ETSI ISG NFV SOL WG: Release 2 and 3 status

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Outline

- PART 1: NFV Release 2
  - What does it contain?
  - Maintenance, API development, etc.

- PART 2: NFV Release 3
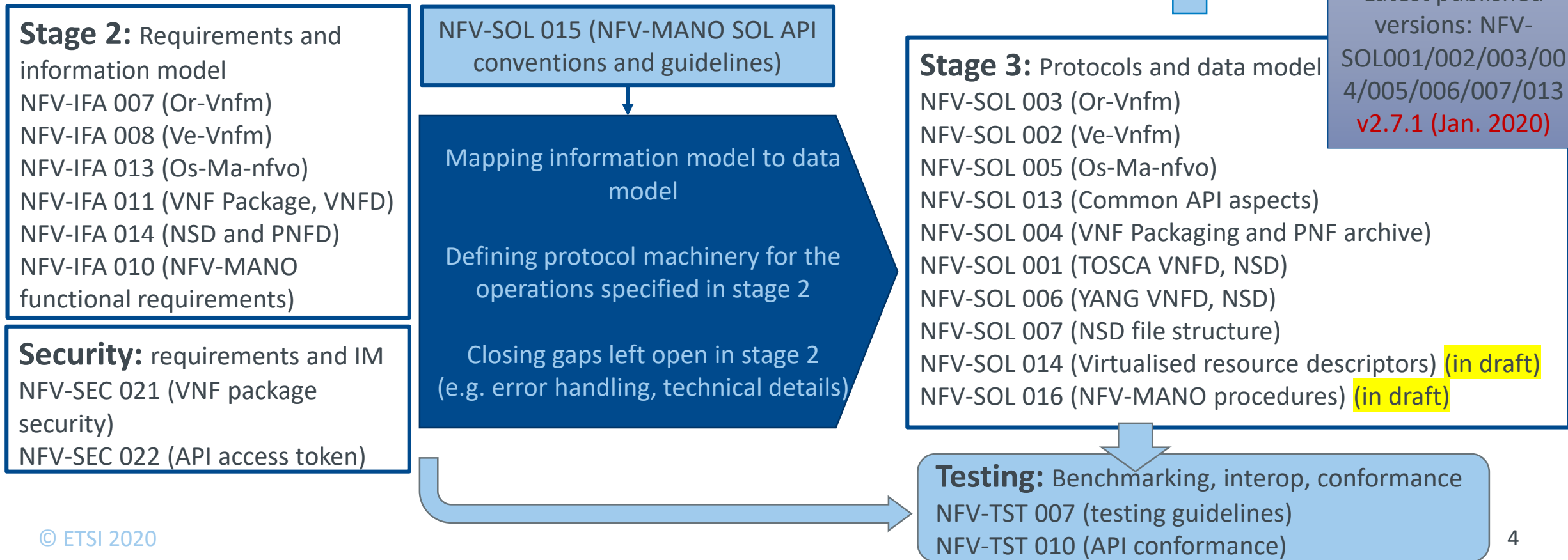 - Overview
  - Features and specification work

Part 1: NFV Release 2

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=Deploymen t_Templates_and_Packaging_specifications

Stage 2: Requirements and information model
NFV-IFA 007 (Or-Vnfm)
NFV-IFA 008 (Ve-Vnfm)
NFV-IFA 013 (Os-Ma-nfvo)
NFV-IFA 011 (VNF Package, VNFD)
NFV-IFA 014 (NSD and PNFD)
NFV-IFA 010 (NFV-MANO functional requirements)

Security: requirements and IM
NFV-SEC 021 (VNF package security)
NFV-SEC 022 (API access token)

NFV-SOL 015 (NFV-MANO SOL API conventions and guidelines)

Mapping information model to data model

Defining protocol machinery for the operations specified in stage 2

Closing gaps left open in stage 2 (e.g. error handling, technical details)

Stage 3: Protocols and data model
NFV-SOL 003 (Or-Vnfm)
NFV-SOL 002 (Ve-Vnfm)
NFV-SOL 005 (Os-Ma-nfvo)
NFV-SOL 013 (Common API aspects)
NFV-SOL 004 (VNF Packaging and PNF archive)
NFV-SOL 001 (TOSCA VNFD, NSD)
NFV-SOL 006 (YANG VNFD, NSD)
NFV-SOL 007 (NSD file structure)
NFV-SOL 014 (Virtualised resource descriptors) (in draft)
NFV-SOL 016 (NFV-MANO procedures) (in draft)

Latest published versions: NFV-SOL001/002/003/004/005/006/007/013
v2.7.1 (Jan. 2020)

Testing: Benchmarking, interop, conformance
NFV-TST 007 (testing guidelines)
NFV-TST 010 (API conformance)

4

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).

