metrics - Spec	Rapporteur:	Al Morton

Full Title: Network Functions Virtualisation (NFV) Release 2;
Testing;
NFVI Compute and Network Metrics Specification

Current status: **PUBLICATION** since 5/29/2017

Scope: *Specify detailed and vendor-agnostic key operational performance metrics at different layers of the Network Function Virtualization Infrastructure (NFVI), especially processor usage and network interface usage metrics.These metrics are expected to serve as references for processed and time-aggregated measurement values for performance management information that traverses the Or-Vi and/or Vi-Vnfm reference points.*
The work item deliverable will contain normative provisions.

Support Companies: *SWISSCOM, AT&T, EANTC AG, Ixia Technologies*

GS NFV-TST 008 v2.4.1 NFVI Compute & Nwk Metrics - Spec	Rapporteur:	Al Morton

Full Title: Network Functions Virtualisation (NFV) Release 2;
Testing;
NFVI Compute and Network Metrics Specification

Current status: **PUBLICATION** since 2/13/2018

Scope: *This revision of NFV-TST 008 conducts NFV Release 2 maintenance: it corrects errors, ambiguities, misalignments, and applies editorial modifications (i.e. Corrections of category F and D as described in ETSI TWPs Annex L). This edition does not add or modify features, nor does it extend the scope of the former Release 2 edition summarized hereafter:*
TST 008 specifies detailed and vendor-agnostic key operational performance metrics at different layers of the NFVI, especially processor usage and network interface usage metrics. These metrics are expected to serve as references for processed and time-aggregated measurement values for performance management information that traverses the Or-Vi and/or Vi-Vnfm reference points of the NFV architectural framework.

Support Companies: *SWISSCOM, AT&T, EANTC AG, Ixia Technologies, PT Portugal, Orange, Huawei, Telefonica*

GS NFV-TST 008 v3.1.1 NFVI Compute & Nwk Metrics - Spec	Rapporteur:	Al Morton

Full Title: Network Functions Virtualisation (NFV) Release 3;
Testing;
NFVI Compute and Network Metrics Specification

Current status: **PUBLICATION** since 8/10/2018

Scope: *This revision of NFV-TST 008 propagates the deliverable into NFV Release 3.*
This edition will add requirements and specification of metrics to support the Release 3 features, and it will extend the scope of the former Release 2 edition summarized hereafter:
Specify detailed and vendor-agnostic key operational performance metrics at different layers of the Network Function Virtualization Infrastructure (NFVI), especially processor usage and network interface usage metrics.These metrics are expected to serve as references for processed and time-aggregated measurement values for performance management information that traverses the Or-Vi and/or Vi-Vnfm reference points.
The work item deliverable will contain normative provisions.
This revision of NFV-TST 008 will address the Release 3 candidate features listed in Annex B of the Release 3 Definition (v0.8.0).
This revision will also reflect the maintenance performed to NFV Release 2 documentation.

Support Companies: *AT&T GNS Belgium, PT Portugal, Ixia Technologies, Swisscom*

GS NFV-TST 008 v2.5.1 NFVI Compute & Nwk Metrics - Spec	Rapporteur:	Al Morton

Full Title: Network Functions Virtualisation (NFV) Release 2;
Testing;
NFVI Compute and Network Metrics Specification

Current status: **PUBLICATION** since 8/10/2018

Scope: *This revision of NFV-TST 008 conducts NFV Release 2 maintenance. It corrects errors, ambiguities, misalignments, and applies editorial modifications (i.e. Corrections of category F and D as described in ETSI TWPs Annex L). This edition does not add or modify features, nor does it extend the scope of the former Release 2 edition summarized hereafter*

TST 008 specifies detailed and vendor-agnostic key operational performance metrics at different layers of the NFVI, especially processor usage and network interface usage metrics. These metrics are expected to serve as references for processed and time-aggregated measurement values for performance management information that traverses the Or-Vi and/or Vi-Vnfm reference points of the NFV architectural framework.

Support Companies: *AT&T, PT Portugal, Orange, Huawei, Telefonica,*

GS ZSM 006 v1.1.1 PoC Framework	Rapporteur:	Klaus Martiny

Full Title: Zero touch network and Service Management (ZSM);
Proof of Concept Framework

Current status: **PUBLICATION** since 5/31/2018

Scope: *The present document defines a framework to be used by ETSI ISG ZSM to coordinate and promote multi stakeholder Proofs of Concept (PoC) projects illustrating key aspects of ZSM. Proofs of Concept are an important tool to demonstrate the viability of a new technology during its early days and or pre-standardisation phase.*
The main objectives of the ZSM PoC framework are:
- *to ensure the PoC projects are scoped around relevant topics for ISG ZSM that require from-the-field input;*
- *to ensure that the PoC results, lessons learnt and identified gaps are feedback to ISG ZSM;*
- *to build confidence on the viability of ZSM;*
- *to encourage the development of a diverse and open ecosystem by fostering the integration of components from different players;*
- *to support standardization and industry promotion activities of ISG ZSM.*
This framework describes:
- *The different roles and responsibilities in the PoC activity process.*
- *The PoC activity process.*
- *The acceptance criteria for PoC proposals and reports.*

