



The Standards People

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



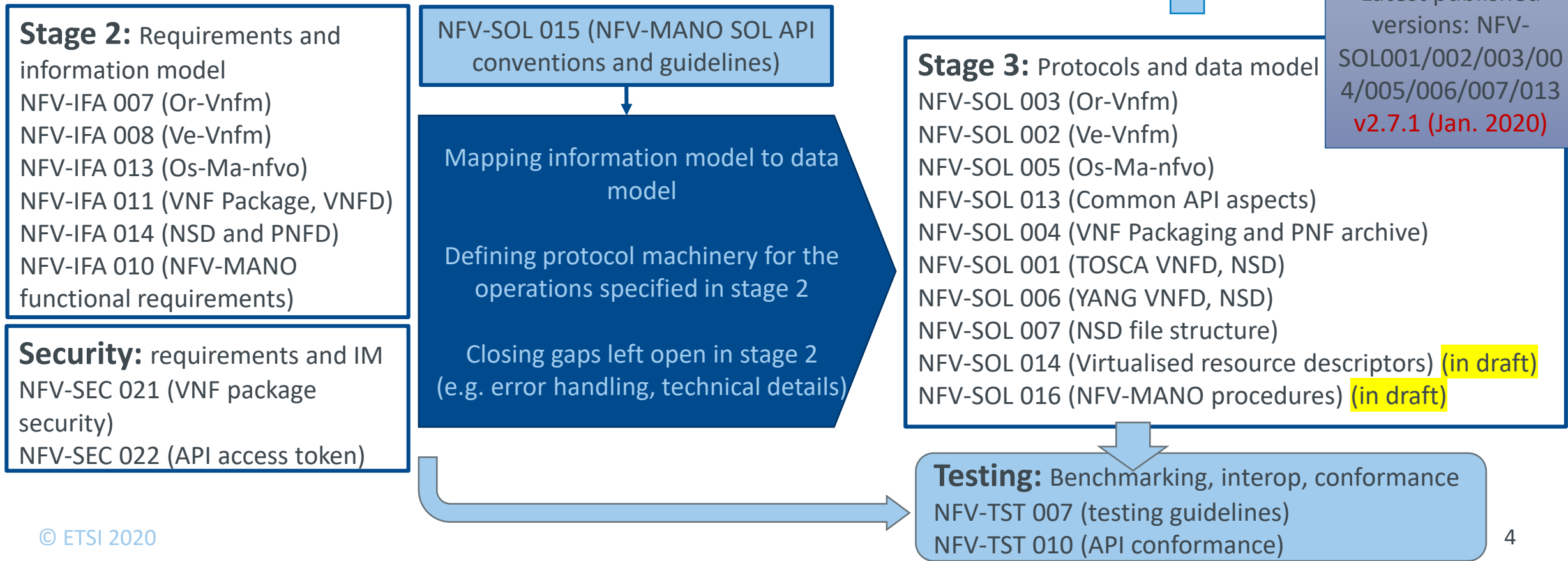


Part 1: NFV Release 2

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=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.

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 `affinityRule`, `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

SOL002 ed271 (1/2)

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

VNF LCM API

- Clarification that VNFM shall request the VIM to release the allocated resources in case of rollback of “InstantiateVnf”
- Mandatory to return a 422 error when the testing of the notification endpoint has failed during subscription process
- Clarify by which operations vnfConfigurableProperties can be modified
- Expose the allowed maximum scale level per scaling aspect in the VnfInstance structure
- Allow to pass vnfConfigurableProperties in the InstantiateVnfRequest
- Clarify that external virtual links that are unchanged do not need to be passed in the ChangeVnfFlavourRequest and ChangeextVnfConnectivityRequest
- Indicate that error information may be provided in VnfLcmOperationOccurrenceNotification and VnfLcmOpOcc also in case of “ROLLED_BACK” state
- Deprecate the direct “UnresolvableFail” transition from "PROCESSING" into "FAILED" in the state model of an LCM operation occurrence
- Add "vnfcResourceInfo" attribute to VnfInfo to clarify “id” of Type “VnfcResourceInfo”.
- Add "vnfcInfoModifications" and "vnfcInfoModificationsDeleteIds" to VnfInfoModificationRequest.
- Fixed bugs of type of extCpInfo in VnfInstance to VnfExtCpInfo

SOL002 ed271 (2/2)

VNF Performance management API

- Remove the “Subscriptions” and “Individual subscription” resources. The management of callback information is now included in the management of thresholds and PM jobs, and is allowed to be updated with PATCH.
- The way performance measurements are referenced has been updated to V 2.7.1 of the measurement specification (IFA027). As opposed to previous versions, a general model of structured measurements is now used that allows to use measured objects, or measured objects and related sub-objects
- The two changes above constitute major, non-backwards-compatible changes which have led to updating the API version (semver) to V 2.0.0

