OSM 3rd Hackfest – Introduction to NFV and OSM

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Agenda

• Quick review of NFV
• Introduction to OSM Release 4
• Contributing to the Community
Quick review of NFV
What is NFV trying to address?

- Network Function Virtualization (NFV) proposes to virtualize network functions that typically run in dedicated appliances.
- The main goal is to support virtualized functions over COTS servers.
- Virtual Network Functions (VNFs) acquire all the advantages of Cloud Applications!
How was this originated?

- A white paper was written in 2012 by the world's leading telecom network operators.
- This group evolved to the ETSI NFV ISG (Industry Specification Group), formed today by 300+ companies.
- Their main motivation had to do with the increasing TCO of building a network with proprietary hardware appliances.
• Based on member’s feedback, field experiences and proof of concepts, standard documents have evolved.

• 60+ publications exist today, including the following three main documents:

  • NFV Architectural Framework
    http://www.etsi.org/deliver/etsi_gs/NFV/001_099/002/01.02.01_60/gs_NFV002v010201p.pdf

  • NFV Infrastructure Overview
    http://www.etsi.org/deliver/etsi_gs/NFV-INF/001_099/01.01.01_60/gs_NFV-INF001v010101p.pdf

  • NFV Management and Orchestration
    http://www.etsi.org/deliver/etsi_gs/NFV/001_099/002/01.02.01_60/gs_NFV002v010201p.pdf
Benefits of a standard NFV architecture

- We are looking for a **unified and generic virtualization infrastructure**, compatible with any vendor’s Virtual Networking Function (VNF), **so standardization is a must**.
The ETSI NFV Architecture

- The standard architecture can be better understood in three blocks:

  - **MANO** (Management & Orchestration) focuses on VNF/NS lifecycle.
  - **NFVI** (NFV Infrastructure) officially part of MANO, but usually bundled with NFVI (focus on VM lifecycle).
  - **VNFs** (Virtual Network Functions) focus on VM lifecycle.
NFVI: NFV Infrastructure

• NFVI goal is to provide a virtualization environment for VNFs, including virtual compute, storage and networking resources.

• But! networking applications may have more strict performance requirements, we will discuss that later.
VNF Special Requirements

VNFs, especially data-plane ones, usually have additional requirements than common cloud applications, including:

- Minor latency (disk I/O & network) → faster disks, QoS, higher BW
- Geographical distribution → multi-site cloud
- Horizontal auto-scaling → automated operations
- Higher throughput or PPS → EPA: Enhanced Platform Awareness

OpenStack Austin 2016: Telco Cloud Requirements: What VNF’s Are Asking For
VNF Special Requirements

EPA covers the different approaches that can be taken at the NFVI layer to increase performance while maintaining a generic (COTS) infrastructure. VIM and MANO should be able to request them.
MANO: Virtualized Infrastructure Manager (VIM)

• The Virtualized Infrastructure Manager is part of the ‘MANO Stack’ and addresses provides lifecycle management for virtualized resources (VMs, volumes, networking paths and connectivity, etc.)

Examples: OpenStack distributions, VMWare products, Public Cloud managers, etc.
MANO: VNF Manager (VNF-M)

• The VNF Manager, also part of the ‘MANO Stack’, covers lifecycle management for Virtual Network Functions (VNFs), either directly or through their own Element Management System (EMS).

• VNF Managers can be generic (current trend), or vendor-specific ones.
The NFV Orchestrator, the higher entity in the ‘MANO Stack’, covers general resource orchestration and services lifecycle, which comprise multiple VNFs and define their roles (traffic paths, scaling decisions, and other service-related requirements).

It can interact with a generic VNF Manager, or vendor-specific ones.
Virtual Network Functions (VNF)

- Finally, the VNFs, which are supported by the underlying NFVI, and managed by their own EM (internal manager) and the VNF Manager (external, ‘context-aware’ manager)
- They should be able to provide any networking function and interact with other VNFs.
VNF Descriptor files (VNFD)

One of the most important aspects of achieving a unified VNF catalogue, is having a standard way of describing VNFs.

- MANO solutions should give the possibility to describe VNFs through ‘descriptor files’
- The industry’s goal is a unified and standard descriptor file format across different platforms.
- Both NS (comprised of VNFs) and VNFs should be described in a simple way.

```yaml
vnfd:vnfd-catalog:
  vnfd:vnfd:
    - vnfd:connection-point:
      - vnfd:name: eth0
      vnfd:type: VPORT
      vnfd:description: Generated by OSM pacakage generator
      vnfd:id: ubuntuvnf_vnfd
      vnfd:mgmt-interface:
        vnfd:cp: eth0
      vnfd:name: ubuntuvnf_vnfd
      vnfd:service-function-chain: UNAWARE
      vnfd:short-name: ubuntuvnf_vnfd
      vnfd:vdu:
        vnfd:cloud-init-file: cloud_init
        vnfd:count: '1'
        vnfd:description: ubuntuvnf_vnfd-VM
        vnfd:guest-epa:
          vnfd:cpu-pinning-policy: ANY
        vnfd:id: ubuntuvnf_vnfd-VM
        vnfd:image: ubuntu_admin
        vnfd:interface:
          vnfd:external-connection-point-ref: eth0
```
The NFV MANO Landscape

• Given that the VIM is already well covered by OpenStack distributions and proprietary solutions, in practice, the “NFV MANO” part focuses on the VNF Manager and NFV Orchestrator.