ᐁ 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:

ᐁ Correction of bugs and feedback from deployments and development: remove ambiguities, enhance APIs, etc.

ᐁ Alignment in between Stage 2 and 3 specifications.

ᐁ Security enhancements related to interfaces, descriptors and other artefacts.

ᐁ Extending constructs of VNF packaging for archiving files and artifacts of PNF.

ᐁ 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.

SOL001 ed271 key changes:

- Generate a new yaml file, the etsi_nfv_sol001_common_types.yaml, which contains the common type definitions

- Added support of the VNFFG design in the NSD model

- Added support of Multiple NS deployment flavours design in the NSD model

- Added support of nested NS design in the NSD model

- Added support of NS monitoring design in the NSD model

- Added support of dependencies design in the NSD model

- Added support of VNF indicator design in the VNFD model based on tosca-simple-profile-yaml v1.3 notification feature

- Differentiate the affiinityRule, AntiAffinityRule policies used in VNFD and NSD --> create new tosca.policies.nfv.NsAffinityRule and tosca.policies.nfv.NsAntiAffinityRule policy types only used in NSD

- Differentiate the SecurityGroupRule policy used in VNFD and NSD --> create new tosca.policies.nfv.NsSecurityGroupRule policy type only used in NSD

- Added support of virtual IP design in the VNFD model

- Added the optional feature of using TOSCA imperative workflows when design a NSD

- Added the informative mapping between the VNFD/NSD TOSCA model and the API attributes as defined by SOL002/SOL003/SOL005

SOL004 ed271

- A number of changes were performed to improve consistency which don't introduce technical changes.

- Add SEC022 support --> Mandatory signing of all artifacts

Release 2 ed281: stage 3: work plan

Reference	TB App
Propagated GSs	
SOL001Ed281 "TOSCA based NFV Descriptors spec"	2020-06-30
SOL002Ed281 "Ve-Vnfm RESTful protocols spec"	2020-06-30
SOL003Ed281 "Or-Vnfm RESTful protocols spec"	2020-06-30
SOL004Ed281 "VNF Package Stage 3"	2020-06-30
SOL005Ed281 "Os-Ma –nfvo RESTful protocols spec"	2020-06-30
SOL006Ed281 "NFV descriptors in YANG"	2020-06-30
SOL007Ed281 "NSD file structure spec »	2020-06-30
SOL013Ed281 "Common aspects of RESTful MANO APIs"	2020-06-30

Part 2: NFV Release 3

Release 3: specification status

Stage 1 and 2:

ᴠ Stage 1 and 2 work has been completed, but some candidate features were closed or carried over to Release 4.

ᴠ Maintenance is ongoing: 1st round started 2H2019 (targeting publication as v3.4.1).

Stage 3:

ᴠ Stage 3 work is progressing to specify the set of stage 2 completed features.

ᴠ 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.

ᴠ Other new NFV-SOL specification drafts related to Release 3 features are in progress (e.g., SOL010 and SOL012).

ᴠ 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)

Release 3 ed331: stage 3: work plan

Reference	TB App
Propagated GSs	
SOL001Ed331 "TOSCA based NFV Descriptors spec"	2020-03-31
SOL002Ed331 "Ve-Vnfm RESTful protocols spec"	2020-03-31
SOL003Ed331 "Or-Vnfm RESTful protocols spec"	2020-03-31
SOL004Ed331 "VNF Package Stage 3"	2020-03-31
SOL005Ed331 "Os-Ma –nfvo RESTful protocols spec"	2020-03-31
SOL006Ed331 "NFV descriptors in YANG"	2020-03-31
SOL007Ed331 "NSD file structure spec »	2020-03-31
SOL013Ed331 "Common aspects of RESTful MANO APIs"	2020-03-31
New GSs	
SOL009 "MANO mgmt stage 3"	2019.10.07
SOL010 "VNF snapshot pkg stage 3"	2020-04-30
SOL011 "Or-Or Stage 3"	2020-01-06
SOL012 "Policy Mgmt Intface"	2020-04-28
New GRs	
SOL017 "MSCS Stage 3"	2020-04-30