Support Companies: *HPE, Nokia Corporation, Telecom Italia, DT, Intel, ZTE, DOCOMO, SPRINT, Huawei, ViaviSolutions*

Annex 1: History of work programme changes

Previous versions of the present document:

Changes between NFV#21 and NFV#22

1 New Work Item proposal was **approved** by Remove Consensus

- DGS/NFV-**SOL007** "NSD file structure spec"
  SOL NWI proposal in NFV(18)000066r1 approved by Remote Consensus

3 Approved drafts were PUBLISHED (2 were approved by Remote Consensus):

- GR NFV-IFA 022 v3.1.1 "Multi-Site Services report": RC ended 1st April, PUBLISHED (19 April)
- GS NFV-SEC 014 v3.1.1 "MANO Security Spec": RC ended 1st April, PUBLISHED (20 April)
- GR NFV-SEC 011 v1.1.1 "LI Architecture Report": PUBLISHED (20 April)

Rapporteur change

- IFA007: Uwe Rauschenbach (Nokia) --> Ernest Bayha (Ericsson)

Changes at NFV#21

1 New Work Item was **created**

- DGS/NFV-**SOL005**ed251 "Os-Ma-nfvo APIs"

1 Final Draft was **approved** for **publication**

Approved for Publication ✓   GR SEC011 "LI Architecture Report"

2 final drafts were sent to approval by **Remote Consensus**.

RC Remote Consensus 🔨   SEC014 "MANO Security Spec"
IFA022 "Multi-Site Services report"

Other changes :

- GS IFA012 was **turned into a GR** (informative), title, scope, and schedule were amended, as well as supporting companies, as described in contribution NFV(18)00067.
- SOL001 scope was changed, as described in NFV(18)00068r1

- SEC0016 approval is expected to be delayed by approximately a year
  → NFV Approval now scheduled at NFV24, December 2018 (was Oct 2017).
- SEC015 Candidate for stopping: the lack of progress and contribution on this WI was discussed in December at NFV#20, and at NFV#21. The NFV#21 plenary agreed to defer the decision until NFV#22, and requested SEC WG to prepare a contribution for decision.

Changes between NFV#20 and NFV#21:

26 deliverables were **published** of which 22 had been approved by Remote Consensus

- GS NFV 003 v1.3.1 Terminology
- GR NFV-EVE 008 v3.1.1 Charging and Billing report
- GR NFV-EVE 010 v3.1.1 License Management report
- GR NFV-EVE 012 v3.1.1 Network Slicing report
- GS NFV-IFA 002 v2.4.1 Acceleration - VNF Intface Spec
- GS NFV-IFA 003 v2.4.1 Acceleration - Switching Aspects Spec
- GS NFV-IFA 004 v2.4.1 Acceleration - Mgmt aspects Spec
- GS NFV-IFA 005 v2.4.1 Or-Vi ref point Spec
- GS NFV-IFA 006 v2.4.1 Vi-Vnfm ref point Spec
- GS NFV-IFA 007 v2.4.1 Or-Vnfm ref point Spec
- GS NFV-IFA 008 v2.4.1 Ve-Vnfm ref point Spec
- GS NFV-IFA 010 v2.4.1 MANO Functional Rqmts Spec
- GS NFV-IFA 011 v2.4.1 VNF Packaging Spec
- GS NFV-IFA 013 v2.4.1 Os-Ma-Nfvo ref point Spec - info model
- GS NFV-IFA 014 v2.4.1 Network Service Templates Spec
- GR NFV-IFA 015 v2.4.1 Info Model Report
- GR NFV-IFA 016 v2.4.1 Papyrus Guidelines
- GR NFV-IFA 017 v2.4.1 UML Modeling Guidelines
- GR NFV-IFA 021 v3.1.1 MANO and automated deployment report
- GR NFV-IFA 028 v3.1.1 Multi admin domain support -report
- GS NFV-REL 006 v3.1.1 SW Upgrade spec
- GS NFV-SOL 002 v2.4.1 Ve-Vnfm RESTful protocols spec
- GS NFV-SOL 003 v2.4.1 Or-Vnfm RESTful protocols spec
- GS NFV-SOL 004 v2.4.1 VNF Package Stage 3 spec
- GS NFV-SOL 005 v2.4.1 Os-Ma-nfvo APIs
- GS NFV-TST 008 v2.4.1 NFVI Compute and Nwk Metrics - Spec

