OSM 7th Hackfest – Welcome

Spyros Denazis (University of Patras)
sdena@upatras.gr
## Hackfest program

<table>
<thead>
<tr>
<th>OSM-MR#7 &amp; Hackfest Patras</th>
<th>MONDAY 9 Sept</th>
<th>TUESDAY 10 Sept</th>
<th>WEDNESDAY 11 Sept</th>
<th>THURSDAY 12 Sept</th>
<th>FRIDAY 13 Sept</th>
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<tbody>
<tr>
<td>09:00..10:30 (1h30)</td>
<td>TECH</td>
<td>S2 Basic Descriptors</td>
<td>TECH</td>
<td>S6 Day 1/2 Config</td>
<td>TECH</td>
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<tr>
<td>10:30 ..11:00 (0h30)</td>
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<td></td>
<td>Q&amp;A &amp; Wrap-up</td>
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<tr>
<td>11:00..13:00 (2h00)</td>
<td>EUAG</td>
<td>S3 Multi VDU</td>
<td>TECH</td>
<td>S6 Day 1/2 Config</td>
<td>TECH</td>
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<td>13:00..14:00 (1h00)</td>
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<tr>
<td>14:00..16:00 (2h)</td>
<td>TSC</td>
<td>S0 Intro DEMO 0</td>
<td>TECH</td>
<td>OSM &amp; 5G Verticals</td>
<td>TECH</td>
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<tr>
<td>16:00..16:30 (0h30)</td>
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<tr>
<td>16:30..18:00 (1h30)</td>
<td>TSC &amp; MDL</td>
<td>DEMO 1 - DPB WIM</td>
<td>TECH</td>
<td>OSM &amp; 5G Verticals</td>
<td>TECH</td>
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</table>

**MONDAY 9 Sept**
- LG

**TUESDAY 10 Sept**
- TECH
  - S2 Basic Descriptors

**WEDNESDAY 11 Sept**
- TECH
  - S6 Day 1/2 Config

**THURSDAY 12 Sept**
- TECH
  - S11 Robot Framework

**FRIDAY 13 Sept**
- TECH
  - S10 How to Contribute
  - Q&A & Wrap-up

**COFFEE BREAK**
- 0h30

**EUAG**
- S3 Multi VDU

**REGISTRATION**
- 1h00

**LUNCH BREAK**
- 2h

**Welcome**
- TSC
  - S0 Intro DEMO 0

**OSM & 5G Verticals**
- TECH
  - OSM & 5G Verticals
  - S7 Fault & Perf Mgmt

**COFFEE BREAK**
- 30min

**Demo 1**
- DPB WIM

**Demo 2**
- VNF Onboarding

**Demo 3**
- Canonical

**Demo 4**
- Tata Elxsi

**Demo 5**
- Whitestack

**Social Gathering**
- 1h30
OSM 7th Hackfest – Introduction

José Miguel Guzmán (Whitestack)
jmguzman@whitestack.com
Agenda

• Quick review of NFV

• Introduction to the latest OSM Release
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**!
The original idea.... triggered an industry movement

- Initial white paper was written in 2012 by the world's leading telecom network operators (Europe, América & Asia).
- This group evolved to the ETSI NFV ISG (Industry Specification Group), formed today by 300+ companies.
- Their main motivation had to do with reducing TCO of building a network by using open solutions.

Network Functions Virtualisation

An Introduction, Benefits, Enablers, Challenges & Call for Action

OBJECTIVES
This is a non-proprietary white paper authored by network operators.

The key objective for this white paper is to outline the benefits, enablers and challenges for Network Functions Virtualisation (as distinct from Cloud/SDN) and the rationale for encouraging an international collaboration to accelerate development and deployment of interoperable solutions based on high volume industry standard servers.

CONTRIBUTING ORGANISATIONS & AUTHORS

AT&T: Margaret Chioll.
BT: Don Clarke, Peter Willis, Andy Reid.
CenturyLink: James Feger, Michael Bugenhagen, Waqar Khan, Michael Ferrana.
China Mobile: Dr. Chunfeng Cui, Dr. Hui Deng.
Coil: Javier Benitez.
Deutsche Telekom: Uwe Michel, Herbert Dambker.
KDDI: Kenichi Ogaki, Tetsuro Matsuoka.
NTT: Masaki Fuku, Katsushi Shimano.
Orange: Dominique Delisle, Quentin Loudier, Christos Kollas.
Telecom Italia: Ivano Guardini, Elena Demaria, Roberto Minerva, Antonio Manzolini.
Telefonica: Diego Lopez, Francisco Javier Ramon Salguero.
Telestra: Frank Rul.
Verizon: Pradip Sen.

