

ETSI ISG NFV: Work Program and Releases Overview

Presented by: **XXX, YYY**

For: **XXX**

Feb. 14, 2020

Outline

- ✓ PART 1: ETSI ISG NFV Overview
 - ✓ ETSI NFV Releases overview
 - ✓ ETSI NFV ongoing work
- ✓ PART 2: NFV Release 2
 - ✓ What does it contain?
 - ✓ Maintenance, API development, etc.
- ✓ PART 3: NFV Release 3
 - ✓ Overview
 - ✓ Features and specification work
- ✓ PART 3: NFV Release 4
 - ✓ Overview
 - ✓ Features and specification work





Part 1: ETSI ISG NFV overview

ETSI NFV Releases overview



Release 1

- Focus: the **feasibility of NFV**.
- Delivered the baseline studies and specifications.
- Set the **NFV Architecture**:
 - Infrastructure (NFVI),
 - Virtualized network functions (VNF),
 - Integration of the VNFs into Network Services (NS), and
 - NFV Management and Orchestration (NFV-MANO) aspects at different layers.

Release 2

- Focus: **interoperability of NFV solutions**.
- Details requirements and specification of interfaces and descriptors.
- Realizes the interoperability of solutions based on the NFV Architecture, detailing
 - **VNF Package and VNF and NS Descriptors**,
 - **Acceleration**,
 - **Internal and external NFV-MANO interfaces**.

Release 3

- Focus: **feature enriching the NFV Architectural Framework**, readying NFV for deployment and operation.
- Interfaces, modeling, etc. to support **new features** such as (not exhaustive list):
 - Policy framework,
 - VNF snapshot,
 - NFV-MANO management,
 - Multi-site,
 - Cloud-native, etc.

Release 4

- Focus: **orchestration, cloudification and simplification of network deployment and operations**.
- Interfaces, modeling, etc. to support **new features** such as (not exhaustive list):
 - Container-based deployments,
 - Further 5G support,
 - Service-based architecture concepts,
 - Generic OAM functions, etc.

ETSI NFV ongoing work

Release 2 maintenance:

- ✔ Stage 2 maintenance is frozen after the completion of 1H2019 maintenance. Maintenance ongoing on stage 3.
- ✔ Maintenance: fifth round for v2.7.1 versions (1H2019) has been completed. Sixth round for v2.8.1 (1H2020) is ongoing.

Release 3 features work:

- ✔ Stage 2 is completed after delivering 1H2019 specifications (drop #3).
 - ✔ 10 new features completed at stage 2 level from 1H2018 (aka drop #1), 2H2018 (aka drop #2), and 1H2019 (aka drop #3).
- ✔ Normative work in stage 3 is ongoing considering all completed stage 2.

Release 4 work:

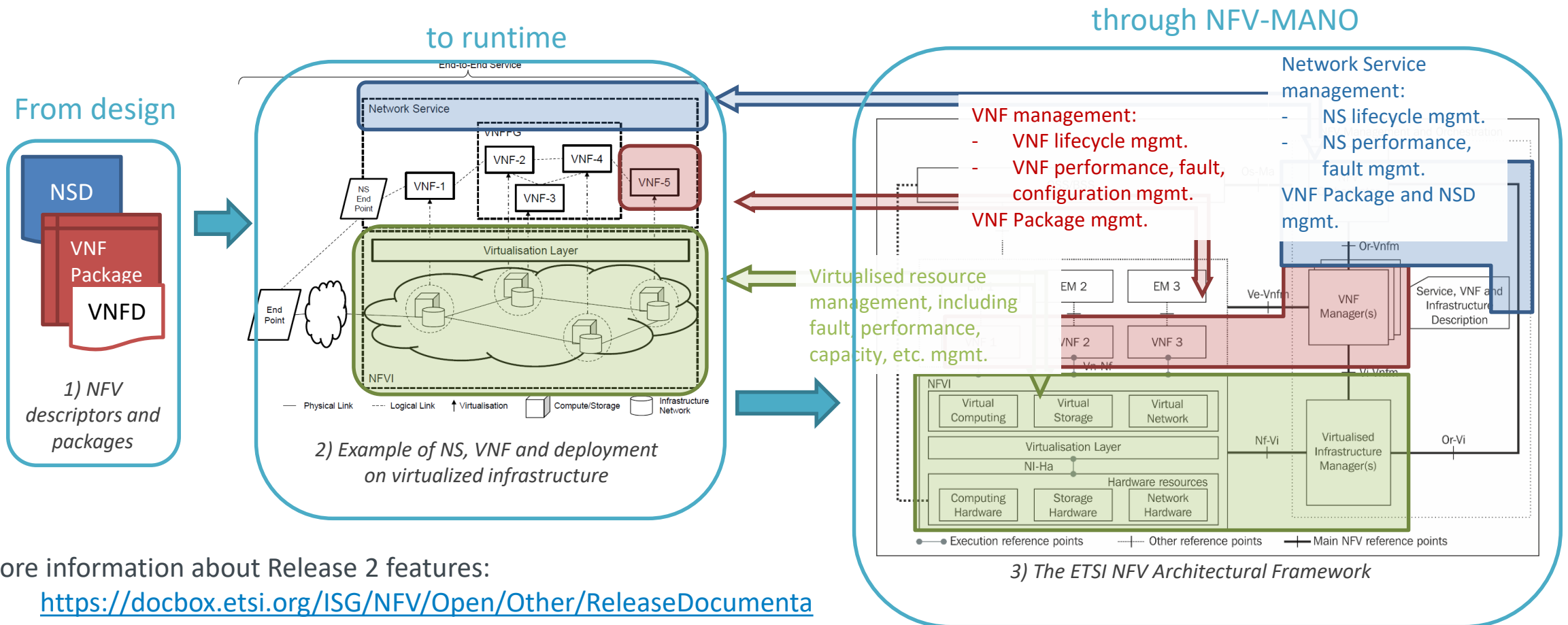
- ✔ Few informative work items started in May 2019.
- ✔ Additional work items (including normative) started at NFV#27 (Sep. 2019).



Part 2: NFV Release 2

Release 2: what does it contain?

Release 2 specifications set up the NFV framework with essential capabilities related to NS, VNF and VR management.

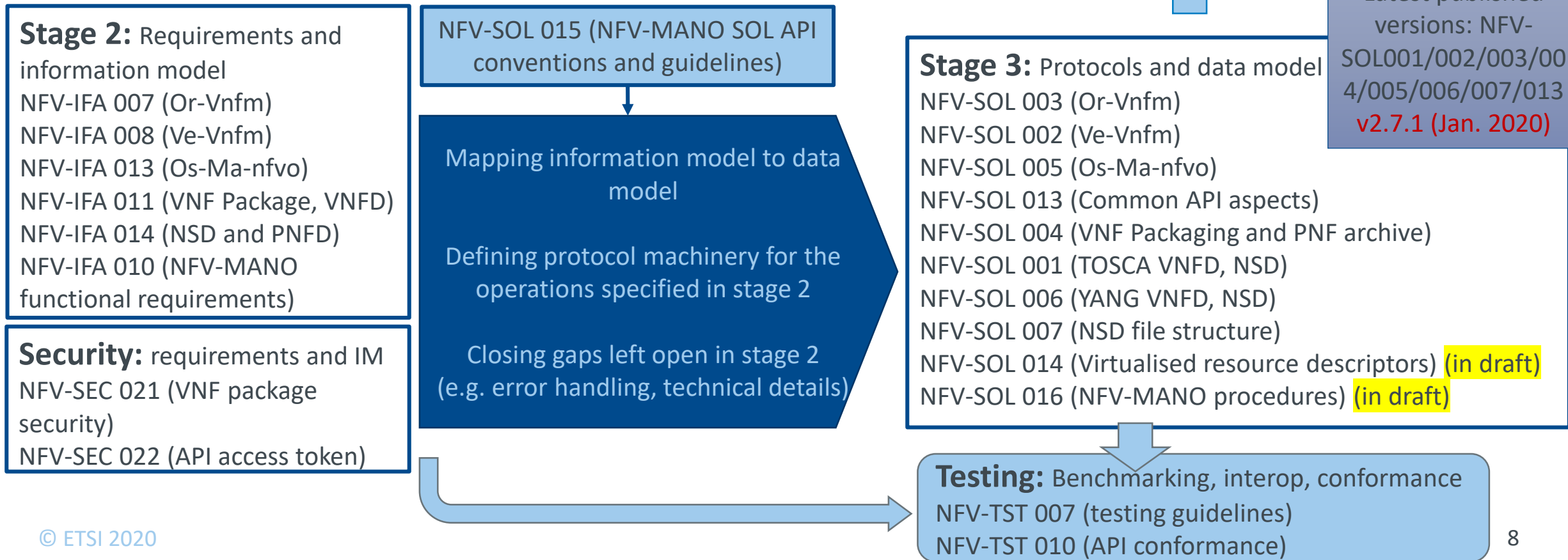


More information about Release 2 features:
[https://docbox.etsi.org/ISG/NFV/Open/Other/ReleaseDocumentation/NFV\(19\)000114r1 NFV Release 2 Description v1 9 0.pdf](https://docbox.etsi.org/ISG/NFV/Open/Other/ReleaseDocumentation/NFV(19)000114r1%20NFV%20Release%20Description%20v1%209%200.pdf)

Release 2: protocols and data model standardization

The content of the NFV-SOL APIs is based on the related NFV-IFA and NFV-SEC specifications. The NFV-SOL specifications are implementable representations of the design defined in the stage 2 specifications, not alternative solutions.

OpenAPI descriptions for all APIs specified in GS NFV-SOL 002/003/005 (v2.6.1)
https://nfvwiki.etsi.org/index.php?title=SOL_Open_API_Representations
GS NFV-SOL 001/006 supporting files on ETSI Forge:
https://nfvwiki.etsi.org/index.php?title=Deployment_Templates_and_Packaging_specifications



Release 2: maintenance work



5 rounds completed (1H2017, published as [v2.3.1](#); 2H2017, published as [v2.4.1](#); 1H2018, published as [v2.5.1](#), 2H2018 published as [v2.6.1](#), and 2H2018 published as [v2.7.1](#)).

6th round, 1H2020 maintenance is ongoing (targeting publication of affected specifications as [v2.8.1](#)).

✔ With a deep focus on [stage 3 specifications \(NFV-SOL specs\)](#). Additional stage 2 specification on security has been considered for maintenance as well.

Main [aspects addressed \(so far\) as part of maintenance](#):

- ✔ Correction of bugs and feedback from deployments and development: remove ambiguities, enhance APIs, etc.
- ✔ Alignment in between Stage 2 and 3 specifications.
- ✔ Security enhancements related to interfaces, descriptors and other artefacts.
- ✔ Extending constructs of VNF packaging for archiving files and artifacts of PNF.
- ✔ Feedback from open source projects, e.g., OpenStack gap analysis and alignment to NFV-IFA005 and NFV-IFA006, OSM information model feedback to NFV-IFA011 and NFV-IFA014, contributions to NFV-IFA011 and NFV-SOL004 by companies participating in ONAP providing feedback, etc.