Change of rapporteur:
EVE015: Bruno CHATRAS → Cecilia CORBI
SEC005: Marcus WONG → Li FENG

CHANGES @ NFV#20

4 FINAL DRAFTS APPROVED for publication:

Approved for Publication ✓
- GR NFV-EVE 008 v3.1.1 "Charging and Billing report"
- GR NFV-EVE 010 v3.1.1 "License Management report"
- GR NFV-EVE 012 v3.1.1 "Network Slicing report"
- GS NFV 003 v1.3.1 "Terminology"

3 final drafts were sent to approval by **Remote Consensus**.
- NFV(17)000327-"Draft - DGS/NFV-**REL006** v0.1.0 "SW Upgrade spec"
- NFV(17)000382-"Draft - DGR/NFV-**IFA021** v0.11.0 "MANO and automated deployment report"
- NFV(17)000381-"Draft - DGR/NFV-**IFA028** v0.13.0 "Multi admin domain support -report""

17 NEW Work Items created:
- GS NFV-003ed141 "Terminology"
- GS NFV-IFA030 "Multi Domain MANO spec"
- GS NFV-IFA031 "NFV-MANO_mgmt_spec"

- GS NFV-IFA032 "Multi-site Intfaces & InfoModel spec"

  - GS NFV-SEC 022 "API Access Token Spec"
  - GS NFV-TST 010 "API Conformance Testing"

Release 3 Super WID: 11 New WIs

11 Release 2 WIs were propagated (or evolved) from Release 2 to Release 3

- RGS/NFV-**TST008ed311** "NFVI Compute & Nwk Metrics - Spec"
- RGS/NFV-**IFA002ed311** "Acceleration - VNF Intface Spec"
- RGS/NFV-**IFA005ed311** "Or-Vi ref point Spec"
- RGS/NFV-**IFA006ed311** "Vi-Vnfm ref point Spec"
- RGS/NFV-**IFA007ed311** "Or-Vnfm ref point Spec"
- RGS/NFV-**IFA010ed311** "MANO Functional Rqmts Spec"
- RGS/NFV-**IFA013ed311** "Os-Ma-Nfvo ref point Spec - info model"
- RGS/NFV-**IFA014ed311** "Network Service Templates Spec"
- RGR/NFV-**IFA015ed311** "Info Model Report"
- RGR/NFV-**IFA016ed311** "Papyrus Guidelines"
- RGR/NFV-**IFA017ed311** "UML Modeling Guidelines"

Titles tuned for 4 Work Item (following TSC proposal):

- EVE008
  Network Functions Virtualisation (NFV) Release 3;
  ~~Management and Orchestration~~ Charging;
  Report on Usage Metering and Charging Use Cases and Architectural Study
- GS EVE011
  Network Functions Virtualisation (NFV) Release 3;
  ~~Software Architecture~~Virtualised Network Function;
  Specification of the Classification of Cloud Native VNF implementations
- GS IFA011
  Network Functions Virtualisation (NFV) Release 2;

  Management and Orchestration;

  VNF Descriptor and Packaging Specification
- GR IFA029
  Network Functions Virtualisation (NFV) Release 3;
  ~~Software Architecture~~ Architecture;
  Report on the Enhancements of the NFV architecture towards "Cloud-native" and "PaaS"

Rapporteurs Changed for 3 Work Items:

- GS IFA008ed241 "Ve-Vnfm ref point Spec"
  was Shitao LI (Huawei) -changed to --> Xu YANG (Huawei)
- GS IFA010ed241 "MANO Functional Rqmts Spec"
  Was Amanda Xiang (Huawei) changed to → Ulrich Kleber (Huawei)
- GS IFA011ed241 "VNF Packaging Spec"
  was Jon TAYLOR (Amdocs) -changed to --> Haibin CHU (Ericsson).

Changes between NFV#19 and NFV#20:

3 deliverables were **published**

  - GR NFV-REL 007 v1.1.2 "MANO resilience report" **Published 2017.10.02**
  - GR NFV-SEC 007 v1.1.1 "NFV Attestation report" **Published 2017.10.19**
  - GR NFV-TST 007 v1.1.1 "MANO Iop Testing Guidelines" **Published 2017.11.28**

1 New Work Item was **approved** by Remote Consensus

- New NWI proposal approved **DGR/NFV-REL010** "Resiliency for Network Slicing report" Rapporteur = Chidung Lac

Remote consensus status/result:

Approved for Publication ✓
- Final Draft GR NFV-SEC 007 v1.1.1 "NFV Attestation report" Remote Consensus success, SEC007 is now published.

🚫 **No**
- Final Draft DGR/NFV-EVE008 "Charging and Billing report" Remote consensus failed → an updated version is proposed for approval @ NFV#20.