PUBLICATION DATE
October 22-24, 2012 at the “SDN and OpenFlow World Congress”, Darmstadt-Germany.

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](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_099/001/01.01.01_60/gs_NFV-INF001v010101p.pdf](http://www.etsi.org/deliver/etsi_gs/NFV-INF/001_099/001/01.01.01_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](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:

1. MANO (Management & Orchestration)
   - Focus on VNF/NS lifecycle

2. NFVI (NFV Infrastructure)
   - Includes VIM (Virtual Infrastructure Manager)
     - Focus on VM lifecycle
   - Usually bundled with NFV

3. VNFs (Virtual Network Functions)
   - Managed by MANO

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

- **Minor latency** (disk I/O & network)
  → Faster hardware (More cores, SSD disks, faster buses)
  → Dataplane acceleration

- **Higher throughput or PPS**
  → Dataplane acceleration
  → EPA: Enhanced Platform Awareness

- **Geographical distribution**
  → multi-site cloud

- **Horizontal auto-scaling**
  → automated operations (orchestration)
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.
VIM: Virtualized Infrastructure Manager

• 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.)
VNF-M: VNF Manager

• 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 Manager
MANO: NFV Orchestrator (NFV-O)

• 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.
Multi-vendor NFV Showcase

with the support of leading NFV-enablers, putting together a number of leading VNF vendors, on top of commoditized x86 infrastructure, managed by OpenStack and Open Source MANO.

Goal: to demonstrate publicly that multi-vendor networks are possible
Multi-vendor NFV Showcase

- **ng4t** VRAN: Emulates the vRAN
- **OpenAir Interface**: Implement the vEPC (MME, SGW, PGW)
- **Fortinet**: implement security
- **Mobileum**: implement DRA and NTR (Roaming Steering)
Multi-vendor NFV Showcase

Day-0, Day-1 and Day-2

Day 0:
Instantiate Isolated VNFs

Day 1:
Build Service (automated)

Day 2:
Operate (on demand)

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The final results, including configurations used for deploying this vEPC, are published, following the guidelines from ETSI Plugtests Programme.

https://www.whitestack.com/posts/results-multivendor-nfv-showcase/
Introduction to OSM Release Five
The NFV MANO Landscape

• Given that the VIM is already well covered by OpenStack distributions and proprietary solutions (e.g. vCD), 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:
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
Layered Model

A multilayered model, where each layer provides a “service object”, composed by service objects provided by lower layers.
OSM’s approach aims to minimize integration efforts.

1. A well-known Information Model (IM), aligned with ETSI NFV, that is capable of modelling and automating the full lifecycle of Network Functions:
   - VNFD (VNF Descriptor), VNFR (VNF Record),
   - NSD (Network Service Descriptor), NSR (Network Service Record),
   - NST (Network Slice Template), NSI (Network Slice Instance)
OSM’s approach aims to minimize integration efforts.

2. A **unified northbound interface** (NBI), based on NFV SOL005
OSM’s approach aims to minimize integration efforts.

3. The extended concept of “Network Service” in OSM, so that an NS can span across the different domains identified and therefore control the full lifecycle of an NS interacting with VNFs, PNFs and HNFs.
4. In addition, OSM can also manage the lifecycle of **Network Slices**, assuming if required the role of Slice Manager, or integrating with an external Slice Manager.
Service Platform view

OSM as a Network Service Orchestrator (NSO)
VIM manages the virtual network to support VNF’s connectivity.