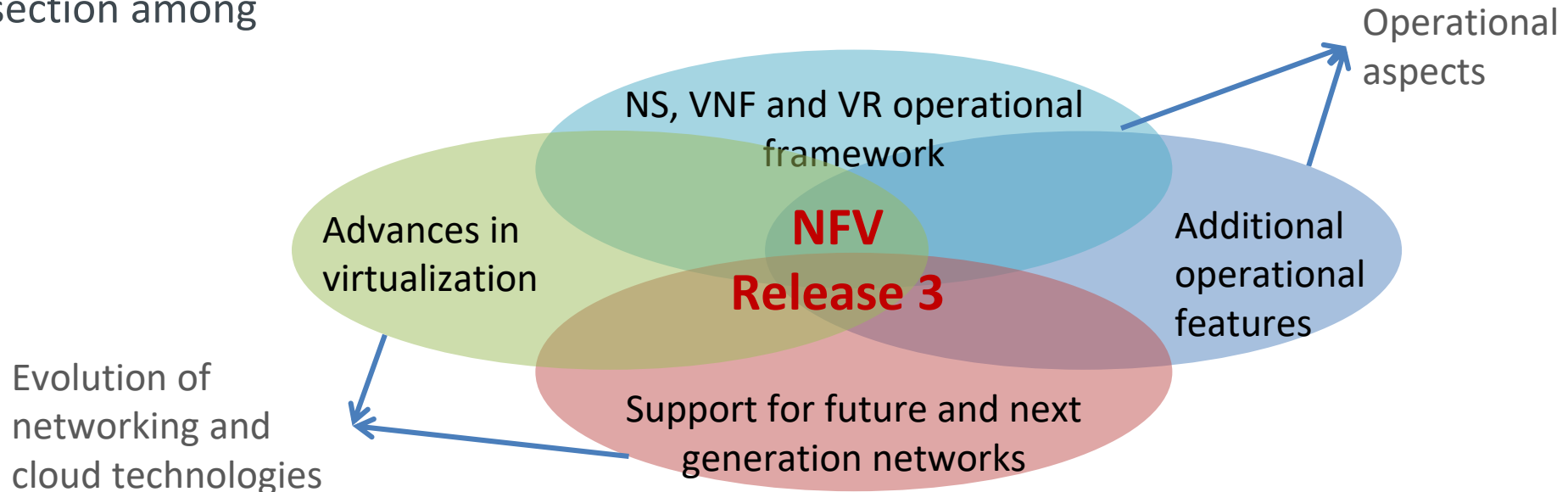
Part 3: NFV Release 3

Release 3: overview

Main focus:

- ✔ Enriching the NFV Architectural Framework, readying NFV for **expansive deployment**, **enhanced operation**, taking into account the **evolution of networking and cloud technologies**.
- ✔ In commercial deployments, operational aspects are critical!

The intersection among



Release 3: specification status



Stage 1 and 2:

- ✔ Stage 1 and 2 work has been completed, but some candidate features were closed or carried over to Release 4.
- ✔ Maintenance is ongoing: 1st round started 2H2019 (targeting publication as v3.4.1).

Stage 3:

- ✔ Stage 3 work is progressing to specify the set of stage 2 completed features.
- ✔ ETSI GS NFV-SOL 009 v3.3.1 and GS NFV-SOL 011 v3.3.1: First specifications as part of Release 3 have been completed and published.
- ✔ Other new NFV-SOL specification drafts related to Release 3 features are in progress (e.g., SOL010 and SOL012).
- ✔ Completion of first versions of evolved (from Rel. 2) SOL specs is planned also for the beginning of 2020. A “dropping” of stage 3 work will also be performed.

Release 3: stage 1&2 completed features

Coloured in blue: more information on
the backup slides



Completed in 1H2018 (aka drop #1)

- ✓ Compute Host Reservation
- ✓ NFV-MANO Policy Management Framework
- ✓ VNF Snapshots
- ✓ Management of NFV-MANO
- ✓ Network Service (NS) across multiple administrative domains
- ✓ Enhancement of acceleration related features:
 - ✓ Hardware-independent acceleration
 - ✓ Network acceleration for VNF
- ✓ Virtualization technologies:
 - ✓ Hypervisor-based virtualisation
 - ✓ Hardware environment for NFV

NFV-IFA specification versions:

- Drop 1H2018 (drop #1) → v3.1.1
- Drop 2H2018 (drop #2) → v3.2.1
- Drop 1H2019 (drop #3) → v3.3.1

Completed in 2H2018 (aka drop #2)

- ✓ VNF software modification
- ✓ Support of network slicing
- ✓ Management and connectivity for multi-site services.

Completed in 1H2019 (aka drop #3)

- ✓ NFVI software modification
- ✓ Service Availability Level (SAL)



Part 4: NFV Release 4

Release 4: feature-based specification

Release 4 Definition (to be available soon)



14 candidate features, including technical and security enhancements (following slides).

Approach:

- ✔ Main activity is now on informative work (studies).
- ✔ Release 4 specification progress and plans are publicly available on the [NFV Public Wiki](#).

Release 4: overview

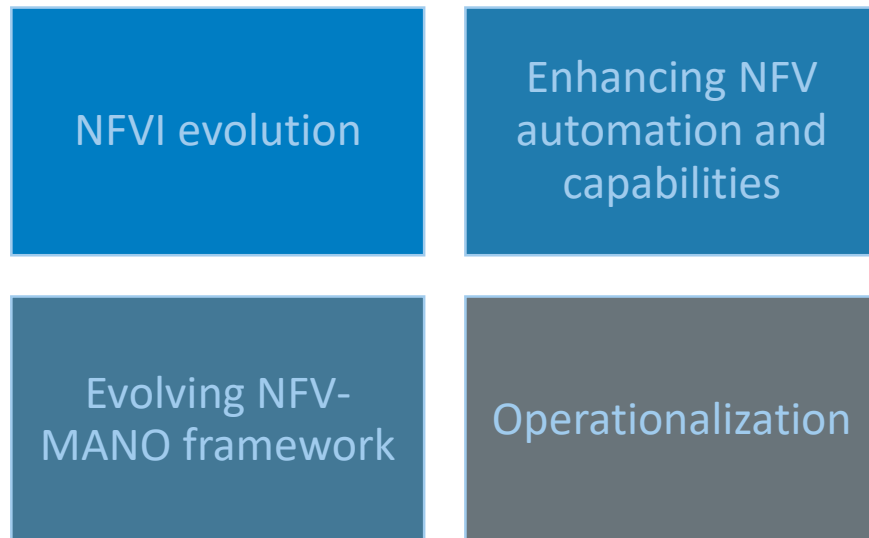
Strawman of the Release 4 Definition:

- “Release 4 Definition”, to be made available soon, will document the candidate features for Release 4.

4 main technical areas and 14 features

- 7 new features, 5 carried-over from Release 3, and 2 enhancement features comprising “specific technical enhancements” and security aspects.

Technical areas



Features in the Release 4 definition

New features

- Network connectivity integration and operationalization
- Multi-tenancy enhancements for NFV-MANO
- NFV-MANO automation and autonomous networks
- SBA for NFV-MANO
- NFV enhancements for 5G
- VNF generic management functions
- Continuous VNF integration

Enhancement features

- NFV security hardening
- Specific technical enhancements

Carried over from Rel. 3

- NFV-MANO upgrade
- MEC in NFV
- Licensing management
- Cloud-native VNFs and Container Infrastructure management
- Security management

Release 4: work items and features: studies and stage 1&2 perspective

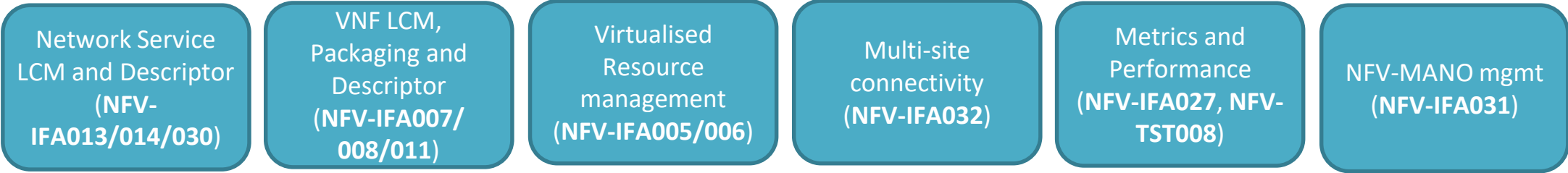
Completed: underlined
Ongoing/not fully completed: *italics*
Evolved: in **bold**

(**): other normative work is part of evolved work items

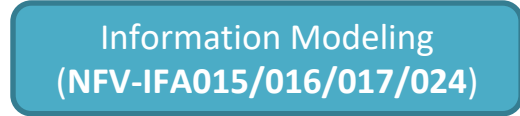
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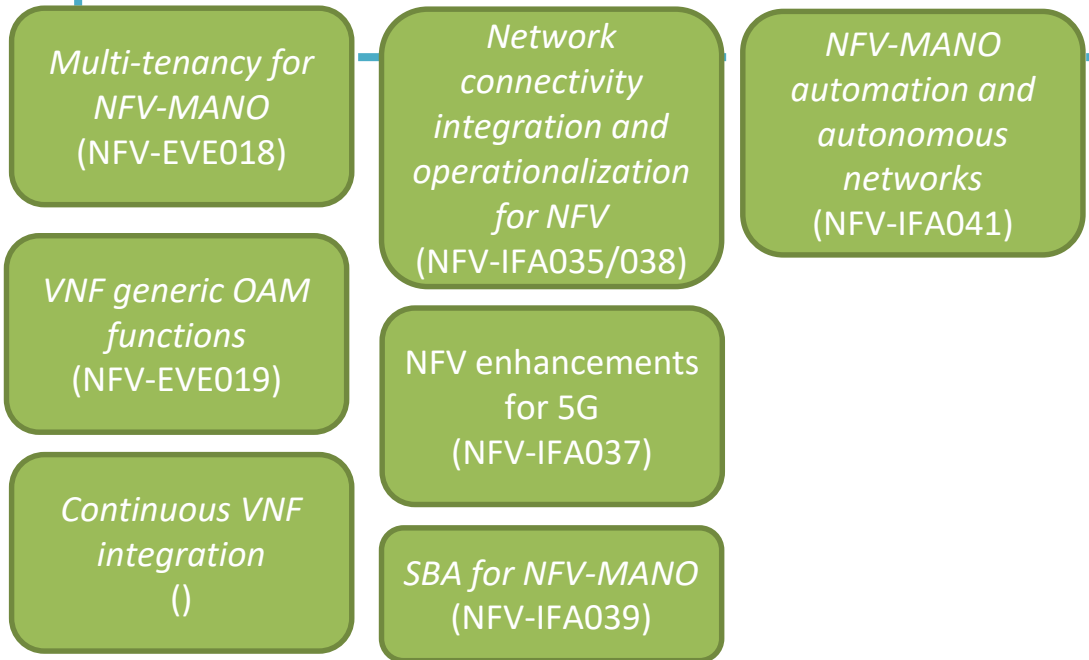
Status as of Jan. 2020