Approved for Publication ✓
- Final Draft GR NFV-TST 007 v1.1.1 "MANO Iop Testing Guidelines" Remote Consensus success, TST007 is now published.

NWI created ✓
- NWI proposal approved **DGR/NFV-REL010** "Resiliency for Network Slicing report" Rapporteur = Chidung Lac

Changes @ NFV#19

6 New WIs proposals were **approved**:

- GR **EVE016** "Report on Connection-based Virtual Services"
- GR **SEC018** "Remote Attestation Architecture report"
- GS **SEC019** "System Architecture Spec for NFV Security enhancement"
- GS **SEC020** "Id Mgmt & Sec spec"
- GS **SEC021** "VNF Package Security Spec"
- GS **SOL006** "YANG based NFV Descriptors spec"

1 Final Draft was **approved** at the closing plenary

Approved for Publication ✓ GR NFV-REL 007 "MANO resilience report"

2 final drafts were sent to approval by **Remote Consensus**.

Remote Consensus **RC**
- NFV(17)000268-"Draft - DGR/NFV-SEC007 v0.0.13 "NFV Attestation report"
- NFV(17)000287-"Draft - DGR/NFV-EVE008 v0.0.13 "Charging and Billing report"

2 Wort Items were **Stopped**

- IFA020 work item was **Stopped**
- EVE009 work item was **Stopped**

Change of rapporteur:

- **NFV003** "Terminology": *Was Andy BENNETT (Samsung), changed to Julien Maisonneuve (Nokia France)*.
- **IFA025** "RT/ultra-low latency aspects report": *Was Michael KLOTZ (DT) changed to Zarrar YOUSAF (Neclab)*

IFA028 *"*Multi admin domain support*: Was Astrid MANN (Huawei) changed to Haitao XIA (Huawei).*

Changes between NFV#18 and NFV#19

21 NFV deliverables were **published** *of which 19 were approved by remote Consensus.*

- GS NFV-EVE001 v3.1.1 "Hypervisor Rqmts spec" *This GS had been approved in April but had dependencies on IFA018 & IFA019 and was published with them.*

12 IFA Release 2 2017H1Maintenance
- GS NFV-IFA002 v2.3.1 "Acceleration - VNF Intface Spec"
- GS NFV-IFA003 v2.3.1 "Acceleration - Switching Aspects Spec"
- GS NFV-IFA004 v2.3.1 "Acceleration - Mgmt aspects Spec"

- GS NFV-IFA005 v2.3.1 "Or-Vi ref point Spec"
- GS NFV-IFA006 v2.3.1 "Vi-Vnfm ref point Spec"
- GS NFV-IFA007 v2.3.1 "Or-Vnfm ref point Spec"
- GS NFV-IFA008 v2.3.1 "Ve-Vnfm ref point Spec"
- GS NFV-IFA010 v2.3.1 "MANO Functional Rqmts Spec"
- GS NFV-IFA011 v2.3.1 "VNF Packaging Spec"
- GS NFV-IFA013 v2.3.1 "Os-Ma-Nfvo ref point Spec - info model"
- GS NFV-IFA014 v2.3.1 "Network Service Templates Specification"
- GR NFV-IFA015 v2.3.1 "Info Model Report"

IFA Release 3
- GS NFV-IFA018 v3.1.1 "Acceleration Intface Spec"
- GS NFV-IFA019 v3.1.1 "Resource Mgmt Acceleration @ Nf-Vi - Spec"
- GR NFV-IFA023 v3.1.1 "Policy Mgmt in MANO report"

SOL deliverables published together with R2 2017H1 Maintenance
- GS NFV-SOL002 v2.3.1 "Ve-Vnfm RESTful protocols spec"
- GS NFV-SOL003 v2.3.1 "Or-Vnfm RESTful protocols spec"
- GS NFV-SOL004 v2.3.1 "VNF Package Stage 3 spec"

- GR NFV-TST004 v1.1.2 "NFVI_PATH_TEST report"
- GS NFV-TST008 v2.1.1 "NFVI Compute & Nwk Metrics - Spec"

19 New WIs were **approved**
by Remote Consensus:

18 Maintenance WIs for Release 2 2017H2 maintenance (approved be RC in July).
See WI list and details in contribution NFV(17)000193r2 -"18 WIs for 2017H2 Release 2 Maintenance"
- **1** Miscellaneous WI in support of an STF proposal
DMI/NFV-EVE015 – Measuring Adoption (approved be RC in August)

Changes @ NFV#18

- **3 New WI** proposals were immediately **approved** during NFV#18:
DGS/NFV-REL009 "NFV Reliability Requirements"- rapporteur = Percy TARAPORE
DGR/NFV-SEC017 "Sec Pol Guidelines Report"- rapporteur = Fei LI
DGS/NFV-TST009 "NFVI_Benchmarks"- rapporteur = Al MORTON

- **2 Final Drafts** were **approved** at the closing plenary
Approved for Publication ✓ NFV-TST 004 v1.1.1 "NFVI_PATH_TEST report"
NFV-TST 008 v2.1.1 "NFVI Compute & Nwk Metrics - Spec"

Other changes:
- IFA022: Change of Rapporteur. Was Andy Veitch (NetCracker), changed to Zarrar Yousaf (NEC).

