NFV MANO: Release 3 Features

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Building on input from all the ETSI NFV Working Groups.

Agenda

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

- Operational 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)
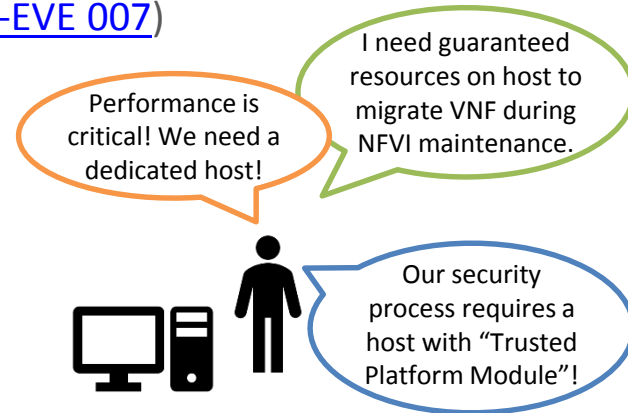 - Security regulations (see ETSI GS NFV-SEC 012)

  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).

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

Performance is critical! We need a dedicated host!

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

BLAZAR
an OpenStack Community Project

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.
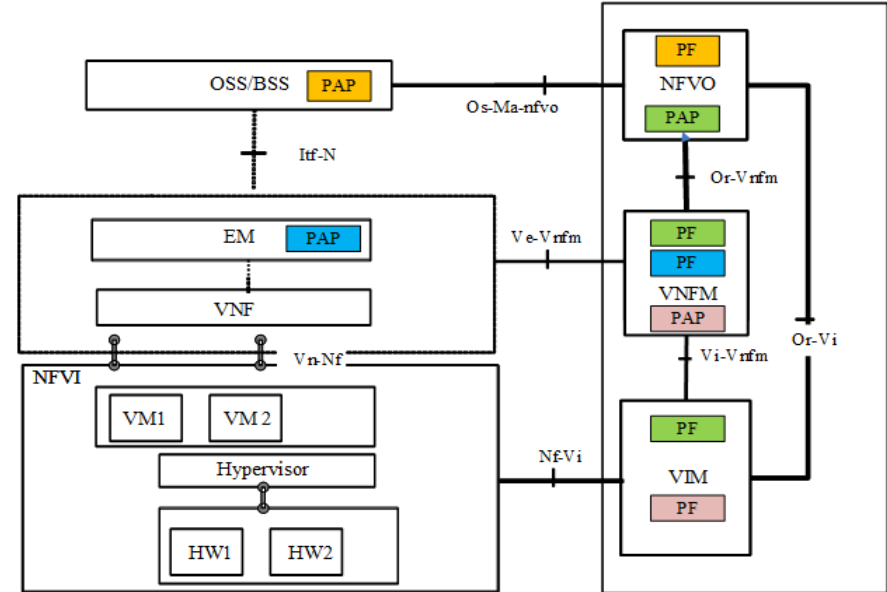
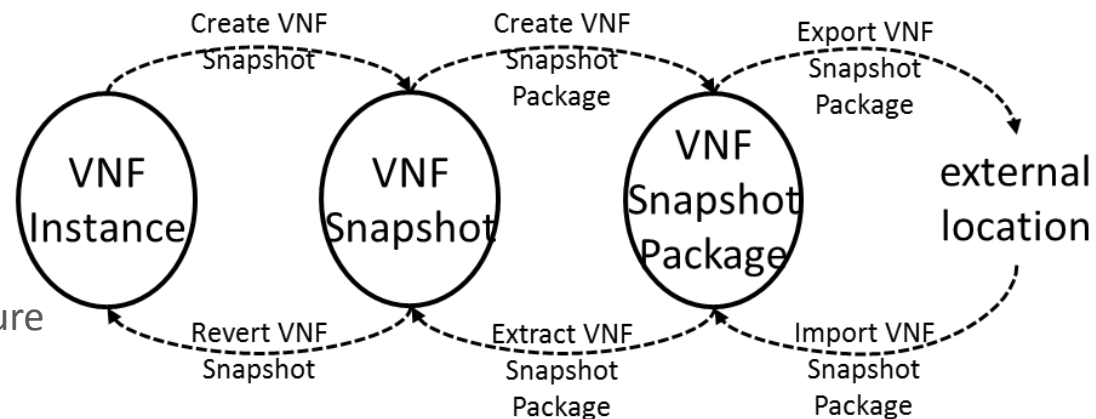**PAP** - Policy Administration Point
PF - Policy Function