VNF Fault management API

- Mandatory to return a 422 error when the testing of the notification endpoint has failed during subscription process
- Added an “alarmAcknowledgedTime” attribute to the “Alarm” data structure
- Allowed to omit the “rootCauseFaultyResource” attribute in case the alarm does not affect virtualized resources
- It is allowed now to reset an Alarm in “ACKNOWLEDGED” state to “UNACKNOWLEDGED” state

VNF Indicator API

- Mandatory to return a 422 error when the testing of the notification endpoint has failed during subscription process
- Clarify optional VNF indicator provided by VNF depends on VNF capability

SOL003 ed271 (1/3)

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

VNF LCM API

- Clarification that VNFM shall request the VIM to release the allocated resources in case of rollback of “InstantiateVnf”
- Mandatory to return a 422 error when the testing of the notification endpoint has failed during subscription process
- Clarify by which operations vnfConfigurableProperties can be modified
- Expose the allowed maximum scale level per scaling aspect in the VnfInstance structure
- Allow to pass vnfConfigurableProperties in the InstantiateVnfRequest
- Clarify that external virtual links that are unchanged do not need to be passed in the ChangeVnfFlavourRequest and ChangeextVnfConnectivityRequest
- Indicate that error information may be provided in VnfLcmOperationOccurrenceNotification and VnfLcmOpOcc also in case of “ROLLED_BACK” state
- Add a “zoneId” attribute to VnfcResourceInfo, VnfVirtualLinkResourceInfo and VirtualStorageResourceInfo to improve correlation of VnfInstance with information exchanged during granting
- Add “resourceDefinitionId” and “zoneId” attributes to AffectedVnfc, AffectedVirtualLink and AffectedVirtualStorage to improve correlation of VnfInstance with information exchanged during granting
- Deprecate the direct “UnresolvableFail” transition from "PROCESSING" into "FAILED" in the state model of an LCM operation

SOL003 ed271 (2/3)

VNF Performance management API

- Remove the “Subscriptions” and “Individual subscription” resources. The management of callback information is now included in the management of thresholds and PM jobs, and is allowed to be updated with PATCH.
- The way performance measurements are referenced has been updated to V 2.7.1 of the measurement specification (IFA027). As opposed to previous versions, a general model of structured measurements is now used that allows to use measured objects, or measured objects and related sub-objects
- The two changes above constitute major, non-backwards-compatible changes which have led to updating the API version (semver) to V 2.0.0

VNF Fault management API

- Mandatory to return a 422 error when the testing of the notification endpoint has failed during subscription process
- Added an “alarmAcknowledgedTime” attribute to the “Alarm” data structure
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- It is allowed now to reset an Alarm in “ACKNOWLEDGED” state to “UNACKNOWLEDGED” state

VNF Indicator API

- Mandatory to return a 422 error when the testing of the notification endpoint has failed during subscription process

SOL003 ed271 (3/3)

Granting API

- Clarify that external virtual links that are unchanged do not need to be passed in the granting response

VNF Pkgm API

- Added full support for security information per individual artifact
- Added full support for external artifacts
- Allow definition of repository to download external artifacts from
- Modified package state model
- Added a resource that allows access to the VNF package manifest
- Added support for bulk-fetching of artifacts
- Added an attribute “onboardingFailureDetails” that allows to expose onboarding failure details
- Mandatory to return a 422 error when the testing of the notification endpoint has failed during subscription process
- The changes above constitute major, non-backwards-compatible changes which have led to updating the API version (semver) to V 2.0.0

SOL005 ed271 (1/6)

NSD Management interface

- In case of the Range header is present in the request and the NFVO does not support responding to range requests with a 206 response, it shall return a 200 OK response instead
- The new value "ERROR" has been added to "PnfdOnboardingStateType" enumeration type. Updated the flow of the uploading of PNFD content
- The new value "ERROR" has been added to "NsdOnboardingStateType" enumeration type. Updated the flow of the uploading of NSD content
- Introduction of changes in the resource structure, new operations and changes in the existing operations of the NSD Management and PNFD Archive Management interfaces to support correctly the PNF Archive file and align the NSD file management, PNFD archive management and VNF Package management
- PATCH method – the Content-Type header has been set to "application/merge-patch+json" according to IETF RFC 7396

SOL005 ed271 (2/6)