Changes between NFV#17 and NFV#18

2 Final draft were approved by **Remote Consensus**
Remote Consensus
- DGS/NFV-EVE001 "Hypervisor Rqmts spec"   ➔ **WAITING** FOR IFA018&019 (Normative Refs)
- NFV 001 v1.2.1 "NFV Use Cases revision"   ➔ **PUBLISHED**

6 Final drafts approved at the NFV#17 closing plenary have been **published**:

- **EVE 007 v3.1.2** "NFVI Hw rqmts spec"
- **IFA 016 v2.1.1** "Papyrus Guidelines"
- **IFA 024 v2.1.1** "NFV IM External touchpoints"
- **IFA 017 v2.1.1** "UML Modeling Guidelines"
- **SEC 013 v3.1.1** "Sec mgmt & Monitoring Spec"
- **TST 005 v3.1.1** "VNF_snapshot_report"

Changes @ NFV#17

- **3 New WIs** approved
  - DGR/NFV-EVE012 "Network Slicing report"
  - DGS/NFV-EVE011 "Cloud Native VNF Classification Spec"
  - DGR/NFV-SEC016 "Location, locstamp and timestamp"

- **6 Final Drafts** approved
  - NFV-EVE 007 v3.1.2 "NFVI Hw rqmts spec"
  - NFV-IFA 016 v2.1.1 "Papyrus Guidelines"   Approved for Publication ✓
  - NFV-IFA 024 v2.1.1 "NFV IM External touchpoints"
  - NFV-IFA 017 v2.1.1 "UML Modeling Guidelines"
  - NFV-SEC 013 v3.1.1 "Sec mgmt & Monitoring Spec"
  - NFV-TST 005 v3.1.1 "VNF_snapshot_report"

Changes between NFV#16 and NFV#17

- **3** Final Drafts approved at and after NFV#16 are now **published**:
  - **SEC 012 v3.1.1** "Arch for sensitive components - Spec"
  - **SEC 009 v1.2.1** "UCs for multi-layer host admin"
  - **IFA 015 v2.1.2** "Info Model Report"
- **1** New WI **approved**

  An ISG-wide conference call took place on the 30th of Jan:
  NFV(16)000361r9 "Report on the Enhancements of the NFV architecture towards "Cloud-native" and PaaS" – Marcus Brunner (Swisscom) was approved as:
  - **DGR/NFV-IFA029** "Arch. enhancement for Cloud-native & PaaS – Report"

Changes @ NFV#16

- **12 New WIs** approved
  - 11 Release 2 maintenance NWIs created
    - RGS/NFV-IFA003**ed221** "Acceleration - Switching Aspects Spec"
    - RGS/NFV-IFA004**ed221** "Acceleration - Mgmt aspects Spec"
    - RGS/NFV-IFA005**ed221** "Or-Vi ref point Spec"
    - RGS/NFV-IFA006**ed221** "Vi-Vnfm ref point Spec"
    - RGS/NFV-IFA007**ed221** "Or-Vnfm ref point Spec"
    - RGS/NFV-IFA008**ed221** "Ve-Vnfm ref point Spec"
    - RGS/NFV-IFA010**ed231** "MANO Functional Rqmts Spec"
    - RGS/NFV-IFA011**ed221** "VNF Packaging Spec"
    - RGS/NFV-IFA013**ed221** "Os-Ma-Nfvo ref point Spec - info model"
    - RGS/NFV-IFA014**ed221** "Network Service Templates Specification"
    - RGS/NFV-IFA015**ed221** "Info Model Report"

  - 1 NWI proposal approved on "Management and Orchestration Report on architecture options to support multiple administrative domains"
    - DGR/NFV-**IFA028** "Multi admin domain support -report"

- **2 Final Drafts** were **approved** for immediate publication:

  Approved for Publication! ✓
  - NFV-IFA 015 v0.8.0 "Info Model Report"
  - NFV-SEC 012 v0.0.13 "Arch for sensitive components - Spec"

- **1 Final Draft** will go for **Remote Consensus approval**:

  RC Remote Consensus
  - NFV-SEC 009ed1.2.1 v1.2.1 "UCs for multi-layer host admin"

