NFV MANO: Release 3 Features

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Building on input from all the ETSI NFV Working Groups.
NFV MANO Release 3
1. Key drivers
2. Operational features
3. Technology evolution features
4. Delivery timeline
5. Conclusion
Key drivers for ETSI NFV Release 3 work

Operation aspects
- In commercial deployments operational aspects are critical!
- **Objective:** address multi-vendor interoperability in the operational aspects of NFV.

Evolution of networking and cloud technology
- Rapid pace of evolution in this space
- **Objective:** understand the changes and use this knowledge to enhance NFV.
Operational Release 3 Features

- Reservation of resources
- MANO Policy Management
- Recording runtime VNF snapshots
- Managing the NFV management layer
- Management and Connectivity for Multi-site Services
- License management
- NFV across multiple administrative domains
- Maintaining Service Availability and Continuity Upon Software Modification

Not a comprehensive list
Reservation of resources: Compute Host Reservation

Objective: Enable reservation of physical hosts in the NFVI

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 Promise: wiki.opnfv.org/display/promise/

Requirements:
- Guarantee allocation of virtualised resources on certain isolated hosts (or under certain security enclaves)
- Only for authorized consumers of NFVI administration

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

Performance is critical! We need a dedicated host!

Our security process requires a host with “Trusted Platform Module”!

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

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

Described use cases specific to policy management over each reference point.

A pair of PAP and PF (in different colours) can be mapped to the peer functional blocks for each reference point.

A new policy management interface is added for each reference point, including operations of policy transfer, deletion, query, activation and deactivation.

**Published report**

ETSI GR NFV-IFA 023

**Legend:**
- PAP - Policy Administration Point
- PF - Policy Function
Recording runtime VNF snapshots

**Objective:** Solution to manage, store and transfer a Snapshot of a VNF

**Use cases:**
- Testing
- Troubleshooting
- Lifecycle management
  - During VNF lifecycle procedure
  - Quick VNF recovery

**Enabled by:**
- Extending VNF and NS lifecycle management interfaces
- New VNF Snapshot Package Management interface

**Published report**
ETSII GR NFV-TST 005
Managing the NFV management layer: Management of NFV-MANO (1)

Problem statement:

- **NFV-MANO functions** can be implemented and delivered by different providers.

- These functions are then deployed and integrated/interworked with the rest of the network operator’s support systems.

- These functions need to be configured for interworking, and monitored against fault and performance issues.

Diagram:

- NFVO (NFV Orchestration and Orchestration)
- VNF Manager(s)
- VIM (Virtual Infrastructure Manager(s))

Questions:

- 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?
- It seems this VNFM is overloaded. I should try to redistribute load to a new VNFM, but which one?
- The NFVO has crashed! What happened! Where are the logs!
- What is happening to that VIM? It is not responsive.

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Managing the NFV management layer: Management of NFV-MANO (2)

Objective: Create a framework for flexible NFV-MANO management.

Specification approach:
- Specify set of requirements, interfaces and information model to ease the interoperability of multi-vendor NFV-MANO, and its integration/interworking with network operators support systems from an “operations and maintenance perspective”.

Published report
ETSI GR NFV-IFA 021

Under development
ETSI GS NFV-IFA 031
Management and Connectivity for Multi-site Services

Objective: Management and provision of connectivity for multi-site NFV services (i.e. over WANs, access networks).

Use cases

• multi-site services in terms of VNFFGs, VNFs, VLinks, CPs, etc.,
• multi-network connectivity at the infrastructure layer, and
• mappings from the infrastructure connectivity to support multi-site services and their associated functional entities.

Published report ETSI GR NFV-IFA 022

Under development ETSI GS NFV-IFA 032
License management

In any software business licensing matters!

Critical for both Service Providers & VNF Vendors

Objectives:

Service Provider: Flexibility and Optimal Utilization of VNF through Licenses.
VNF Vendors: Appropriate Usage and Payment by Service Provider

Published report
ETSI GR NFV-EVE 010
**Objective:** Enable different business models where the NFV infrastructure or Network Services are provided by another administrative domain.

NS provisioning and lifecycle management require coordination between two NFVOs in different administrative domains.

Enable a **new reference point** with the functionality mainly referencing to the existing IFA013 operations.