The 1st publication of Release 3 GSs will not address all Release 3 features and might contain fixes agreed in IFAEd341. The minimum list of features required for the 1st publication: VNF software modification, Host Reservation; Network Slicing, Mgmt & Connectivity Multi-Site Services (MCMSS); VNF Snapshotting

SOL001 ed331 planning and impact

- FEAT02: VNF SWUP → VNFD

- FEAT05: Network Slicing → NSD

- FEAT10: MCMSS → NSD

- FEAT15: VNF Snapshotting → VNFD

- FEAT16: SAL → NSD

- FEAT03: NFVI SWUP → VNFD

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).

Performance is critical! We need a dedicated host!

I need guaranteed resources on host to migrate VNF during NFVI maintenance.

Our security process requires a host with "Trusted Platform Module"!

Other information:

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

BLAZAR
an OpenStack Community Project

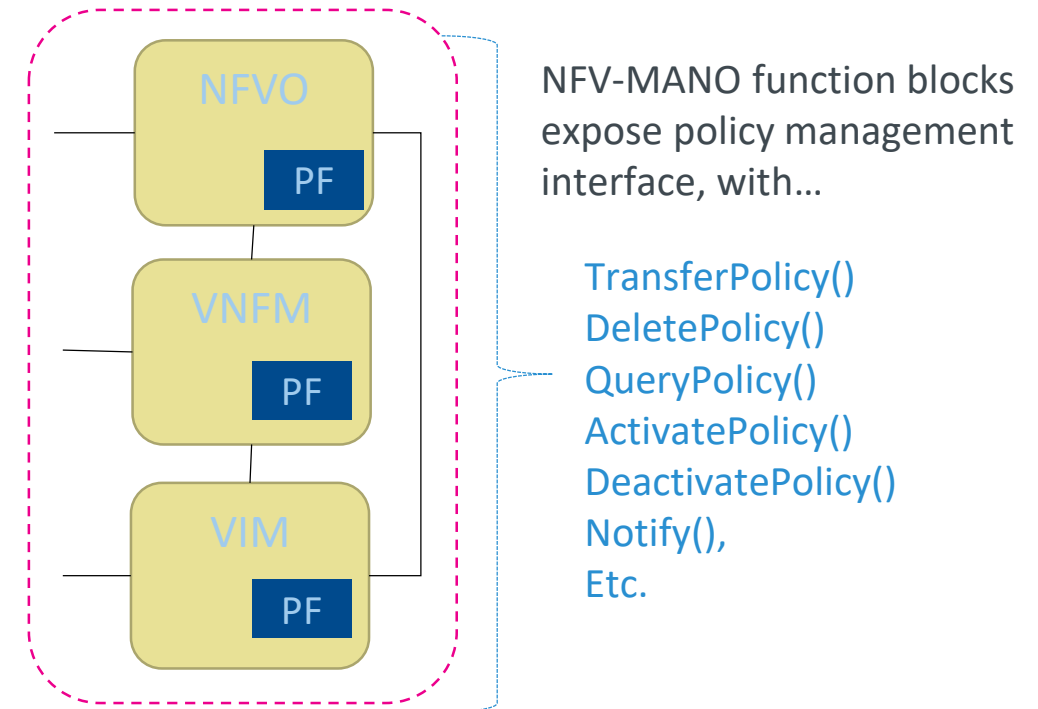# Release 3 features:
NFV-MANO Policy Management Framework

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.

NFV-MANO function blocks expose policy management interface, with…

TransferPolicy()
DeletePolicy()
QueryPolicy()
ActivatePolicy()
DeactivatePolicy()
Notify(),
Etc.