  - IFA016 and IFA017 moved from Release 3 to Release 2
  - Title tuning: decision to include the release number in the title of all drafts and Work Items.
    - GSs (not GRs) included in Release 3 got "Release 3"added to the first line of their title.
      This includes: EVE001, EVE007, IFA012, IFA018, IFA019, IFA026, SEC012, SEC013, SEC014
    - GSs remaining non-published Release 2 WI got "Release 2"added to the first line of their title.
      This includes: SOL001, SOL003, SOL005, SOL002, SOL004, NFV-003ed211

Changes between NFV#15 and NFV#16 (as of 2016.11.25)

- **7** Drafts approved in September/October have been **published**:

2016.10.18:	**NFV-IFA 007 v2.1.1** "Or-Vnfm ref point Spec"
2016.10.18:	**NFV-IFA 008 v2.1.1** "Ve-Vnfm ref point Spec"
2016.09.27:	**NFV-IFA 010 v2.2.1** "MANO Functional Rqmts Spec"
2016.10.17:	**NFV-IFA 011 v2.1.1** "VNF Packaging Spec"
2016.10.17:	**NFV-IFA 013 v2.1.1** "Os-Ma-Nfvo ref point Spec - info model"
2016.10.17:	**NFV-IFA 014 v2.1.1** "Network Service Templates Specification"
2016.10.21:	**NFV-TST 002 v1.1.1** "Iop Testing Methodology report"

4 New WIs approved in November:

- **4 New WIs were APPROVED** during the 2016.11.23 conference call
- NFV(16)000271r4 (Performance measurements)   **APPROVED** as GS **IFA027**
- NFV(16)000279r2 (VNF Package Stage 3)   **APPROVED** as GS **SOL004**
- NFV(16)000339r7 (Os-Ma-nfvo Stage 3)   **APPROVED** as GS **SOL005**
- NFV(16)000336r2 (NFVI compute/network metrics)   **APPROVED** as GS **TST008**

Remote Consensuses in October:

  No → **SEC014** final draft was sent to Remote Consensus for approval (see RC report here)
  → **consensus was not reached**, and SEC014 was not approved.

- **2** late NWI proposals @ NFV#15 were sent for approval by Remote Consensus:
  - NFV(16)000307r1-"Security Specification for other MANO reference points"
    → **APPROVED** as GS **SEC015**
  - No NFV(16)000308r2-"External industry activities focused on NFV info/data modelling and APIs"

    consensus was not reached, several comments by WG Officials requesting clarification
    → Proposal was **Noted** (not approved), revision requested.
    → The author of the proposal (Michael Brenner, Gigaspaces) has **withdrawn** the proposal.

- Title tuning
  Titles were aligned with the conventions commonly applied to NFV publications.
  Updates WIs are : REL006, REL007, SEC012, SEC013, SOL002, SOL003, TST004)
 → See TSC contribution NFVTSC(16)000052 …

Changes @ NFV#15

- ▪ **9 New WI proposals** were presented:
- ▪ **4 New WI** proposals were immediately **approved**:

  R**GR**/NFV-**SEC009ed121** "SEC009 Maintenance"
  D**GR**/NFV-**EVE10** "Report on License Management for NFV"
  D**GR**/NFV-**IFA02**5 "Real-time/ultra-low latency aspects report"
  D**GS**/NFV-**IFA026** "Architecture enhancement for Sec Mgmt Spec"

  - **2** proposals were **late** submission → sent to approval by Remote Consensus (1 week).

    Remote Consensus

    NFV(16)000308r2-"External industry activities focused on NFV info/data modelling and APIs"-GigaSpaces
    NFV(16)000307r1-"Security Specification for other MANO reference points"-NEC
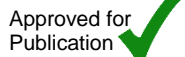
  - **3** proposals required more discussion and were **deferred**:

    Approved for Publication ✓

    NFV(16)000271r3-"NWI on Performance Measurements Definitions"-Intel
    NFV(16)000279-"Stage 3 VNF Package"-Huawei
    NFV(16)000267-"NFV Descriptors based on YANG"-Cisco

- ▪ **2 Final Drafts** were **approved** for publication:

  IFA 010 "MANO Functional Rqmts Spec"
  TST 002 "Iop Testing Methodology report"

- ▪ Other changes:

  *SEC014 title has been changed upon IFA request: "*Security Specification for MANO Components and ~~Interfaces~~Reference points"

  TST007 Scope changed
  NFV001 → GS changed to GR
  IFA015 → GS changed to GR (title, scope, and deliverable type updated)

Changes between NFV#14 and NFV#15 (as of 2016.09.14)

- • 7 Final Drafts went to approval by Remote Consensus (RC).
  4 were **approved** for publication:

  Approved for Publication ✓

  - ▪ IFA009 "MANO architectural options report" **published** 2016.07.05
  - ▪ **IFA007** "Or-Vnfm ref point Spec" to be published soon
  - ▪ **IFA008** "Ve-Vnfm ref point Spec" to be published soon
  - ▪ **SEC003** "Security and Trust Guidance" **published** 2016.08.26