Published report
ETSI GR NFV-IFA 023

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
[ETSI 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**.

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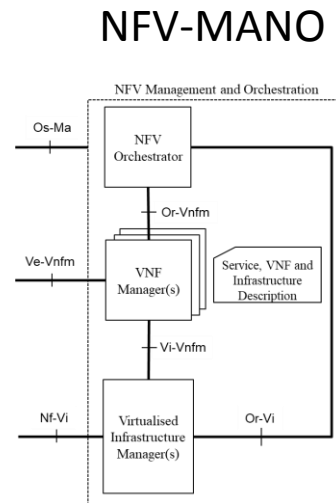
How do I connect the NFVO with the VNFM? What is the configuration input to the NFVO?

What interfaces can be consumed from my VIM?

It seems this VNFM is overloaded. I should try to redistribute load to a new a VNFM, but which one?

The NFVO has crashed! What happened! Where are the logs!

What is happening to that VIM? It is not responsive.

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".

Fault management

Configuration management

Performance management

Log management

State management

Published report	Under development
ETSI GR NFV-IFA 021	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.
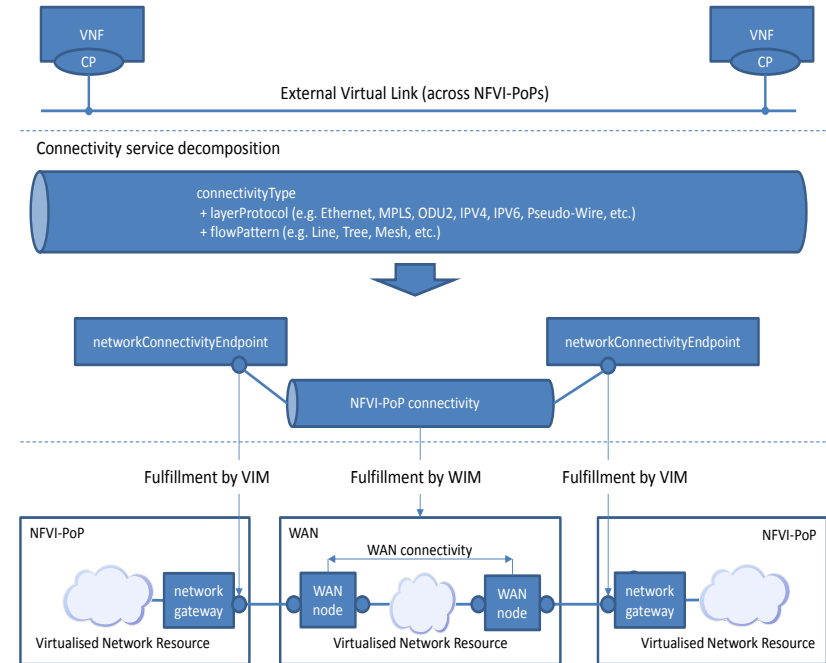
Published report [ETSI GR NFV-IFA 022](#)

Under development [ETSI GS NFV-IFA 032](#)

License management

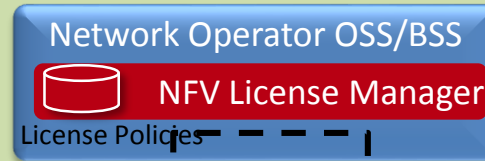
In any software business licensing matters!