Network Services provided using multiple administrative domains

Published report

**ETSI GR NFV-IFA 028**

Under development

**ETSI GS NFV-IFA 030**
Maintaining Service Availability and Continuity Upon Software Modification

**Objective:**
- Software Modification, such that service availability and continuity are maintained.
  - All types of software related to NFV (e.g., VNFs, MANO and NFVI).

**Types of Software Modification:**
- Update - bug fixes
- Upgrade - modifying functionality, interfaces or protocols.

**Normative Requirements:**
- VNFs – initiating modification process, metadata of VNF software modification, VNFC modification issues, and simultaneous operation of old and new versions.
- MANO Functional Blocks – focus on redundancy and maintenance of state information.
- NFVI Elements – focus on avoiding negative impacts on supported VNFs during modification process.

Published Requirements Specification  
[ETSI GS NFV-REL 006](#)
Technology evolution Rel 3 Features

- Network Slicing
- “Cloud native” VNF classification and enhancement toward “Cloud-native” and “PaaS”
- Edge computing (MECinNFV)
Network Slicing

- Most features required to enable network slicing are already incorporated in the NFV Architectural Framework.
- Network slices can be created using NFV network services by a simple mapping, see diagram.
- Support for network slicing is unlikely to bring fundamentally new requirements to an NFV system.
- Slice management can be regarded as an add-on functionality at the OSS level.
- A few areas deserve further attention:
  - Multi-site / Multi-Admin orchestration
  - Scalability of NFV management and orchestration functions
  - Resource isolation and security
  - Priority handling for resource allocation

Published report
ETSI GR NFV-EVE 012
“Cloud native” VNFs and enhancement toward “Cloud-native" and “PaaS”

**Objective:** Support “Cloud Native” VNF implementations

- Decomposed VNF Software Architectures for higher reliability
- Container-based implementations
- Mechanisms for interacting VNF components (dependencies, APIs, self-management)

- Study impact on the NFV architecture of providing “PaaS"- type capabilities following “cloud-native" design principles for VNFs.
  - Common features provided by the platform
  - Enable B2B services with converged ICT
Edge computing (MECinNFV)

ETSI MEC published a report ETSI GR MEC017 “Deployment of Mobile Edge Computing in an NFV environment”

Design decisions made by ETSI MEC
- Mobile edge applications appear as VNFs to the NFV environment
- The mobile edge platform runs as a VNF and is managed as such
- The mobile edge host dissolves in the cloud
- NFV MANO components are re-used as far as possible
- Parts of Mobile Edge Orchestration are delegated to the NFVO
- Parts of Mobile Edge Application LCM are delegated to a VNFM

ETSI NFV and ETSI MEC have agreed a framework for future collaboration
Features targeted for Release 3: 1st feature set

- Reservation of resources
- MANO Policy Management
- Recording runtime VNF snapshots
- Managing the NFV management layer

Target publication date: Aug 2018
In the 2018-2019 timeframe, the objective is to deliver 4+ new features every 6 months, with each publication of the core IFA specifications. Development of the corresponding SOL API specifications will then follow.

**Release 3 - Delivery timeline**

- **IFA Architecture and Information Model specifications**
  - Rel 3 (1st feature set): Aug 2018
  - Rel 3 (2nd feature set): Feb 2019

- **SOL API and Data Model specification development**

- **NFV Release 3 publication plan**
Conclusion

- ETSI NFV has a pipeline of Release 3 features for operational aspects of NFV deployment and the evolution of networking and cloud technology.

- Analysis reports for most of these features have been published.

- The during 2018-2019 the target is to publish normative interface and architecture (IFA) specifications every 6 months with 4+ new Release 3 features.
More information

- NFV Technology Page (information) [http://www.etsi.org/nfv](http://www.etsi.org/nfv)
- NFV Portal (working area) [http://portal.etsi.org/nfv](http://portal.etsi.org/nfv)
- NFV Proofs of Concept (information) [http://www.etsi.org/nfv-poc](http://www.etsi.org/nfv-poc)
- NFV Plugtest (information & registration) [http://www.etsi.org/nfvplugtest](http://www.etsi.org/nfvplugtest)

Open Area:

- Published Docs: [https://docbox.etsi.org/ISG/NFV/Open/Publications_pdf](https://docbox.etsi.org/ISG/NFV/Open/Publications_pdf)