Other information:

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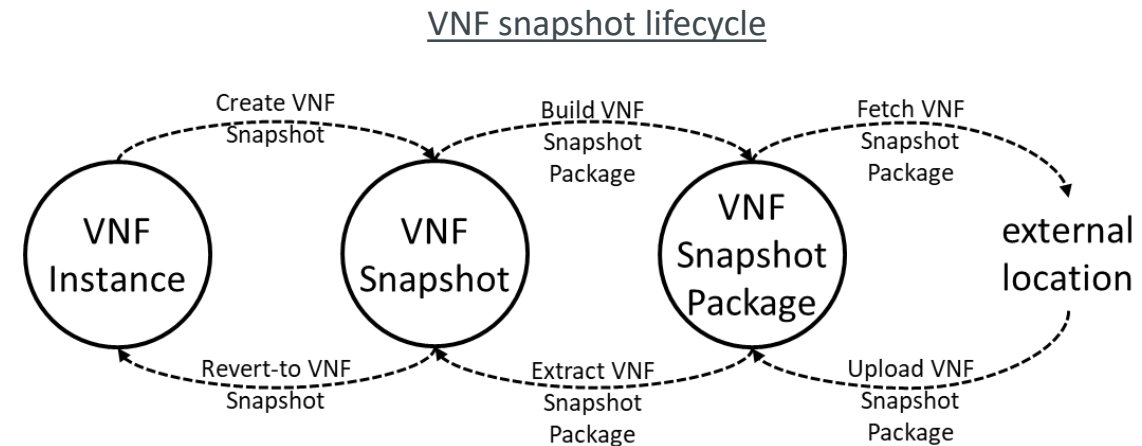
Release 3 features:
VNF Snapshots

ETSI

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.

VNF snapshot lifecycle

Other information:

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

Release 3 features:
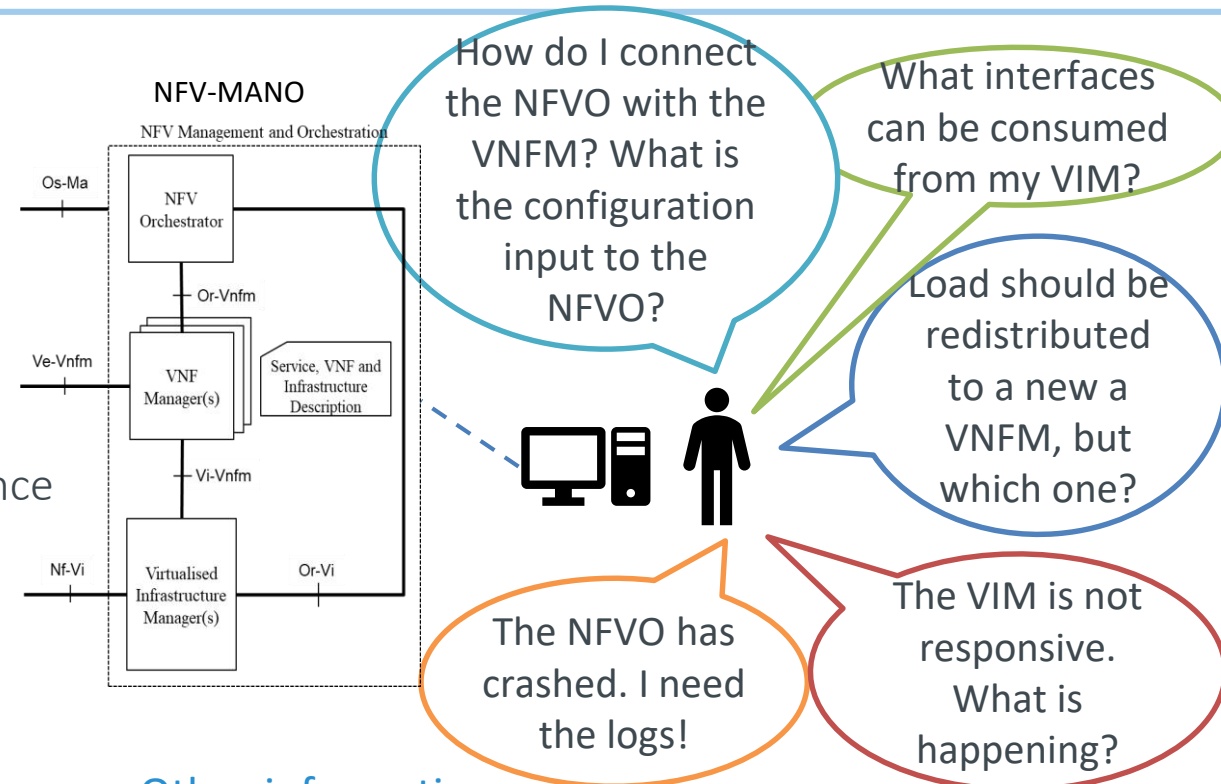# Management of NFV-MANO

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).