• Among the most popular open source platforms for NFV MANO, we have:
Introduction to OSM Release Four
The Open Source MANO Project

We are here!
Open Source MANO is an ETSI-hosted project to develop an Open Source NFV Management and Orchestration (MANO) software stack aligned with ETSI NFV.
OSM Architectural Principles

Layering

Abstraction

Modularity

Simplicity

Architectural Principles
Release 3 simplified architecture

UI: User interface
SO: Service Orchestrator
VCA: VNF Configuration & Abstraction
RO: Resource Orchestrator

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Release 4 architecture & additions

1. → unified message bus for async communications
2. → Integrated components for policy, fault and performance management (auto-scaling, monitoring, etc)
3. → Lighter version of the orchestrator: LifeCycle Management (LCM) component as an alternative to SO
4. → Unified Northbound Interface
5. → Complete control through CLI and stand-alone new UI

Common Services
- OSM IM
- Object Storage
- Logs
- Auth

New OSM’s NBI

osmclient light-ui

NBI

Kafka bus

→ common DB, storage, authentication and logging systems

VCA

RO

PM

MON

LCM

N2VC

→ integrated components for policy, fault and performance management (auto-scaling, monitoring, etc)
Why is OSM Awesome?

It has a rich and open information model

- Agnostic to VIM, SDN platform, VNF and OSS connectors/details.
- It allows for a uniform NFV orchestration, abstracted from the environment.
- Aligned with ETSI-NFV Information Model.

Visit: https://osm.etsi.org/wikipub/index.php/OSM_Information_Model
Why is OSM Awesome?

It has a large and diverse community!
More than 90 members and growing

- 11 Global Service Providers
- Leading IT/Cloud players
- VNF providers
Why is OSM Awesome?

It is well organized for producing production-ready upstream code
Why is OSM Awesome?

It prioritizes features for production readiness

**APRIL 2017**
- Multi-VIM
  - OpenStack, AWS, VMWare
- Multi-SDN
  - ODL, ONOS, Floodlight
- One-click installer
- Network Service Scaling
- Multi-Site, and more!

**DECEMBER 2017**
- Multi-tenancy & RBAC
- Monitoring Module
- Enhanced VIM support & emulation
- NB API Consolidation
- Affinity/Anti-Affinity Rules
- CI/CD Workflow
- Information Model Consolidation

**MAY 2018**
- Model-driven NBI
- Monitoring Improvements
- Cloud-native deployment
- Improved modeling
- Service Chaining
- Native Charms
- Enhanced usability

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Why is OSM Awesome?

...and will keep expanding its features towards production deployments:

- Improved interface towards VNFs
- Further evolution of Performance and Fault Management capabilities
- Management of VNFs of new generation
  - Docker containers + Kubernetes management
  - Hybrid NFs (Virtual + Physical)
- Support of future 5G deployments
  - Network Slicing likely to require NS Nesting, Management of shared resources
Open Source MANO

Contributing to the Community
Joining the OSM Community

• Join [here](#) as a company or individual contributor!

**HOW TO GET INVOLVED IN OSM**

There are two paths to get involved in OSM as an organisation: as an ETSI Member, or as an OSM Participant.

Check first if your organization is already involved by consulting the list of OSM Members and Participants.

**Get involved as an ETSI Member**

To take part in the development of OSM and participate to the meetings, ETSI Members need to sign the OSM Membership Agreement and CCLA. In doing this, they agree to the OSM operating rules which in some cases are different from those in ETSI’s Technical Working Procedures. Check if your company is an ETSI Member.

**Get involved as an OSM Participant**

Organizations who are not members of ETSI may also participate in OSM, attend meetings and help to develop OSM by making technical contributions. They are not applicable for leadership (LG) positions and must pay a participation fee to attend OSM meetings. To get involved as a Participant, please sign the OSM Participant Agreement and the CCLA.

**Developers and Users**

Individual developers and end users are welcome to contribute code and feedback to OSM, they just need to create an individual contributor or user account.
OSM Community Activities

• Weekly Conference Calls
  • Technical, leadership, DevOps, and more!

• Face to Face Meetings
  • Plenaries and Mid-Release meetings (every 3 months)
  • Next location: Palo Alto (US)

• OSM Hackfest
  • Third edition taking place on June 2018 at Norway, expecting to keep co-locating with OSM Face-to-Face meetings.
Ways to contribute to OSM

- **Try OSM** and give feedback to the community.
- Join as a developer to **make contributions to the code**.
- Join the community to **contribute to design discussions**.
- **Start building your own distribution** of OSM as an integrator.
- **Host an OSM meeting** to contribute to the community’s growth and diversity.