License Security Management
- License Onboarding
- Management of Licenses
- Operations with Licenses

Critical for both Service Providers & VNF Vendors

Automation, Security, Trust and Optimal utilization during operations.

Network Operator OSS/BSS
NFV License Manager
License Policies

Onboarding of License meeting the on-demand requirements

VNF Vendor A
VNF Vendor B
VNF Vendor C

Interaction with NFV MANO, enabling trusted, secure, authenticated and optimal utilization of VNFs Licenses.

NFVO
VNFM
VNF A VNF B VNF C
VIM
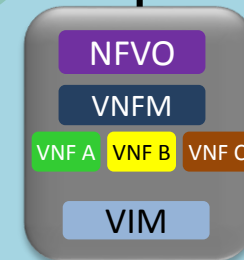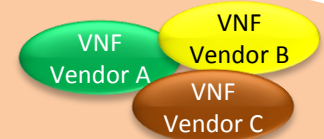
Optimal utilization, Enforcement, Event collection and more.

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

NFV across multiple administrative domains

ETSI World Class Standards

- **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 Or-Or** with the functionality mainly referencing to the existing IFA013 operations.
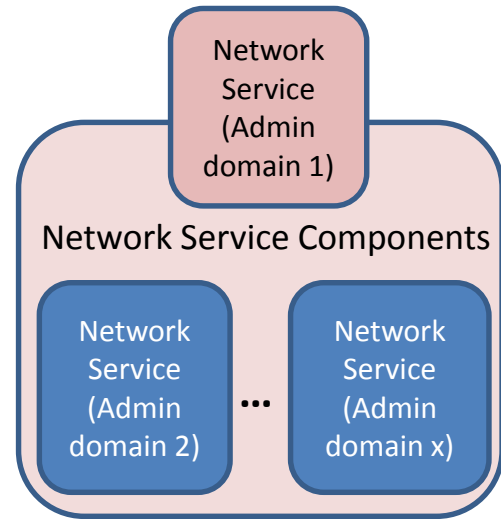
Network Services provided using multiple administrative domains
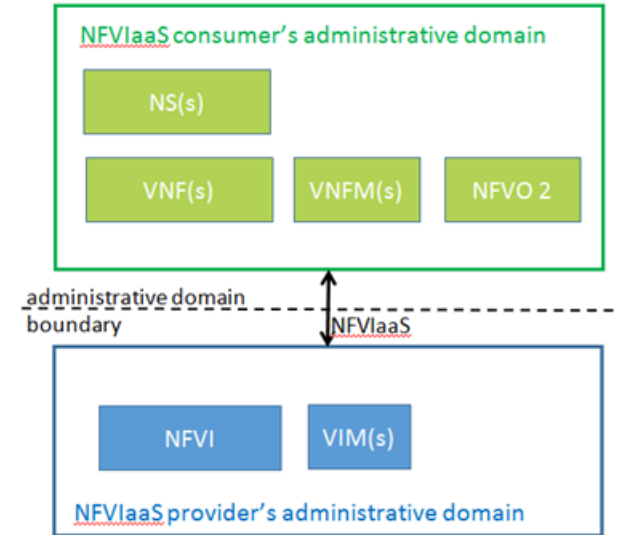
NFV IaaS