NFV-MANO

NFV Management and Orchestration

How do I connect the NFVO with the VNFM? What is the configuration input to the NFVO?

What interfaces can be consumed from my VIM?

Load should be redistributed to a new a VNFM, but which one?

The NFVO has crashed. I need the logs!

The VIM is not responsive. What is happening?

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

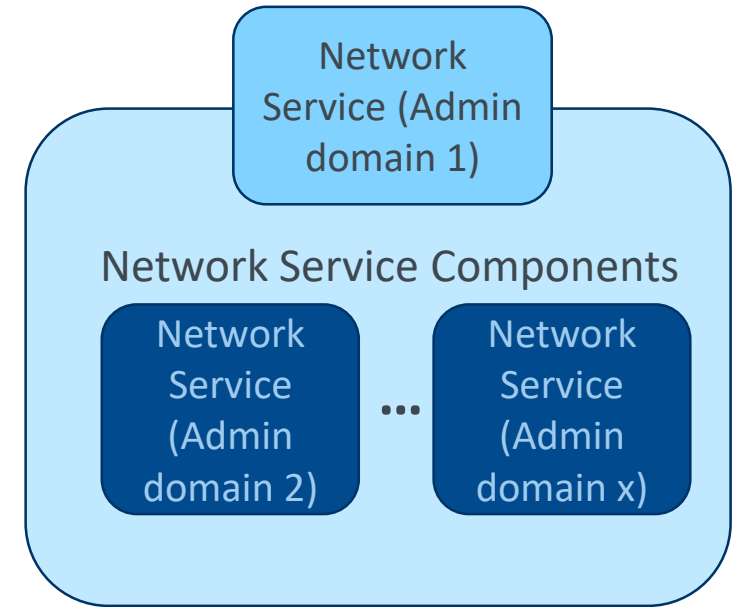# Release 3 features:
NS across multiple administrative domains

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

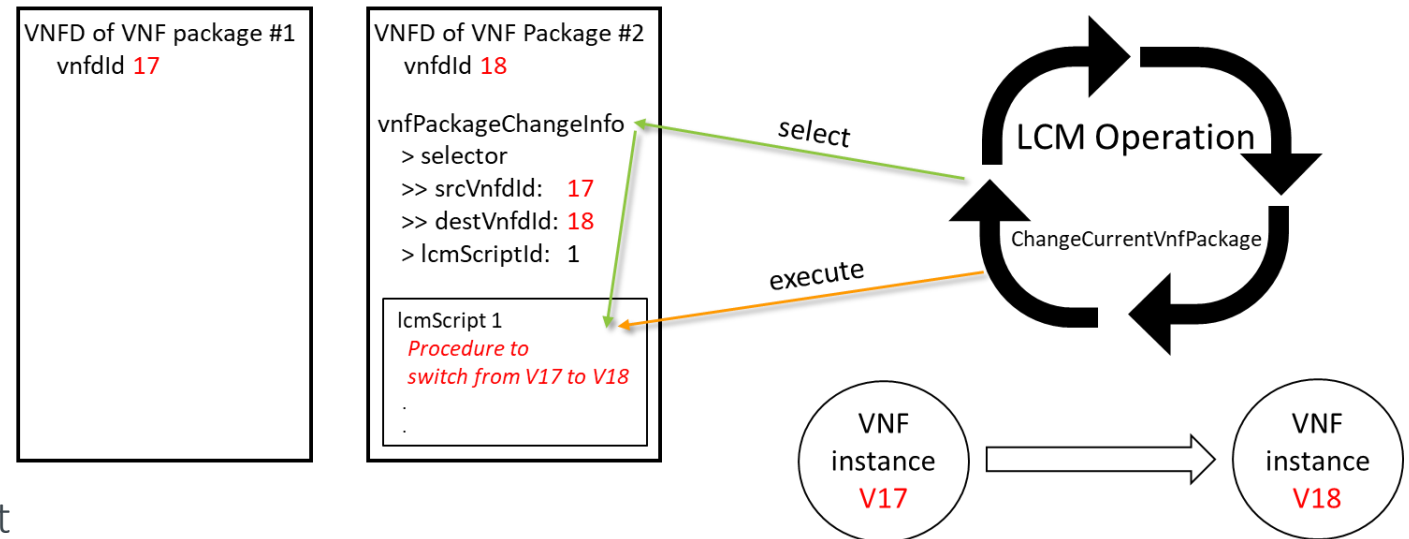**Objective:** Minimize the impact of VNF software modification on service continuity.