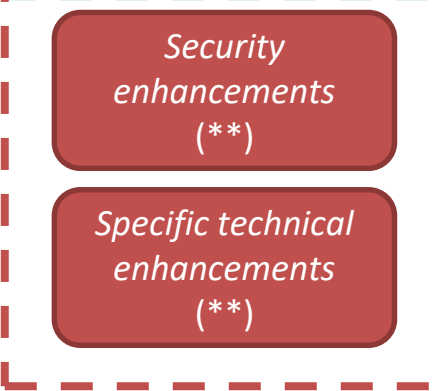
1) Framework from past releases



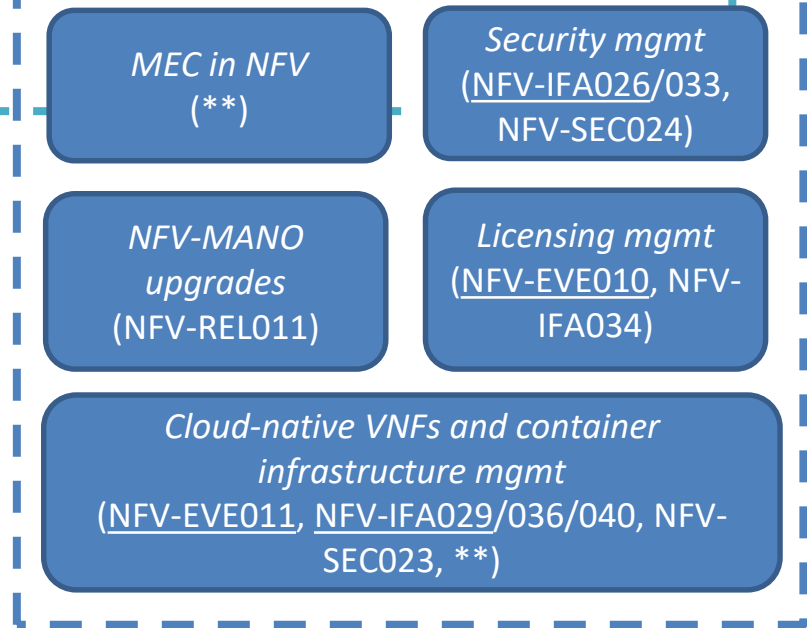
2) New features



3) Technical enhancements



4) Carried-over from Rel. 3



Release 4: ongoing work items for **new** documents



Status as of Jan. 2020

Id	Title	Type	Feature mapping
DGR/NFV-EVE018	Evolution and Ecosystem; Report on Multi-tenancy in NFV	GR	Multi-tenancy enhancements for NFV-MANO (M-Tenant, FEAT22)
DGR/NFV-EVE019	Architectural Framework; Report on VNF generic OAM functions	GR	VNF common management functions (VNF-OAM, FEAT24)
DGR/NFV-IFA034	Management and Orchestration; Report on Architectural enhancement for VNF License Management support and use of VNF licenses	GR	License management (FEAT13 [carried over from Rel. 3])
DGR/NFV-IFA035	Architectural Framework; Report on network connectivity integration and operationalization for NFV	GR	Network connectivity integration and operationalization for NFV (NFV-Connect, FEAT19)
DGS/NFV-IFA036	Management and Orchestration; Specification of requirements for the management and orchestration of container cluster nodes	GS	Cloud native VNFs and container infrastructure management (FEAT17 [carried over from Rel. 3])
DGR/NFV-IFA037	Architectural Framework; Report on further NFV support for 5G	GR	NFV enhancements for 5G (5GNFV, FEAT21)

Release 4: ongoing work items for new documents



Status as of Jan. 2020

Id	Title	Type	Feature mapping
DGR/NFV-IFA038	Architectural Framework; Report on network connectivity for container based VNF	GR	Network connectivity integration and operationalization for NFV (NFV-Connect, FEAT19)
DGR/NFV-IFA039	Architectural Framework; Report on Service Based Architecture (SBA) design	GR	SBA for NFV-MANO (MANO-SBA, FEAT23)
DGS/NFV-IFA040	Management and Orchestration; Requirements for service interfaces for OS container management and orchestration	GS	Cloud native VNFs and container infrastructure management (FEAT17 [carried over from Rel. 3])
DGR/NFV-IFA041	Management and Orchestration; Report on enabling autonomous management in NFV-MANO	GR	NFV-MANO automation and autonomous networks (Auto, FEAT20)
DGR/NFV-REL011	Management and Orchestration; Report on NFV-MANO software modification	GR	NFV-MANO upgrades (FEAT01 [carried over from Rel. 3])
DGS/NFV-SEC023	Security; Container Security Specification	GS	Cloud native VNFs and container infrastructure management (FEAT17 [carried over from Rel. 3]) Security management (FEAT18)
DGS/NFV-SEC024	Security; Security Management Specification	GS	Security management (FEAT18 [carried over from Rel. 3])

Conclusion

Conclusion

Release 2 documentation is almost fully complete.

- ✔ Only few stage 3 and testing specifications are remaining.
- ✔ Maintenance has been performed since 2017. Maintenance will be frozen soon (mid-2020).

Release 3 specification work is progressing.

- ✔ A pipeline of features has been delivered every 6 months. 10 new features had been completed since summer 2019.
- ✔ Focus is now on stage 3 normative specification work. Work will continue through 2020.

Release 4 just started.

- ✔ With 2 new normative work items on container-based deployments, 9 new informative work items on various technical areas, and 2 normative work items on security aspects.
- ✔ Scope: 7 new features, 2 enhancement features on specific technical enhancements and security, and 5 features carried over from Release 3 are considered.

More information

NFV Technology Page
(information / main website)

<http://www.etsi.org/nfv>

NFV Portal (working area)

<http://portal.etsi.org/nfv>

NFV Proofs of Concept
(information)

<http://www.etsi.org/nfv-poc>

NFV Plugtest (information &
registration)

<http://www.etsi.org/nfvplugtest>

Open Area and other tools:

✔ [Published Documents](#)

✔ [Working Drafts](#)

✔ [Issue tracker](#)

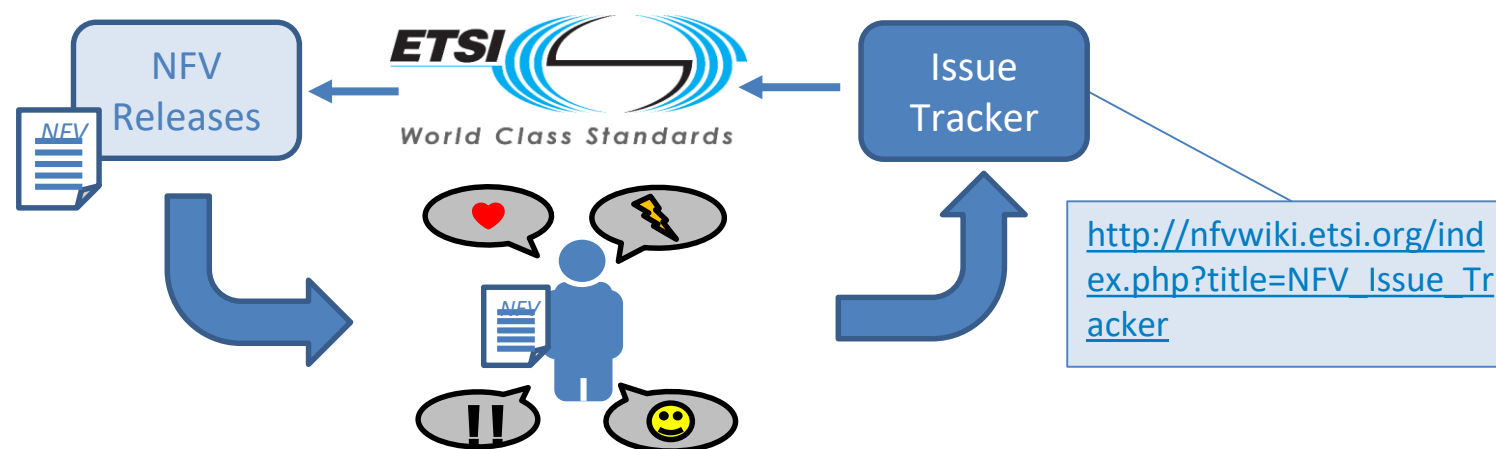
✔ Releases documentation: [Rel. 2 Description](#), [Rel. 3 Description](#), [Rel. Definition](#)

✔ Detailed [Release 3 and 4 specification progress wiki pages](#):

✔ [OpenAPI representations](#) of GS NFV-SOL NFV-MANO APIs

✔ [GS NFV-SOL 001/006 supporting files](#) on ETSI Forge

✔ [GS NFV-TST 010 Robot API test files](#)



Backup slides

Release 2
specification
summary

Release 2: specification summary



Published documents

Release 2, published documentation (28): 23 Group Specification (GS) and 5 Group Report (GR).

- 15 Stage 2 GS (12 from IFA, 1 from TST, 2 from SEC).
- 8 Stage 3 GS (SOL).
- 4 Stage 2 GR (IFA).
- 1 testing GR (TST).

Active work items

Currently, 3 ongoing unpublished active WI:

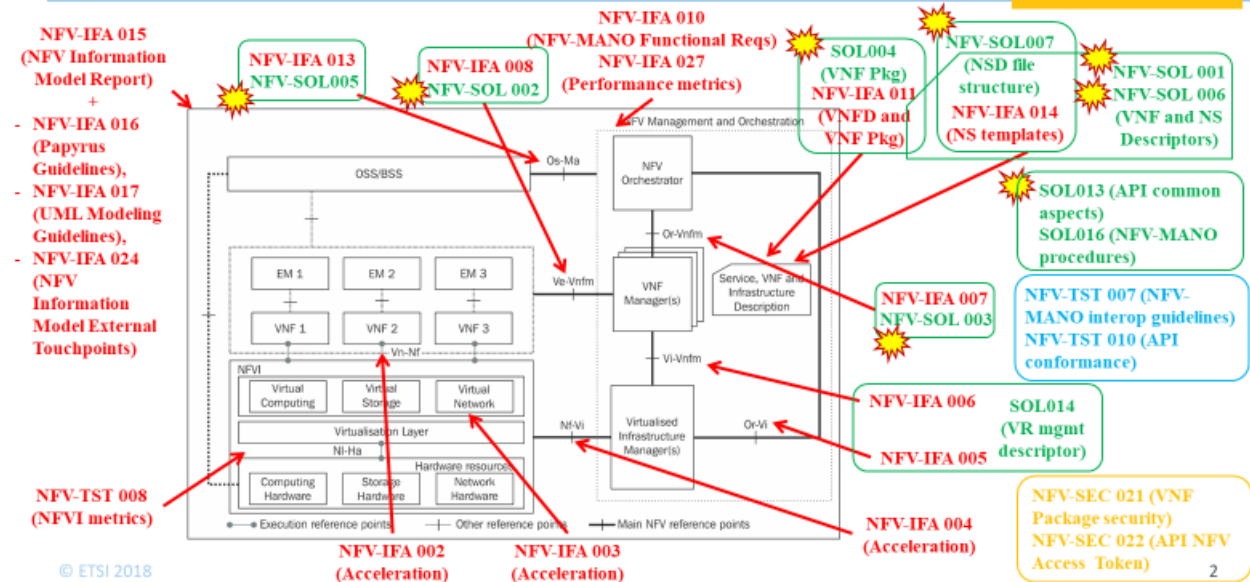
- 2 Stage 3 GS drafts (NFV-SOL014/016).
- 1 GS draft on conformance testing (NFV-TST010).