  3 did not reach approval at the first RC and went for a second RC after modification:
  many valid editorial and technical comments were raised during the first RC. WG IFA decided to implement them all, and it was hence decided to implement the changes in new versions of the draft and to submit them for approval in a second Remote Consensus.
  The Second RC closed on 22nd of Sept:

  - ▪ **IFA011** "VNF Packaging Spec"
  - ▪ **IFA013** "Os-Ma-Nfvo ref point Spec - info model"   Approved for Publication ✓
  - ▪ **IFA014** "Network Service Templates Specification"

  - o **REL003 published** 2016.06.28
    An editorial error was found: in v1.1.1 figure 70 had been duplicated erroneously at publication time (page 76 and 77). This was corrected in REL003 v1.1.2.

- • **17** Informative GSs created by ISG NFV at or after NFV#12 were turned into Group Reports (GR).
  Note: GR us the new deliverable type created by ETSI Board earlier this year to distinguish between informative and normative work.

Changes @ NFV#14

Introduction (by ETSI Board) of the new GR (Group Report) deliverable type: in the future Work Items that only contain informative content will be published as GRs, not as GSs.

→ As per TSC decision, current reports that were created **at** or **after** NFV#12 will be turned into GRs.

- **3** New WI proposals were approved:
  - DGR/NFV-EVE009 "E2E Process Descriptions report"
  - DGR/NFV-IFA023 "Policy Mgmt in MANO report"
  - RGR/NFV-SEC003ed112 "Security and Trust Guidance" (maintenance revision for immediate Re-Pub)
- Other changes
  - EVE02 "MEF Use Cases report" was **STOPPED**, as per NFV(16)000158 proposal
  - RGS/NFV-001**ed211** WI reference changed to RGS/NFV-001**ed121**
    And target publication version changed from v2.1.1 to v1.2.1
    - On DGS/NFV-TST004: title changed:
      from *"Report on Test Plan for Path implementation through NFVI"*
      to *"Guidelines for Test plan for path implementation through NFVI"*
- Rapporteur change
  - On DMI/NFV-TST003: was Frank ZDARSKY (RedHat) changed to Gergely CSATARI (Nokia)

Changes between NFV#13 and NFV#14

- **3** Final Drafts approved at NFV#13 are now **published**:

  2016.03.11: **EVE 004**v1.1.1 "Virtualisation technologies Report"
  2016.04.15: **REL 004**v1.1.1 "Active monitoring & failure detection report"
  2016.04.4: **TST 001**v1.1.1 "Pre-deployment Validation report"

- **9** Final Drafts were approved by Remote Consensus, they are now **published**:

  2016.03.30: **NFV-IFA 002v2.1.1** "Acceleration - VNF Intface Spec"
  2016.04.19: **NFV-IFA 003v2.1.1** "Acceleration - Switching Aspects Spec"
  2016.04.21: **NFV-IFA 004v2.1.1** "Acceleration - Mgmt aspects Spec"
  2016.04.21: **NFV-IFA 005v2.1.1** "Or-Vi ref point Spec"
  2016.04.20: **NFV-IFA 006v2.1.1** "Vi-Vnfm ref point Spec"
  2016.04.6: **NFV-IFA 010v2.1.1** "MANO Functional Rqmts Spec"
  2016.04.27: **NFV-REL 003v1.1.1** "E2E reliability models report"
  2016.04.18: **NFV-SEC 006v1.1.1** "Sec & Regulation report"
  2016.04.18: **NFV-SEC 010v1.1.1** "Retained Data Report"

- **6** New WI proposals were **Approved** during an ISG-Wide conference call on the 7th of April.

  - **EVE008** "Charging and Billing report"-Rajshree CHAR
  - **IFA020** "Report on NFVO split options"-Astrid MANN
  - **IFA021** "MGMT_FUNCTIONS_REPORT"-Joan TRIAY
  - **IFA022** "Multi-Site Services"-Andrew VEITCH
  - **SOL002** "Ve-Vnfm protocols"-Bruno CHATRAS
  - **SOL003** "Or-Vnfm protocols"-Uwe RAUSCHENBACH

- Rapporteur changed for IFA002ed221
  Was Francois OZOG (6Wind), changed to Abdel Hafiz RABI (Intel).

Changes @ NFV#13

Update of target dates is not indicated in this log.

- 4 Scope Adjustments: IFA004, IFA010, IFA005 and IFA006
  See details in contribution NFV(16)000083

- Rapporteur changed for EVE001
  Was Valerie YOUNG (intel), changed to Bruno CHATRAS (Orange).