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

VNFD of VNF package #1
vnfdId 17

VNFD of VNF Package #2
vnfdId 18

vnfPackageChangeInfo
  > selector
  >> srcVnfdId: 17
  >> destVnfdId: 18
  > lcmScriptId: 1

lcmScript 1
Procedure to switch from V17 to V18
.
.

select

execute

LCM Operation

ChangeCurrentVnfPackage

VNF instance V17

VNF instance V18

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.

Network Slice Model
Part of 3GPP 5G Network Resource Model

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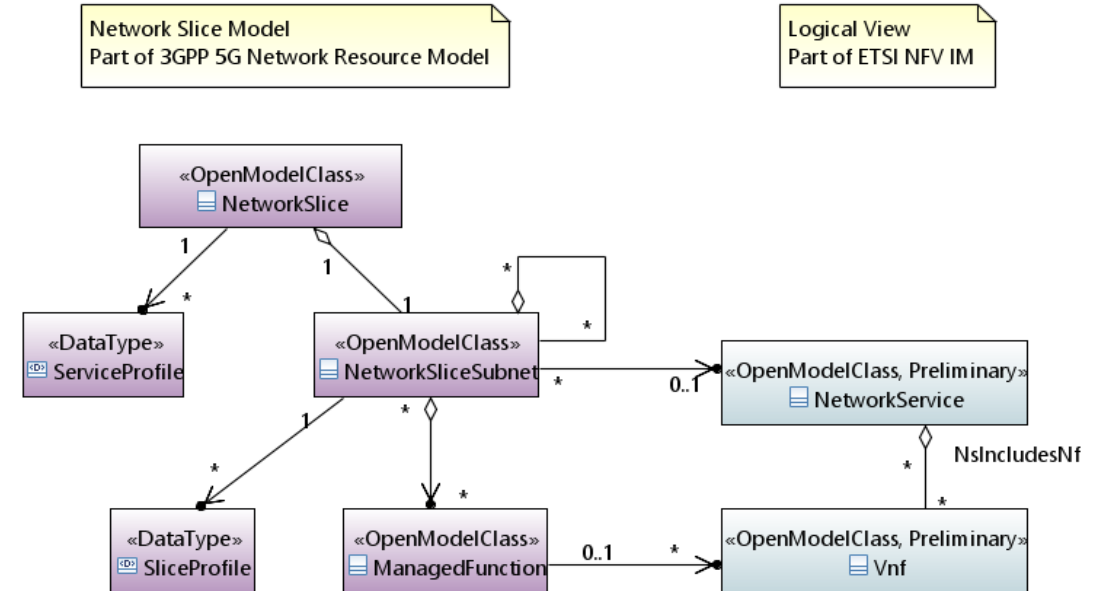
Other information:
- Mgmt. of Network Services already supports most requirements for the use network slice management functions (e.g. multi-tenancy, nested NSs).
- Main new requirement: Priority attribute for Network Service instances to be used to resolve conflicts during resource allocation