Published report	Under development
ETSI GR NFV-IFA 028	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
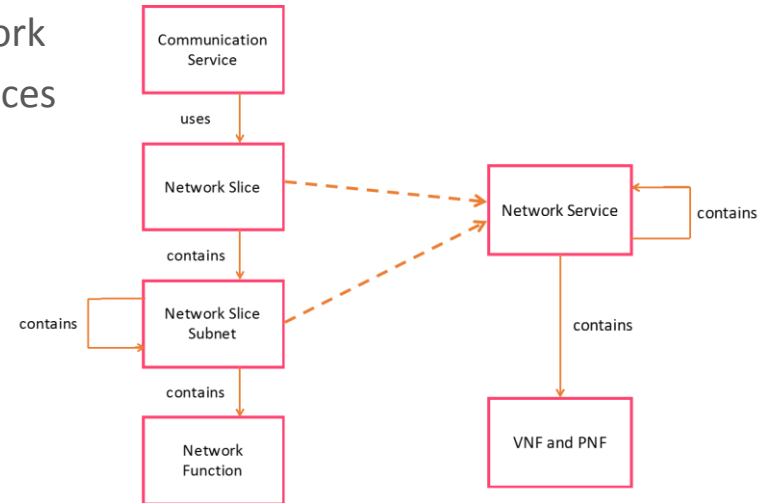
Published report
ETSI GR NFV-EVE 012

# "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

Deploy 3rd Party ICT Applications

Use 5G Functions by APIs

EPC   HSS
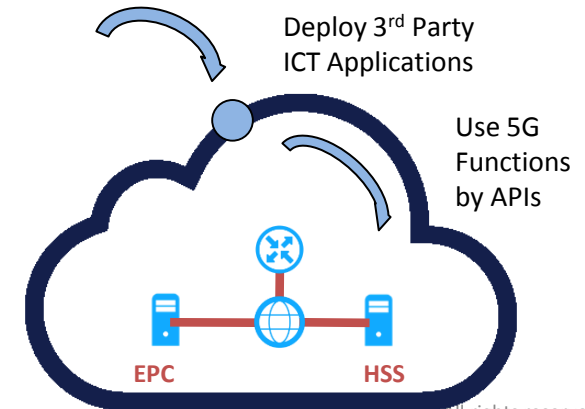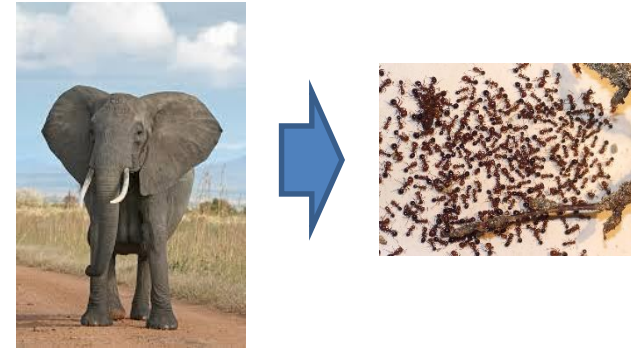
Edge computing (MECinNFV)

- 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

MEC

+

NFV
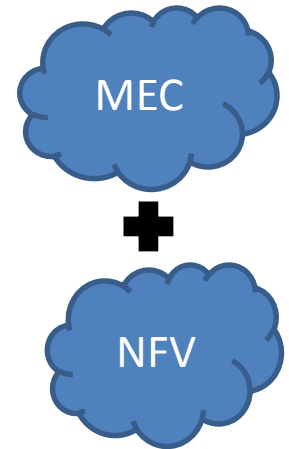
ETSI MEC
Published report
ETSI GR MEC 017

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

Release 3 - Delivery timeline

- In 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.

IFA Architecture and Information Model specifications

Rel 3 (1st feature set)

Rel 3 (2nd feature set)

Aug 2018

Feb 2019

NFV Release 3 publication plan

SOL API and Data Model specification development

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**
- 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:
  - Published Docs: https://docbox.etsi.org/ISG/NFV/Open/Publications_pdf
  - Working Drafts http://docbox.etsi.org/ISG/NFV/Open/Drafts/
  - Issue tracker http://nfvwiki.etsi.org/index.php?title=NFV_Issue_Tracker
  - Detailed Release 3 specification progress can be found at: https://nfvwiki.etsi.org/index.php?title=Feature_Tracking