- Scope updated for IFA004, IFA010, IFA005 and IFA006
  See details in contribution NFV(16)000083

  - **3 Final Drafts approved** for publication
    - EVE004 v0.6.0 "Virtualisation technologies Report" in NFV(16)000032
    - REL004 v0.2.0 "Active Monitoring and Failure Detection" in NFV(16)000036
    - TST001 "Pre-deployment validation report" in NFV(16)000037

  - **9 Final Drafts** sent for approval by Remote Consensus
    SEC
    - SEC006 v0.0.14 "Sec & Regulation report" in NFV(16)000105-
    - SEC010 v0.0.7 "Retained Data Report" in NFV(16)000119
    REL
    - REL003 v0.6.0 "E2E reliability models report" in NFV(16)000117
    IFA
    - IFA002 v0.4.1 (GS NFV-IFA 002) "Acceleration - VNF Intface Spec" inNFV(16)000123
    - IFA003 v0.3.0 "Acceleration - Switching Aspects Spec" in NFV(16)000104
    - IFA004 v0.5.0 "Acceleration - Mgmt aspects Spec" in NFV(16)000121
    - IFA005 v0.11.1 "Or-Vi ref point Spec" in NFV(16)000131
    - IFA006 v0.9.0 "Vi-Vnfm ref point Spec" in NFV(16)000130
    - IFA010 v0.8.1 "MANO Functional Rqmts Spec" in NFV(16)000132

- **17 New WIs** approved
    - 001ed311   "NFV Use Cases" (revision)
    - 00TOSCA desc   "TOSCA-based NFV descriptors spec"
    - EVE007   "NFVI Hw rqmts spec"
    - IFA002ed311   "Acceleration - VNF Intface Spec" (revision)
    - IFA010ed221   "MANO Functional Rqmts Spec" (revision)
    - IFA016   "Papyrus Guidelines"
    - IFA017   "UML Modeling Guidelines"
    - IFA018   "Acceleration Intface Spec"
    - IFA019   "Resource Mgmt Acceleration @ Nf-Vi - Spec"
    - REL006   "SW Upgrade spec"
    - REL007   "MANO resilience report"
    - REL008   "Error Handling report"
    - SEC014   "MANO Security Spec"
    - TST004   "NFVI_PATH_TEST report"
    - TST005   "VNF_snapshot_report"
    - TST006   "CICD & Devops report"
    - TST007   "VIM/VNFM Iop Testing Guidelines"

Changes between NFV#12 and NFV#13

1 draft approved during NFV#12 + 4 Drafts approved after NFV#12 by Remote Consensus were PUBLISHED:

2016.01.08:   EVE 003 "NFVI Node Arch report" -published.
2016.01.04:   REL 005 "Quality Accountability Framework" - published
2015.12.18:   EVE 005 "SDN usage in NFV Report "
    SEC 009 "UCs for multi-layer host admin" - published
2015.12.04:   IFA001 "Acceleration 1 - UCs report" published

Changes @ NFV#12

- **2 New Work Items** created

- ▪ **SEC12** "Architecture for sensitive components - Spec"
- ▪ **SEC13** "Security Management & Monitoring Spec"
- **1 Final Drafts approved** for publication
  - ▪ **EVE005** "SDN usage in NFV Report" *V0.2.0 in* NFV(15)000225 *was approved*
- **4 Final Drafts** ready for remote approval
  - ▪ **SEC009** "UCs for multi-layer host admin" *v0.0.18 in* NFV(15)000224r3*.*
  - ▪ **IFA001** "Acceleration 1 - UCs report"
    V0.7.1 in NFV(15)000222r2 *.*
  - ▪ **REL005** "Quality Accountability Framework"
    V0.1.6 in NFV(15)000231 *.*
  - ▪ **EVE3** "NFVI Node_Arch report"
    V0.1.3 in NFV(15)000284 *.*
- Other changes
  - SEC008 was STOPPED
  - IFA 003 rapporteur changed: was Dan DALY, changed to Brian SKERRY, Intel
  - IFA002 scope changed, see NFV(15)000289
  - IFA015 Scope changed, see NFV(15)000234

Many target dates were updated during NFV#12

Changes between NFV#11 and NFV#12:

- 4 new WIs were created at NFV#11: **NFV-0003**ed211 Terminology (revision)
  IFA015 NFV Information Model Report
  SEC010 Retained Data Report
  SEC011 LI Architecture Report
- **SEC002**, was approved at NFV#11 and published on August the 17th.
- **REL002** and **SEC004** were approved by Remote Consensus in August and published early Sept.
- **IFA001, IFA002, IFA003**, **IFA004** (acceleration): titles modified
  "*Part x*" removed from all 4 titles. These 4 WIs are no longer presented as a group.
- **IFA008:** Rapporteur changed
  Was Deepanshu GAUTAM (Huawei) changed to Shitao LI (Huawei)