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.
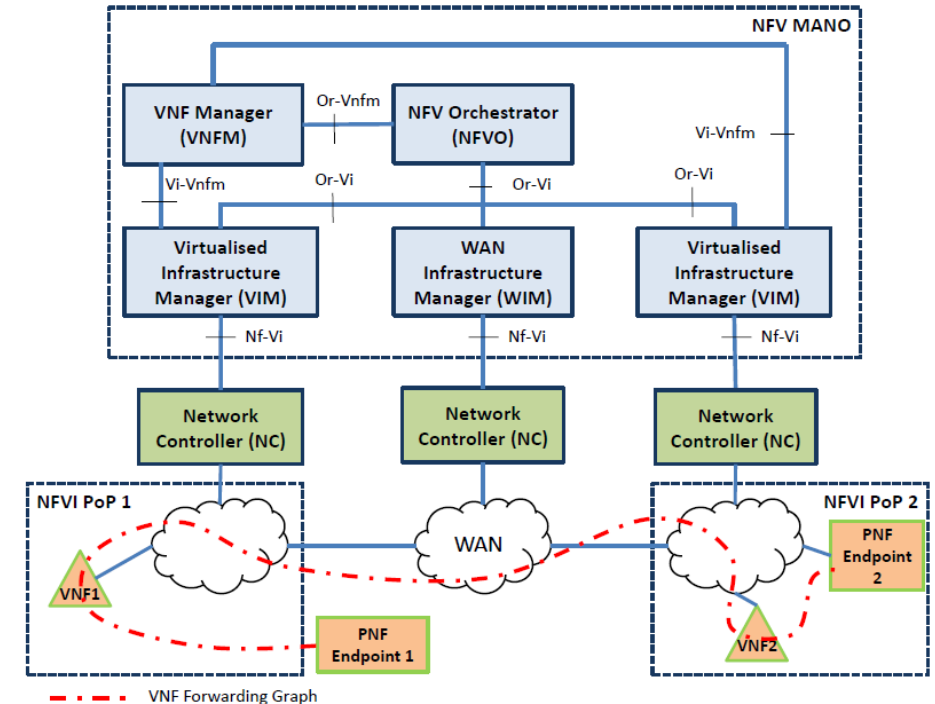
Other information:

▽ 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)

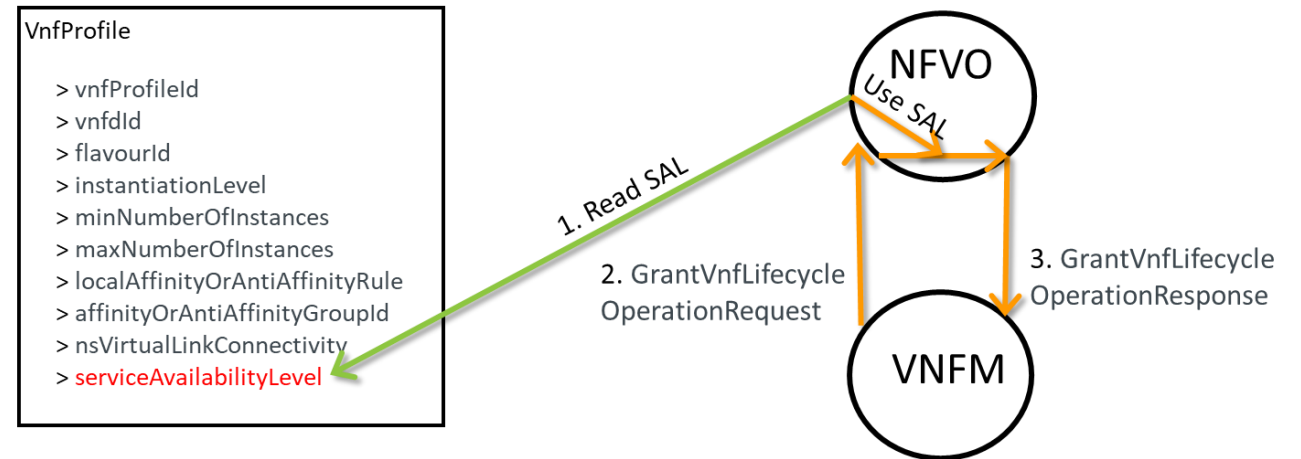**Objective:** Enable the NFV system to select the optimal resources to achieve a given level of availability.

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

VnfProfile

> vnfProfileId
> vnfdId
> flavourId
> instantiationLevel
> minNumberOfInstances
> maxNumberOfInstances
> localAffinityOrAntiAffinityRule
> affinityOrAntiAffinityGroupId
> nsVirtualLinkConnectivity
> serviceAvailabilityLevel

NFVO
Use SAL

1. Read SAL

2. GrantVnfLifecycle
OperationRequest

3. GrantVnfLifecycle
OperationResponse

VNFM

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

ETSI

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.

VNF

NFVO O&M constraints:
Max size of impact: 2
Notification lead time: 30
...

Lead timer: 30

constraints

warning

Upgrade selected resources with impact ≤ max size of impact

Max size of impact: 2

NFVI Upgrade

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.