Refer to regular updates of the Release 2 Description (latest version [v1.9.0](#), Sep. 2019).

Release 2: specification summary

Status as of Jan. 2020

Status as of Jan. 2020



5 rounds of maintenance have been completed (1H2017, 2H2017, 1H2018, 2H2018, and 1H2019) and one additional round is ongoing (1H2020):

- Versioning: 1st round: v2.3.1; 2nd round: v2.4.1; 3rd round: v2.5.1 (some specs without maintenance remain in v2.4.1); 4th round: v2.6.1 (some specs w/o maintenance remain in v2.4.1 or v2.5.1); and 5th round: v2.7.1.

Release 2: specification summary

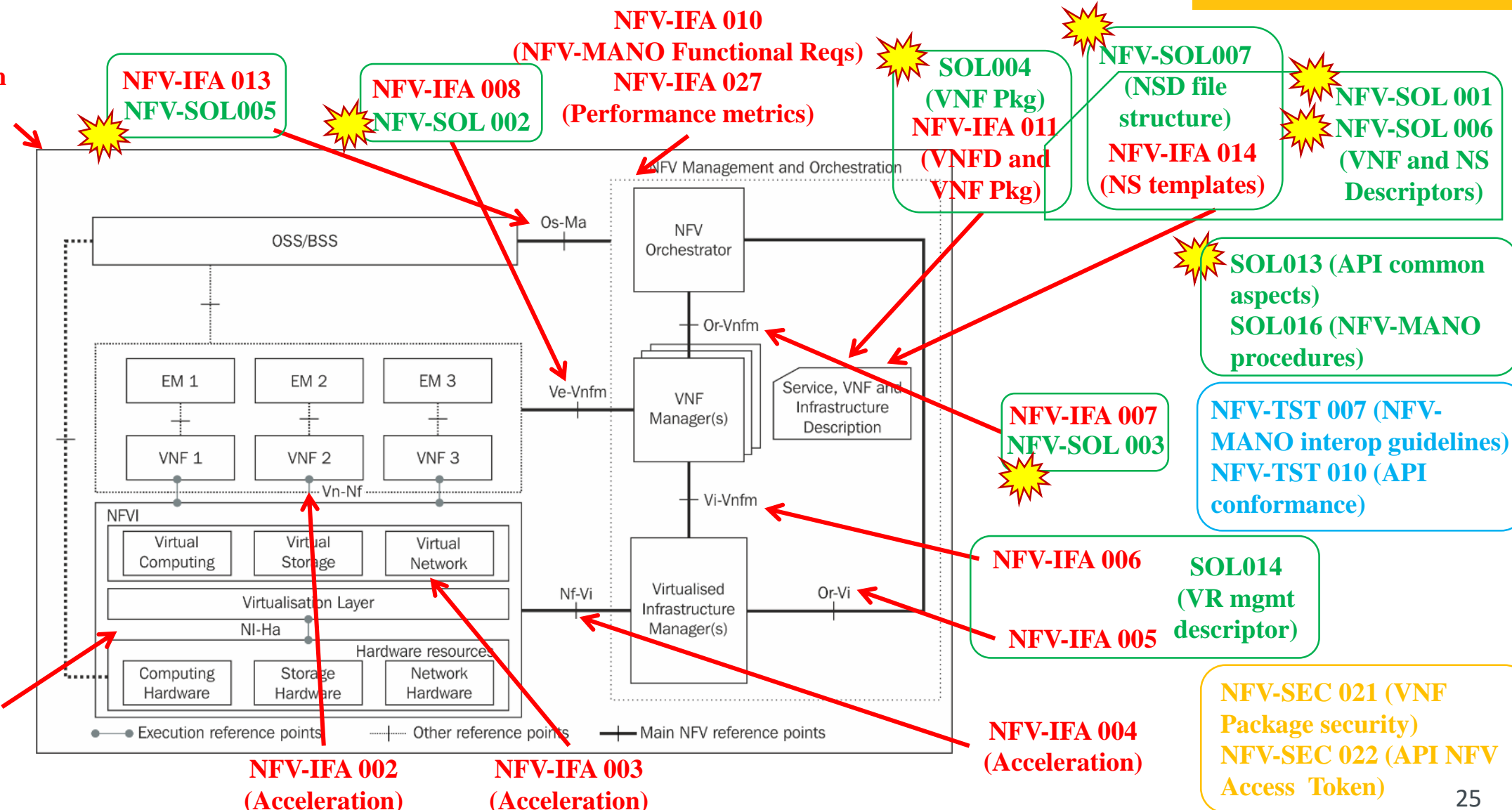
Published!
Stage 3



Status as of Jan. 2020

- NFV-IFA 015 (NFV Information Model Report)
- +
- NFV-IFA 016 (Papyrus Guidelines),
- NFV-IFA 017 (UML Modeling Guidelines),
- NFV-IFA 024 (NFV Information Model External Touchpoints)

NFV-TST 008 (NFVI metrics)



- NFV-SEC 021 (VNF Package security)
- NFV-SEC 022 (API NFV Access Token)

Release 2: stage 2 published documents (for reference)



Status as of Jan. 2020

ID	Title
Functional requirements	
ETSI GS NFV-IFA 010 v2.7.1	MANO; Functional requirements specification
Acceleration (with interfaces)	
ETSI GS NFV-IFA 002 v2.4.1	Acceleration Technologies; VNF Interfaces Specification
ETSI GS NFV-IFA 003 v2.4.1	Acceleration Technologies; vSwitch Benchmarking and Acceleration Specification
ETSI GS NFV-IFA 004 v2.4.1	Acceleration Technologies; Management aspects Specification
NFV-MANO reference points and interfaces	
ETSI GS NFV-IFA 005 v2.7.1	MANO; Or-Vi reference point - Interface and Information Model Specification
ETSI GS NFV-IFA 006 v2.7.1	MANO; Vi-Vnfm reference point - Interface and Information Model Specification
ETSI GS NFV-IFA 007 v2.7.1	MANO; Or-Vnfm reference point - Interface and Information Model Specification
ETSI GS NFV-IFA 008 v2.7.1	MANO; Ve-Vnfm reference point - Interface and Information Model Specification
ETSI GS NFV-IFA 013 v2.7.1	MANO; Os-Ma-Nfvo reference point - Interface and Information Model Specification

Release 2: stage 2 published documents (for reference)



Status as of Jan. 2020

ID	Title
Descriptors and artefacts	
ETSI GS NFV-IFA 011 v2.7.1	MANO; VNF Descriptor and Packaging Specification
ETSI GS NFV-IFA 014 v2.7.1	MANO; Network Service Templates Specification
Information modeling	
ETSI GR NFV-IFA 015 v2.5.1	MANO; Report on NFV Information Model
ETSI GR NFV-IFA 016 v2.5.1	IM; Papyrus Guidelines
ETSI GR NFV-IFA 017 v2.5.1	IM; UML Modeling Guidelines
ETSI GR NFV-IFA 024 v2.1.1	IM; Report on External Touchpoints related to NFV Information Model
Metrics, measurements	
ETSI GS NFV-TST 008 v2.5.1	Testing; NFVI Compute and Network Metrics Specification
ETSI GS NFV-IFA 027 v2.4.1	MANO; Performance Measurements Specification

Release 2: stage 3 published documents (for reference)



Status as of Jan. 2020

ID	Title
NFV-MANO APIs	
ETSI GS NFV-SOL 002 v2.7.1	Protocols and Data Models; RESTful protocols specification for the Ve-Vnfm Reference Point
ETSI GS NFV-SOL 003 v2.7.1	Protocols and Data Models; RESTful protocols specification for the Or-Vnfm Reference Point
ETSI GS NFV-SOL 005 v2.7.1	Protocols and Data Models; RESTful protocols specifications for the Os-Ma-nfvo Reference Point
ETSI GS NFV-SOL 013 v2.7.1	Protocols and Data Models; Specification of common aspects of RESTful NFV-MANO APIs
Artefacts	
ETSI GS NFV-SOL 001 v2.7.1	Protocols and Data Models; NFV descriptors based on TOSCA specification
ETSI GS NFV-SOL 004 v2.7.1	Protocols and Data Models; VNF Package specification
ETSI GS NFV-SOL 006 v2.7.1	Protocols and Data Models; NFV descriptors based on YANG specification
ETSI GS NFV-SOL 007 v2.7.1	Protocols and Data Models; Network Service Descriptor File Structure Specification

Release 2: other published documents (for reference)



Status as of Jan. 2020

ID	Title
Testing	
ETSI GR NFV-TST 007 v2.5.1	Testing; Guidelines on Interoperability Testing for MANO
Security	
ETSI GS NFV-SEC 021 v2.6.1	Security; VNF Package Security Specification
ETSI GS NFV-SEC 022 v2.7.1	Security; Access Token Specification for API Access

Release 2: maintenance work (1/2)



5 rounds completed (1H2017, published as [v2.3.1](#); 2H2017, published as [v2.4.1](#); 1H2018, published as [v2.5.1](#), 2H2018 published as [v2.6.1](#), and 2H2018 published as [v2.7.1](#)).

6th round, 1H2020 maintenance is ongoing (targeting publication of affected specifications as [v2.8.1](#)).

✔ With a deep focus on [stage 3 specifications \(NFV-SOL specs\)](#). Additional stage 2 specifications on security have been considered for maintenance as well.

Main [aspects addressed \(so far\) as part of maintenance](#):

- ✔ Correction of bugs and feedback from deployments and development: remove ambiguities, enhance APIs, etc.
- ✔ Alignment in between Stage 2 and 3 specifications.
- ✔ Security enhancements related to interfaces, descriptors and other artifacts.
- ✔ Feedback from open source projects, e.g., OpenStack gap analysis and alignment to NFV-IFA005 and NFV-IFA006, OSM information model feedback to NFV-IFA011 and NFV-IFA014, contributions to NFV-IFA011 and NFV-SOL004 by companies participating in ONAP providing feedback, etc.