NS Lifecycle Management interface

- The “vnfConfigurableProperties” attribute has been added in “ParamsForVnf” and “InstantiateVnfData” data types
- Alignment of LCM flows with SOL003
- Addition of “locationConstraints” attribute in “InstantiateVnfData” data type and “additionalParam” attribute in “OperateVnfData” data type
- Addition of the “id” attribute in some Notifications datatypes (NsIdentifierCreationNotification, NsInstanceDeletionNotification, NsChangeNotification)
- Added 4 new attributes into “ParamsForVnf” data type
- Exposure of max scale levels through the addition of the “maxScaleLevels” attribute in the “instantiateVnfInfo” structure attribute of “VnfInstance” data type

SOL005 ed271 (3/6)

NS Performance Management interface

- Added “objectType” and “subObjectInstanceIds” attributes in several data types to align with IFA027
- Remove the “Subscriptions” and “Individual subscription” resources. The management of callback information is now included in the management of thresholds and PM jobs, and is allowed to be updated with PATCH.
- The way performance measurements are referenced has been updated to V 2.7.1 of the measurement specification (IFA027). As opposed to previous versions, a general model of structured measurements is now used that allows to use measured objects, or measured objects and related sub-objects
- The two changes above constitute major, non-backwards-compatible changes which have led to updating the API version to V 2.0.0
- PATCH method – the Content-Type header has been set to "application/merge-patch+json" according to IETF RFC 7396

SOL005 ed271 (4/6)

NS Fault Management interface

- New “alarmAcknowledgedTime” attribute in “Alarm” data type
- Mandatory to return a 422 error when the testing of the notification endpoint has failed during subscription process
- Added an “alarmAcknowledgedTime” attribute to the “Alarm” data structure
- Allowed to omit the “rootCauseFaultyResource” attribute in case the alarm does not affect virtualized resources
- It is allowed now to reset an Alarm in “ACKNOWLEDGED” state to “UNACKNOWLEDGED” state
- PATCH method – the Content-Type header has been set to "application/merge-patch+json" according to IETF RFC 7396
- PATCH Method – the cardinality of ProblemDetails attribute has been changed from “0..1” to “1”

SOL005 ed271 (5/6)

VNF Package Management interface

- New “artifactUri” attribute in VnfPackageArtifactInfo data type
- Addition of the “vnfmInfo” attribute to “VnfPkgInfo” to expose useful metadata from the VNFD. Also add “vnfmInfo” from VNFD as an optional attribute to the VNF package onboarding notification and package management notifications filter
- Introduction of the “artifactClassification” enumerated attribute in “VnfPackageArtifactInfo” data type that allows classifying artifacts
- Addition of OAuth-type credentials for fetching external VNF packages in “UploadVnfPackageFromUriRequest” data type
- Added API constructs to access the security information (resources “VNFD in an individual VNF package”, “Manifest in an individual VNF package”, “VNF package content”, “VNF package artifacts” and “Individual VNF package artifact”) – GET method
- In case of the Range header is present in the request and the NFVO does not support responding to range requests with a 206 response, it shall return a 200 OK response instead
- Added normative statements of the steps to be taken after VNF package upload (PUT method)
- The new value “ERROR” has been added to “PackageOnboardingStateType” enumeration type. New “onboardingFailureDetails” attribute has been added to “VnfPkgInfo” data type. The “ERROR” state has been added in VNF package state model.
- Addition of the resource “Access configuration for external artifact download” (/ext_artifacts_access in the resource tree), flow and methods to provide and read access configuration information for the download of external artifacts

SOL005 ed271 (6/6)

VNF Package Management interface (cont.)

- Added the resource “VNF package artifacts” (“/artifacts” in the resource tree), flow and GET method for bulk-fetch artifacts that are not images
- Added the “manifest of an individual VNF package” resource (“/manifest” in the resource tree), flow and GET method for reading the manifest of an on-boarded VNF package (for fetching the VNF package manifest)
- New “nonManoArtifactSetId” attribute in “VnfPackageArtifactInfo” data type
- PATCH method – the Content-Type header has been set to "application/merge-patch+json" according to IETF RFC 7396

All APIs:

- In the POST method of the resource “Subscriptions” has been added the “ProblemDetails” attribute with response code “422 Unprocessable Entity”
- Aligning API version indication with SOL015 - {apiRoot}/apiName/v1 to {apiRoot}/apiName/{apiMajorVersion}

Release 2 ed281: stage 3: work plan



Reference	TB App
<i>Propagated GSs</i>	
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:

- ✔ 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)

Release 3 ed331: stage 3: work plan



Reference	TB App
<i>Propagated GSs</i>	
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
<i>New GSs</i>	
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
<i>New GRs</i>	
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