In advanced cases, the VIM might (transparently) control an external SDN Controller, to fulfill the connectivity requirements.
Integration with SDN Controller

CASE #1: Vanilla
- Overlay: Native
- No underlay

CASE #2: VIM + all SDN
- Overlay: SDNC
- Underlay: if available, via SDNC

CASE #3: VIM with partial SDN
- Overlay: Native
- Underlay: SDNC

CASE #4: SDN Assist
- Overlay: VIM native
- Underlay: SDNC, via OSM

SDN Assist
Allows OSM to control SDN connectivity, even when not possible by the VIM (eg: PCI Passthrough, SR-IOV)
Release FOUR+ architectural view

1. unified message bus for async communications
2. Integrated components for policy, fault and performance management (auto-scaling, monitoring, etc)
3. N2VC-VCA Juju controller for VNF configuration & indicator management
4. Complete orchestrator: LifeCycle Management (LCM) component
5. Unified Northbound Interface
6. Complete control through CLI and stand-alone new UI

Common Services
- OSM IM
- Common Database (NoSQL)
- Object Storage
- TSDB (Metrics)
- Auth

New components:
- osmclient
- light-ui
- OSM’s NBI
- NBI
- VCA
- RO
- POL
- MON
- Kafka bus
- Integrated components for policy, fault and performance management (auto-scaling, monitoring, etc)
Release FOUR+ architecture

Microservice architecture to enable extensibility

**OSM stack**
- NBI
- Kafka
- MON
- MONGO
- zookeeper
- POL
- Light-UI
- LCM
- RO
- RO-DB

**ELK stack**
- Elasticsearch
- Logstash
- Kibana

**Perf. Mon. stack**
- Prometheus
- Grafana

**Add here your stack**
- docker X
- docker Y

netOSM docker network
Why is OSM Awesome?

It has a rich and open information model

- Agnostic to VIM, SDN platform, VNF and OSS connectors/specifcics.
- 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 131 members!

- 12 Global Service Providers
- Leading IT/Cloud players
- VNF providers

(*) Names & brands may be claimed as the property of others
Why is OSM Awesome?

It is well organized for producing production-ready upstream code
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It is well organized for producing production-ready upstream code

LEADERSHIP GROUP

Francisco Javier Ramón  Andy Reid  Pål Grønsund

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Why is OSM Awesome?

It is well organized for producing production-ready upstream code

TECHNICAL STEERING COMMITTEE

Vanessa Little  Gerardo García  Mark Shuttleworth  José Miguel Guzmán  Felipe Vicens
Why is OSM Awesome?

It is well organized for producing production-ready upstream code

END USER ADVISORY GROUP

Andy Reid

VNF ONBOARD TASK FORCE

Gianpietro Lavado

VNF ONBOARDING TASKFORCE
Why is OSM Awesome?

It prioritizes features for production readiness...

- **APRIL 2017**
  - Multi-VIM
  - Multi-SDN
  - One-click installer
  - Network Service Scaling
  - Multi-Site, and more!

- **OCTOBER 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

- **NOVEMBER 2018**
  - Network Slicing
  - Monitoring Improvements
  - Multi-site Extensions
  - Improved modeling
  - Hybrid Network Services
  - Auto-Scaling
  - Enhanced usability

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Why is OSM Awesome?

...and launched Release SIX in May 2019, with more key features for 5G and production environments!

- Role-based authentication control (RBAC)
- Support for full/native charms for enhanced VNF management
- Network Slicing extensions
- Network-Service-level primitives
- Improved monitoring of infrastructure components and VNFs
- Enhanced support for instantiation parameters
Why is OSM Awesome?

And because other people say that OSM Rocks!

Table III: OSM vs ONAP resource footprint comparison.

<table>
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<tr>
<th>Resource</th>
<th>OSM-4</th>
<th>ONAP-B</th>
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<tbody>
<tr>
<td>vCPU</td>
<td>2</td>
<td>88</td>
</tr>
<tr>
<td>Memory (GB)</td>
<td>8</td>
<td>176</td>
</tr>
<tr>
<td>Storage (GB)</td>
<td>40</td>
<td>1760</td>
</tr>
<tr>
<td>IP Addresses</td>
<td>1 static</td>
<td>20 Floating 3 static</td>
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</table>
Contributing to the Community
Joining the OSM Community

• Join [here](https://osm.etsi.org/about/how-to-join) 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 (i.e. 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: Santa Clara, US (May 2019)

- **OSM Hackfest**
  - Sixth edition taking place on May 2019 at Santa Clara, 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.
Thanks
José Miguel Guzmán (Whitestack)
jmguzman@whitestack.com