Release 2: maintenance work (2/2)



Capability changes and enhancements developed during maintenance (not an exhaustive list) since first published version of the specs (i.e., v2.1.1 and v2.2.1):

- ✓ Adding support for compute flavour management.
- ✓ Merging of VNF and NS lifecycle change notifications into VNF and NS LCM interfaces, respectively.
- ✓ Merging of VNF configuration and instance information mgmt. into VNF LCM interface.
- ✓ Adding support for changing the external VNF connectivity.
- ✓ Enhancements and consistency to alarm management within the fault management interfaces.
- ✓ Enhancements in the information and data modelling of network connectivity.
- ✓ Adding support for flexible upload of VNF package's software images.
- ✓ Adding support for security groups, trunking, etc.

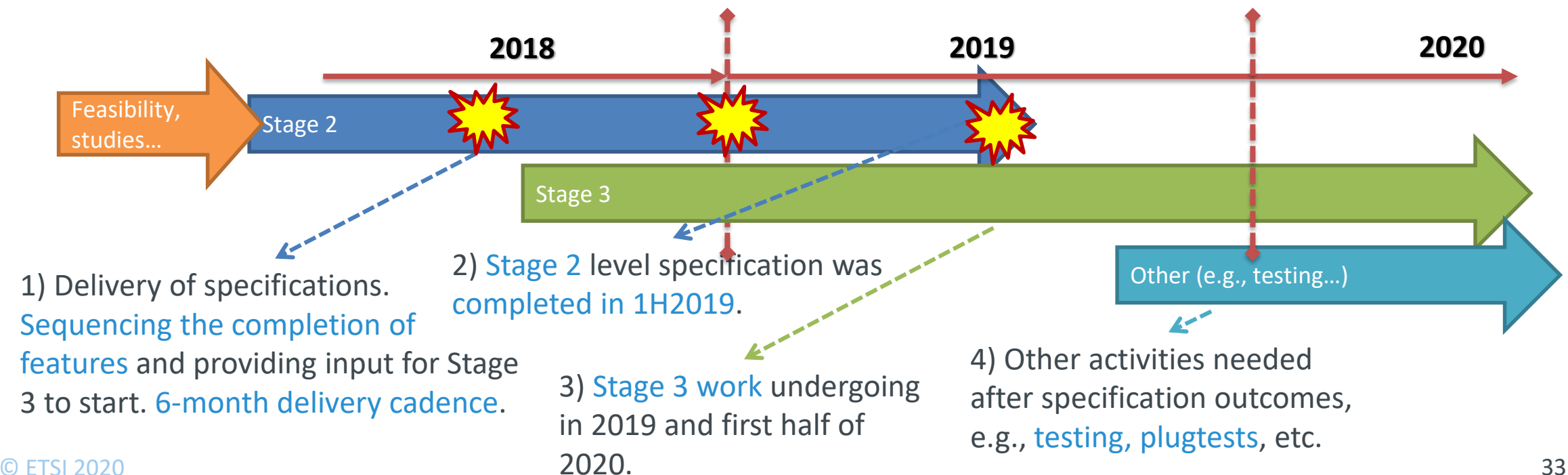
Backup slides

Release 3
specification
summary

Release 3: feature-based specification

- Following a [feature-based specification approach](#).
- 18+ [candidate features](#) (see backup slides).
- “stage 2 level” specification has been completed, and now developing “stage 3 level” work.

Release specification progress and plans are publicly available on the [NFV Public Wiki](#).
List of candidate features is available in the Release 3 Definition (latest [v0.14.0](#) Sep. 2019).
List of completed features is available in the Release 3 Description (latest [v0.4.0](#) Dec. 2019). See also backup slides.



Release 3: specification summary



Status as of Jan. 2020

Published documents

Release 3, published documentation (40): 25 Group Specification (GS) and 15 Group Report (GR).

- ✔ 4 Stage 1/2 GS (NFV-EVE001/007/011, NFV-REL006).
- ✔ 5 Stage 2 GS (NFV-IFA018/019/030/031/032).
- ✔ Stage 2 evolved from Release 2: 9 GS (NFV-IFA005/006/007/008/010/011/013/014 and NFV-TST008) and 4 GR (NFV-IFA015/016/017/024).
- ✔ 2 new Stage 3: 2 GS (NFV-SOL009/011).
- ✔ 4 GS on security (NFV-IFA026, NFV-SEC012, NFV-SEC013, NFV-SEC014).
- ✔ 11 GR (NFV-EVE008/010/012, NFV-IFA012/021/022/023/028/029, NFV-TST005, NFV-REL010).
- ✔ 1 GS on testing/benchmarking (NFV-TST009).

Refer to regular updates of the Release 3
Description (latest version is [v0.4.0](#), Dec. 2019).

Active work items

Release 3, ongoing unpublished work items (refer to Release 3 Definition): 14 WI.

- ✔ 1 Stage 2 GS draft (NFV-IFA033).
- ✔ 1 GS drafts on security (NFV-SEC020).
- ✔ Evolved Rel. 2 deliverables from stage 2 and 3, and testing: 9 GS (NFV-SOL001/002/003/004/005/006/007/013 and NFV-TST010).
- ✔ 2 GS drafts on newly stage 3 (NFV-SOL010/012).
- ✔ 1 GR draft on newly stage 3 (NFV-SOL017).

Release 3, ongoing “maintenance work”: 19 WI.

- ✔ Propagated/evolved Rel. 2 deliverable drafts: 10 Stage 2 GS (NFV-IFA005/006/007/008/010/011/013/014/027, NFV-TST008), and 3 GR (NFV-IFA015/016/017).
- ✔ Newly added by Release 3: 4 Stage 2 GS (NFV-IFA026/030/031/032), 1 testing GS (NFV-TST009), and 1 security (NFV-SEC014).

Release 3: work items and features from stage 1&2 perspective

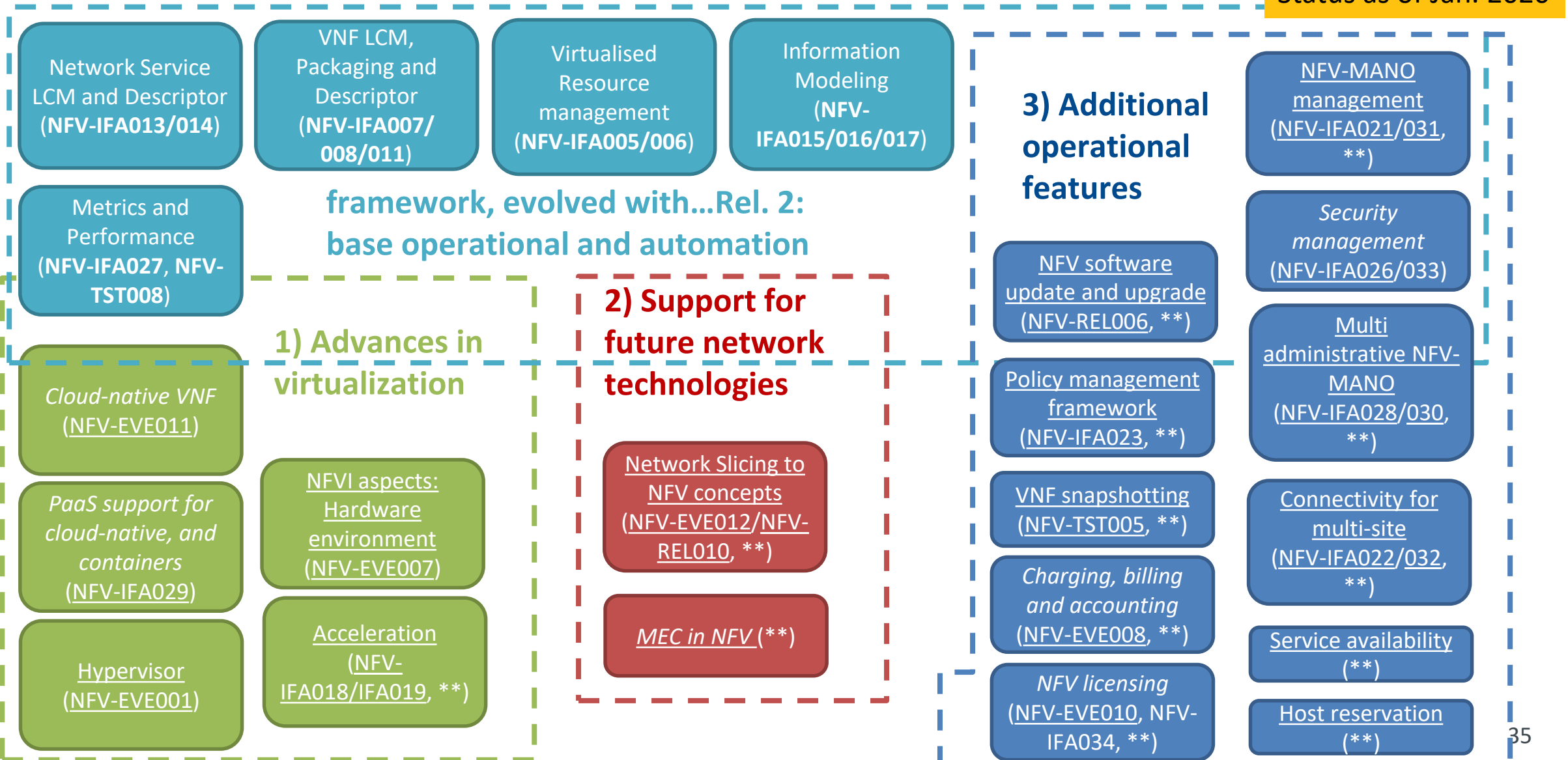
Completed: underlined
 Ongoing/not fully completed: *italics*
 Evolved: in **bold**

(**): other normative work is part of evolved work items

NOTE: might not be a full complete list due to lack of space



Status as of Jan. 2020



Release 3: stage 2 published documents (for reference)



Status as of Jan. 2020

ID	Title
Functional requirements	
ETSI GS NFV-IFA 010 v3.3.1	MANO; Functional requirements specification
NFV-MANO reference points and interfaces	
ETSI GS NFV-IFA 005 v3.3.1	MANO; Or-Vi reference point - Interface and Information Model Specification
ETSI GS NFV-IFA 006 v3.3.1	MANO; Vi-Vnfm reference point - Interface and Information Model Specification
ETSI GS NFV-IFA 007 v3.3.1	MANO; Or-Vnfm reference point - Interface and Information Model Specification
ETSI GS NFV-IFA 008 v3.3.1	MANO; Ve-Vnfm reference point - Interface and Information Model Specification
ETSI GS NFV-IFA 013 v3.3.1	MANO; Os-Ma-Nfvo reference point - Interface and Information Model Specification
ETSI GS NFV-IFA 030 v3.3.1	MANO; Multiple Administrative Domain Aspect Interfaces
ETSI GS NFV-IFA 032 v3.3.1	MANO; Interface and Information Model Specification for Multi-Site Connectivity Services
Descriptors and artefacts	
ETSI GS NFV-IFA 011 v3.3.1	MANO; VNF Descriptor and Packaging Specification
ETSI GS NFV-IFA 014 v3.3.1	MANO; Network Service Templates Specification

Release 3: stage 2 published documents (for reference)



Status as of Jan. 2020

ID	Title
Acceleration (with interfaces), virtualization technologies and NFVI	
ETSI GS NFV-EVE 001 v3.1.1	Virtualisation Technologies; Hypervisor Domain Requirements specification
ETSI GS NFV-EVE 007 v3.1.2	NFV Evolution and Ecosystem, Hardware Interoperability Requirements Specification
ETSI GS NFV-IFA 018 v3.1.1	Acceleration Technologies; Network Acceleration Interface Specification
ETSI GS NFV-IFA 019 v3.1.1	Acceleration Technologies; Acceleration Resource Management Interface Specification
Information modeling	
ETSI GR NFV-IFA 015 v3.1.1	MANO; Report on NFV Information Model
ETSI GR NFV-IFA 016 v3.1.1	IM; Papyrus Guidelines
ETSI GR NFV-IFA 017 v3.1.1	IM; UML Modeling Guidelines
ETSI GR NFV-IFA 024 v3.2.1	IM; Report on External Touchpoints related to NFV Information Model
Metrics, measurements	
ETSI GS NFV-TST 008 v3.2.1	Testing; NFVI Compute and Network Metrics Specification
NFV-MANO management	
ETSI GS NFV-IFA 031 v3.3.1	Management and Orchestration; Requirements and interfaces specification for management of NFV-MANO

Release 3: other areas, published documents (for reference)



Status as of Jan. 2020

ID	Title
Testing	
ETSI GR NFV-TST 009 v3.2.1	Testing; Specification of Networking Benchmarks and Measurements
Security	
ETSI GS NFV-IFA 026 v3.2.1	MANO; Architecture enhancement for Security Management Specification
ETSI GS NFV-SEC 012 v3.1.1	Security; system architecture specification for execution of sensitive components
ETSI GS NFV-SEC 013 v3.1.1	Security; Security Management and Monitoring specification
ETSI GS NFV-SEC 014 v3.1.1	NFV Security; Security Specification for MANO Components and Reference Points
Reliability	
ETSI GS NFV-REL 006 v3.1.1	Reliability; Maintaining Service Availability and Continuity Upon Software Modification
Other non-functional requirements	
ETSI GS NFV-EVE 011 v3.1.1	Virtualised Network Function; Specification of the Classification of Cloud Native VNF implementations

Release 3: stage 3 published documents (for reference)



Status as of Jan. 2020

ID	Title
NFV-MANO management APIs	
ETSI GS NFV-SOL 009 v3.3.1	Protocols and Data Models; RESTful protocols specification for the management of NFV-MANO
NFV-MANO APIs	
ETSI GS NFV-SOL 011 v3.3.1	Protocols and Data Models; RESTful protocols specification for the Or-Or Reference Point

Release 3: published reports (for reference)



Status as of Jan. 2020

ID	Title
Reports	
ETSI GR NFV-EVE 012 v3.1.1	Evolution and Ecosystem; Report on Network Slicing Support with ETSI NFV Architecture Framework
ETSI GR NFV-IFA 021 v3.1.1	MANO; Report on management of NFV-MANO and automated deployment of EM and other OSS functions
ETSI GR NFV-IFA 022 v3.1.1	MANO; Report on Management and Connectivity for Multi-Site Services
ETSI GR NFV-IFA 023 v3.1.1	MANO; Report on Policy Management in MANO
ETSI GR NFV-IFA 028 v3.1.1	MANO; Report on architecture options to support multiple administrative domains
ETSI GR NFV-IFA 029 v3.3.1	Architecture; Report on the Enhancements of the NFV architecture towards "Cloud-native" and "PaaS"
ETSI GR NFV-REL 010 v3.1.1	Reliability; Report on NFV Resiliency for the Support of Network Slicing
ETSI GR NFV-TST 005 v3.1.1	Continuous Development and Integration; Report on use cases and recommendations for VNF Snapshot

Backup slides

Release 3
features

Release 3 features: Compute Host Reservation

Objective: Enable reservation of physical hosts in the NFVI by „authorized consumers of NFVI administration“.

Use cases:

- ✔ Secure NFVI resource availability during maintenance processes.
- ✔ Hardware interoperability requirements (see [ETSI GS NFV-EVE 007](#)).
- ✔ Security regulations (see [ETSI GS NFV-SEC 012](#)).
- ✔ See also OPNFV’s Promise project: wiki.opnfv.org/display/promise/

Specification outcomes:

- ✔ Requirements and interface specification in [ETSI GS NFV-IFA 010](#) and [ETSI GS NFV-IFA 005](#) (versions v3.1.1).



Other information:

- ✔ Aligned with (Resource reservation service): <https://docs.openstack.org/blazar/> which supports reservation of virtual compute(s) and physical compute host(s).



Release 3 features: NFV-MANO Policy Management Framework

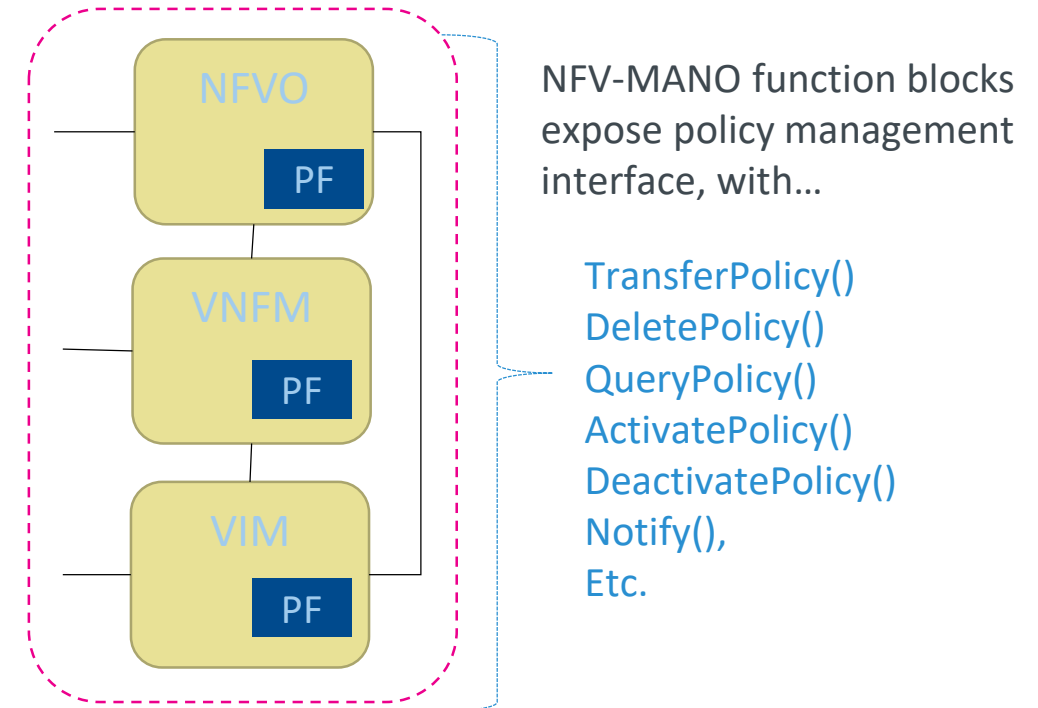
Objective: Create a policy management framework to further enhance the flexibility in NFV Management and Orchestration.

Use cases:

- Change the behaviour of VNF, NS and VR lifecycle and orchestration based on policies.
- See also use cases documented in the published report [ETSI GR NFV-IFA 023](#).

Specification outcomes:

- NFV-MANO FB (i.e., NFVO, VNFM and VIM) act as Policy Functions (PF) to enforce policies. NFV-MANO FB can also act as Policy Administration Points (PAP).
- A new policy management interface is added for each reference point, which includes operations of policy transfer, deletion, query, activation and deactivation. Specified in v3.1.1 versions of ETSI GS NFV-IFA [010/005/006/007/008/013](#).



Other information:

- RESTful protocol and data model solution (stage 3) work expected to start soon (work item proposal currently under ISG approval).

Release 3 features: VNF Snapshots

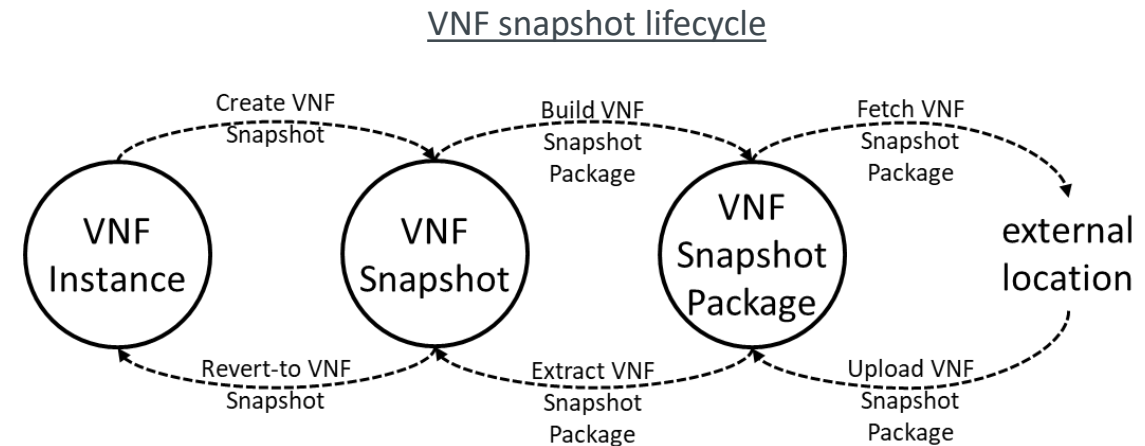
Objective: Solution to manage, store and transfer a snapshot of a VNF.

Use cases:

- Testing, troubleshooting, as fall-back in LCM procedures, e.g., quick VNF recovery.
- See also use cases documented in the published report [ETSI GR NFV-TST 005](#).

Specification outcomes:

- Extending VNF and NS lifecycle management interfaces with new operations to create and revert to snapshots. Specified in ETSI GS NFV-IFA [010/007/008/013](#).
- A new VNF Snapshot Package Management interface, for building/extracting packages from/to VNF/C snapshots. Specified in ETSI GS NFV-IFA [007/008/013](#).



Other information:

- Data model (stage 3) work for the VNF Snapshot Packages started (work item [DGS/NFV-SOL010](#)).

Release 3 features: Management of NFV-MANO

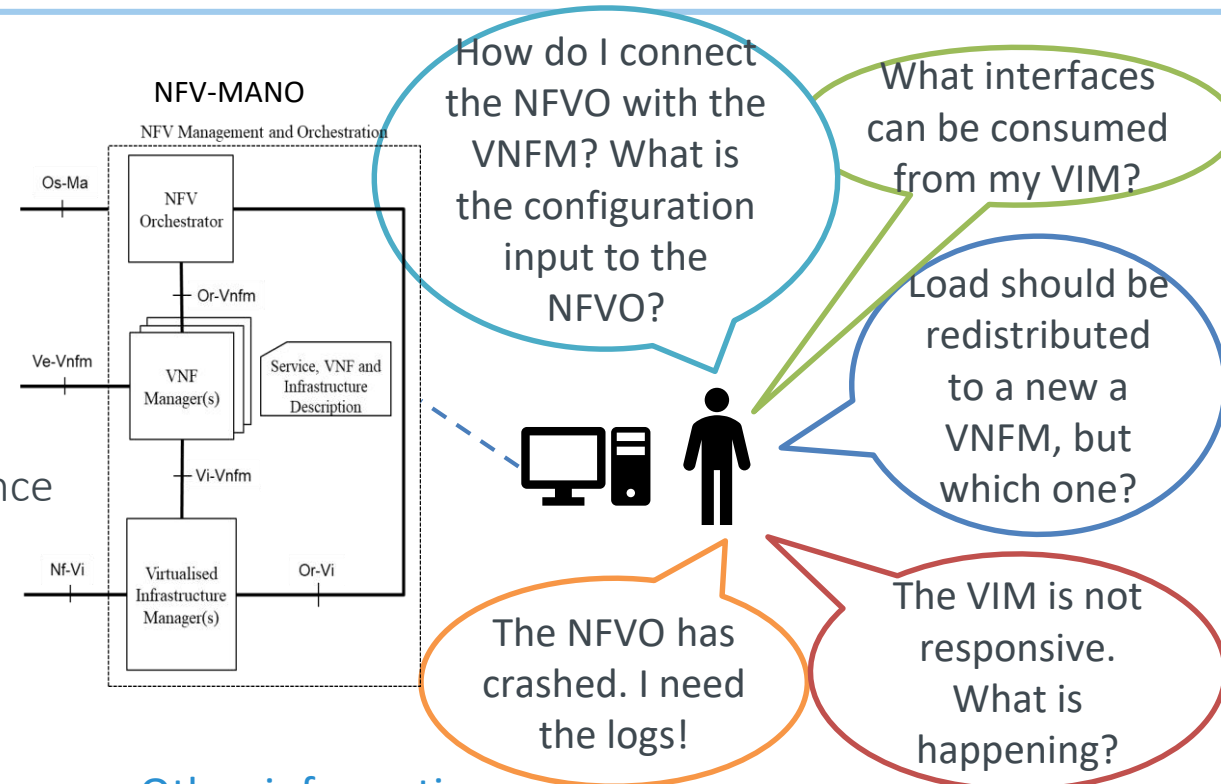
Objective: Create a framework for flexible NFV-MANO management to ease the integration/interworking of NFV-MANO system with network operators support systems.

Use cases:

- NFV-MANO functions need to be configured for interworking, and monitored against fault and performance issues.
- See also use cases documented in the published report [ETSI GR NFV-IFA 021](#).

Specification outcomes:

- Set of requirements, interfaces and information model for the operation, management and maintenance of NFV-MANO (see also [ETSI GS NFV-IFA 031](#)).



Other information:

- RESTful protocol and data model solution (stage 3) work just started (work item [DGS/NFV-SOL009](#)).



Fault management



Configuration management



Performance management



State management



Log management

Release 3 features: NS across multiple administrative domains

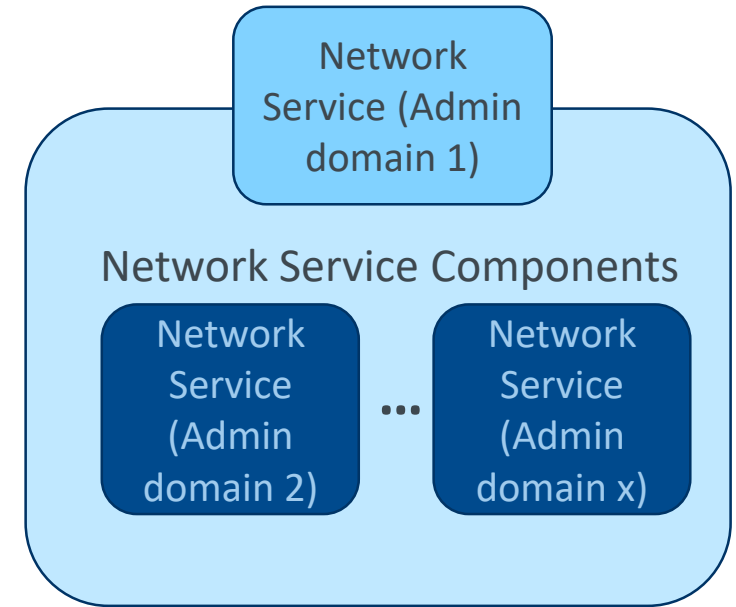
Objective: Enable different business models where the NFV infrastructure or Network Services are provided by another administrative domain.

Use cases:

- ✔ NS provisioning and lifecycle management require coordination between two NFVOs in different administrative domains.
- ✔ See also use cases documented in the published report [ETSI GR NFV-IFA 028](#).

Specification outcomes:

- ✔ Enable a new reference point Or-Or with the functionality mainly referencing to the existing ETSI GS NFV-IFA 013 operations. Developed in the [ETSI GS NFV-IFA 030](#).



Other information:

- ✔ RESTful protocol and data model solution (stage 3) work just started (work item [DGS/NFV-SOL011](#)).

Release 3 features: VNF software modification

Objective: Minimize the impact of VNF software modification on service continuity.

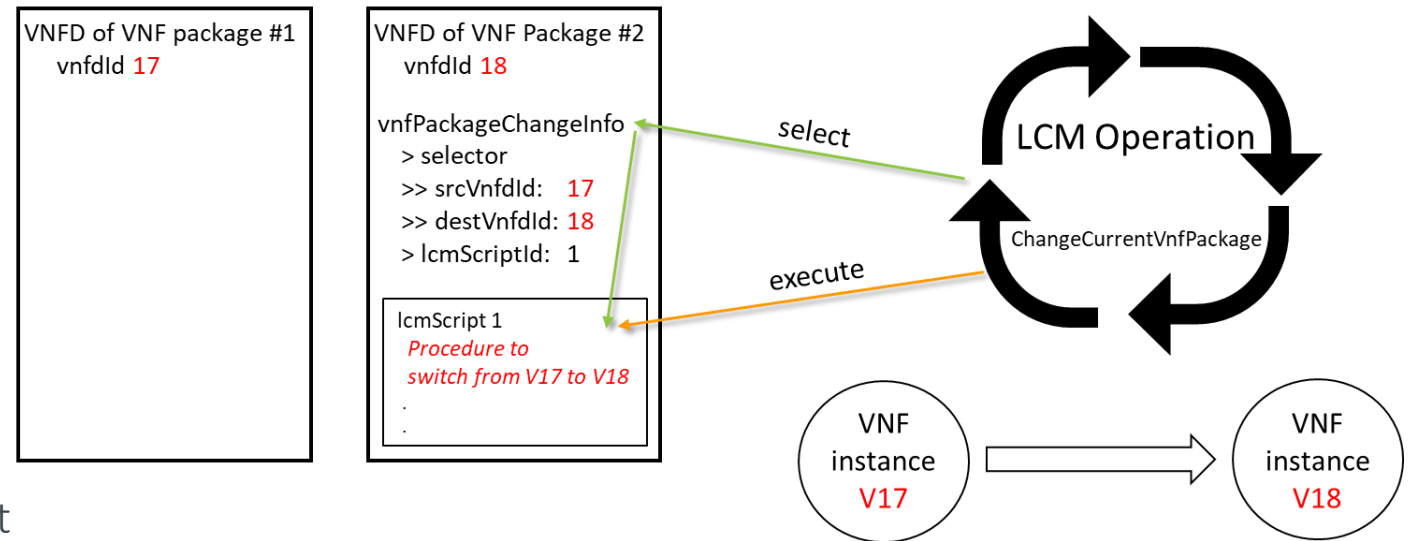
Use cases:

- ✔ Change software version of deployed VNF.
- ✔ See also use cases documented in published report [ETSI GS NFV-REL 006](#).

Specification outcomes:

- ✔ Extending functional requirements to support the change of a VNF Package to update the VNF instance as specified in ETSI GS NFV-IFA 010.
- ✔ Extending VNF lifecycle management interfaces with new operations to change to a VNF Package containing a modified VNF as specified in ETSI GS NFV-IFA 007/008/[010](#)/[011](#)/[013](#).

VNF software modification



Other information:

- ✔ The LCM supports the change of a VNF Package to allow for upgrade and downgrade of VNF instances.

Release 3 features: Network Slicing

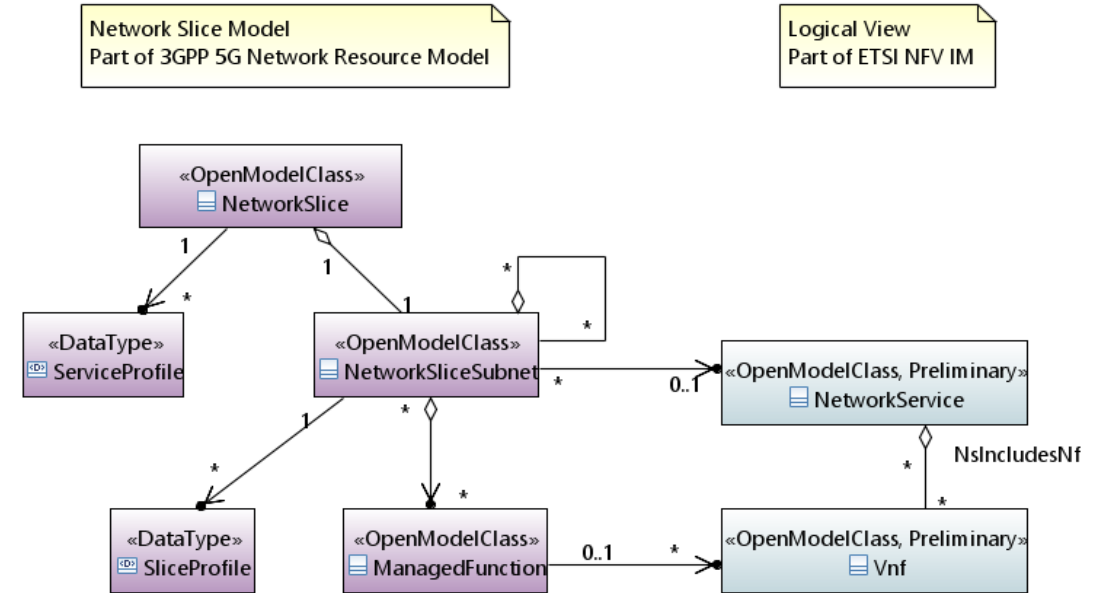
Objective: Support Network Slicing by defining the necessary requirements and enhancements of interfaces and descriptors.

Use cases:

- ✔ NFV network services as constituents for network slices.
- ✔ See also use cases documented in the published report [ETSI GR NFV-EVE 012](#).

Specification outcomes:

- ✔ New touchpoint in [ETSI GR NFV-IFA 024](#).
- ✔ Updated NS descriptor in [ETSI GS NFV-IFA 014](#): The NSD includes in the Deployment Flavour the „priority“ attribute, which is assigned by the consumer (OSS/NSMF/NSSMF), based on the priority of the slice that uses the NS instance.
- ✔ Requirements and interface specification in [ETSI GS NFV-IFA 010](#) and [NFV-IFA 013](#): Os-Ma-nfvo support for the LCM coordination notifications to enable the consumer to subsequently resolve priority conflicts.



Other information:

- ✔ Mgmt. of Network Services already supports most requirements for the use network slice management functions (e.g. multi-tenancy, nested NSs).
- ✔ Main new requirement: Priority attribute for Network Service instances to be used to resolve conflicts during resource allocation

Release 3 features: Management & Connectivity of Multi-Site Services

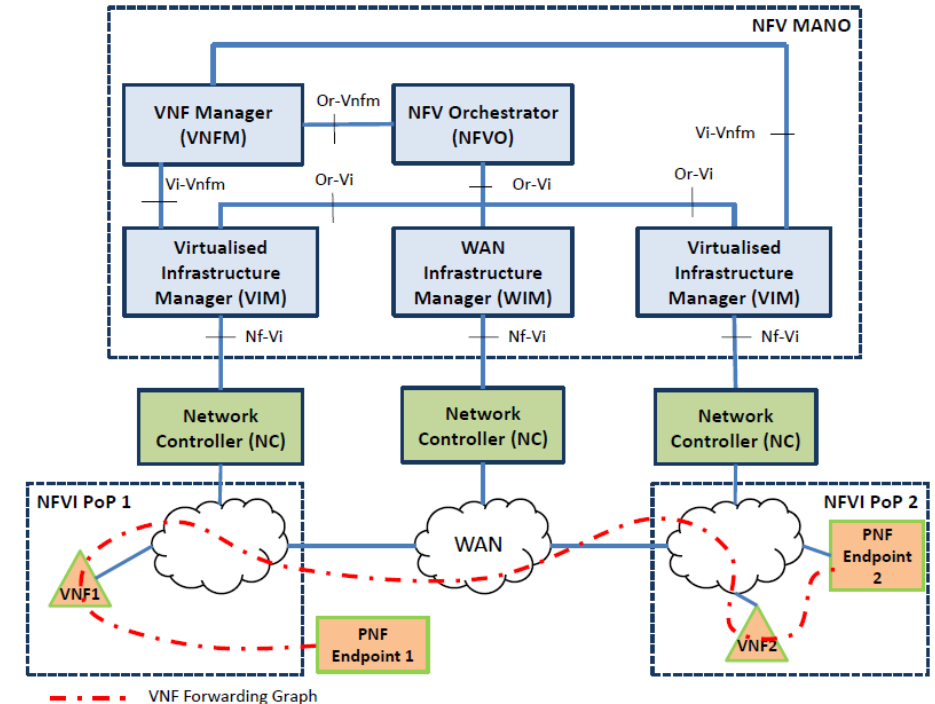
Objective: Specify management aspects for enabling inter-connectivity between, and management of network services across, multiple NFVI-PoPs over WAN infrastructure.

Use cases:

- ✔ A set of requirements, interfaces and information models for the WAN Infrastructure Manager (WIM).
- ✔ See also use cases documented in the published report [ETSI GR NFV-IFA 022](#).

Specification outcomes:

- ✔ 4 management interfaces (Multi-site connectivity service, Capacity, Performance, Fault management) to provision and manage multi-site connectivity services (refer to [ETSI GS NFV-IFA 032](#)).
- ✔ Updates on ETSI GS NFV-IFA 005/007/[010](#)/[013](#)/[014](#) specifications to support exposure of connectivity information and multi-site service deployment.



Other information:

- ✔ PoC#42: Mapping ETSI-NFV onto Multi-Vendor, Multi-Domain Transport SDN 4.
- ✔ PoC#42 report available on <https://www.etsi.org/technologies/nfv/nfv-poc>.
- ✔ Proposal to develop Stage 3 related work is planned as a next step.

Release 3 features: Service availability level (SAL)

Objective: Enable the NFV system to select the optimal resources to achieve a given level of availability.

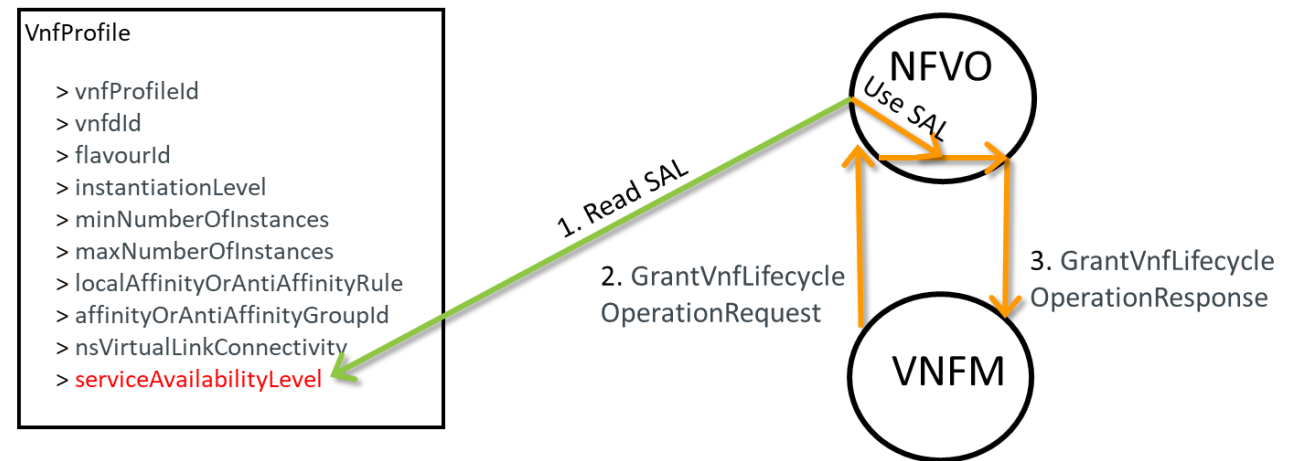
Use cases:

- During instantiation of a network service, virtualised resources are assigned. Expected service availability level is taken into account for this resource assignment.

Specification outcomes:

- Extending functional requirements to support the selection of a service availability level in [ETSI GS NFV-IFA 010](#).
- Include SAL value into VNFD and NS deployment flavour in [ETSI GS NFV-IFA 014](#).

Service availability level



Other information:

- The mechanisms how to include SAL value in the selection of the virtualized resource has not been specified in Release 3.

Release 3 features: NFVI software modification

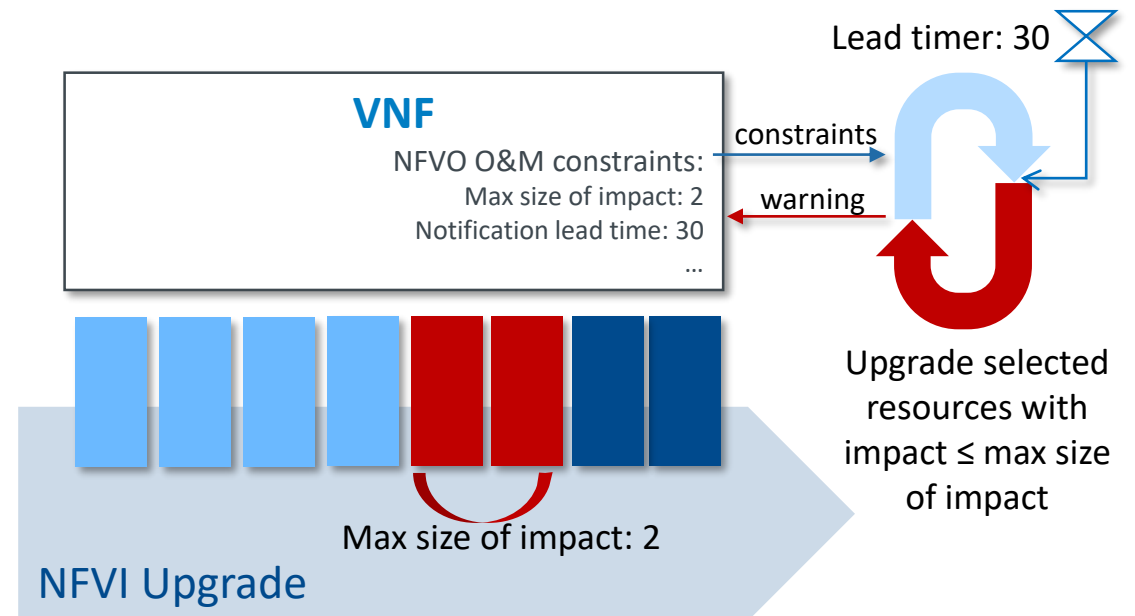
Objective: Minimize the impact of NFVI operation and maintenance (O&M), e.g. upgrade, on service continuity.

Use cases:

- ✔ Allow VNFs to prepare for upcoming impacts due to NFVI O&M on virtualised resources they use.
- ✔ See also use cases documented in the published [ETSI GS NFV-REL 006](#) specification.

Specification outcomes:

- ✔ Extension of the functional requirements specified in [ETSI GS NFV-IFA 010](#) with support for NFVI O&M constraints and for advanced notification of VNF instances about upcoming impacts.
- ✔ Extension of the VNFD and policy management interface specified in ETSI GS NFV-IFA [005/006/008/011](#) to include NFVI O&M constraints
- ✔ Extension of the fault management/resource change interfaces specified in ETSI GS NFV-IFA [005/006/008](#) to allow for notifications for upcoming impacts due to NFVI O&M.



Backup slides

Release 4
specification
summary

Release 4: specification summary



Status as of Jan. 2020

Published documents

Release 4, published documentation (0): 0 Group Specification (GS) and 0 Group Report (GR).

None at this moment.

Active work items

Release 4, ongoing unpublished work items (refer to Release 4 Definition): 31 WI.

- 9 GR work items (NFV-EVE018/019, NFV-IFA034/035/037/038/039/041, NFV-REL011)
- 3 Stage 2 GS draft (NFV-IFA033/036/040).
- 2 GS drafts on security (NFV-SEC023/SEC024).
- Propagate/evolved Rel. 3 deliverables: 17 WI:
 - 12 Stage 2 GS (NFV-IFA005/006/007/008/010/011/013/014/026/030/031/032),
 - 4 GR (NFV-IFA015/016/017/024), and
 - 1 security GS (NFV-SEC012).

Release 4, ongoing “maintenance work”: 0 WI.

None at this moment.

Refer to Release 4 Definition (to be available soon).