# Hackfest Week Plan

<table>
<thead>
<tr>
<th>OSM#8 &amp; Hackfest Lucca</th>
<th>MONDAY 18 Nov</th>
<th>TUESDAY 19 Nov</th>
<th>WEDNESDAY 20 Nov</th>
<th>THURSDAY 21 Nov</th>
<th>FRIDAY 22 Nov</th>
</tr>
</thead>
<tbody>
<tr>
<td>09:00...10:30 (1h30)</td>
<td>LG</td>
<td>Opening Plenary</td>
<td>S2 Basic Descriptors</td>
<td>TECH</td>
<td>TECH</td>
</tr>
<tr>
<td>10:30...11:00 (3h30)</td>
<td></td>
<td></td>
<td>S6 1 Day 1/2 Proxy Charms</td>
<td>S6.3 Nat Chars</td>
<td>S11 CI/CD Robot Frwkd</td>
</tr>
<tr>
<td>11:00...13:00 (2h)</td>
<td>EUAG</td>
<td>Opening Plenary</td>
<td>TECH</td>
<td>S6 1 Day 1/2 Proxy Charms</td>
<td>S7 Fault &amp; Perf</td>
</tr>
<tr>
<td>13:00...14:00 (1h)</td>
<td>Registration</td>
<td>LUNCH BREAK</td>
<td>TECH</td>
<td>S7 Fault &amp; Perf Management</td>
<td>S12 VNF Orbl to VCD</td>
</tr>
<tr>
<td>14:00...15:30 (1h30)</td>
<td>TSC</td>
<td>S5 Intro DEMO 0</td>
<td>S6 Day 0</td>
<td>S4 2 8R-IOV</td>
<td>S10 How to contribute Wrap up</td>
</tr>
<tr>
<td>15:30...16:30 (3h30)</td>
<td>TSC &amp; MDL</td>
<td>S6 - Network Slicing</td>
<td>TECH</td>
<td>S3 Multi-VDU VNFS</td>
<td>S4.3 PNFs &amp; HNFs</td>
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<tr>
<td>16:00...18:00 (2h)</td>
<td>TSC &amp; MDL</td>
<td>S1 OSM Install</td>
<td>TECH</td>
<td>S9 Service Function Chaining</td>
<td></td>
</tr>
</tbody>
</table>

19:30 ...

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[Slides]
8th OSM Hackfest
Introduction

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

• Quick overview 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 by 300+ companies.
- Their main motivation had to do with reducing TCO of building a network by using open solutions.
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_NFV002v01_0201p.pdf](http://www.etsi.org/deliver/etsi_gs/NFV/001_099/002/01.02.01_60/gs_NFV002v01_0201p.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_NFV002v01_0201p.pdf](http://www.etsi.org/deliver/etsi_gs/NFV/001_099/002/01.02.01_60/gs_NFV002v01_0201p.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**.

![Diagram showing Hardware Infrastructure for Virtualization + Manager, a.k.a. “Telco Cloud”]
The ETSI NFV Architectural Framework

The standard architecture can be better understood in three blocks:

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

2. **NFVI**
   - NFV Infrastructure
     - Virtual Computing
     - Virtual Storage
     - Virtual Network

3. **VIM**
   - Officially part of MANO, but usually bundled with NFVI (focus on VM lifecycle)

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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: Virtualised Infrastructure Manager

- The Virtualised Infrastructure Manager is part of the ‘MANO Stack’ and provides lifecycle management for virtualized resources (VMs, volumes, networking paths and connectivity, etc.)
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.
MANO: NFV Orchestrator (NFVO)

• 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, element 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)

![Diagram of network nodes and connections]
Multi-vendor NFV Showcase

Day-0, Day-1 and Day-2

Day 0: Instantiate

Isolated VNFs

cloud-init

Day 1: Build Service (automated)

Evolved Packet Core

juju

Day 2: Operate (on demand)

Evolved Packet Core

juju
Multi-vendor NFV Showcase

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 SIX
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 developing 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.
OSM’s approach aims to minimize integration efforts

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.

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**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.**

**Full E2E Management (Integrated Modelling)**

**Standalone Management (Vanilla NFV/3GPP)**
Service Platform view

OSM as a Network Service Orchestrator (NSO)
Service Platform view

VIM manages the virtual network to support VNF’s connectivity

In advanced cases, the VIM might (transparency) control the external SDN Controller, to fulfil 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**
   - common DB, storage, authentication and TSDB systems

2. **Integrated components for policy, fault and performance management (auto-scaling, monitoring, etc)**
   - N2VC-VCA Juju controller for VNF configuration & indicator management

3. **Complete orchestrator: LifeCycle Management (LCM) component**
   - Unified Northbound Interface

4. **Complete control through CLI and stand-alone new UI**
   - OSM’s NBI

5. **New unified message bus for async communications**

6. **New OSM IM**

7. **Common Database (NoSQL) with new Object Storage**
   - New TSDB (Metrics)
   - New Auth

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Release FOUR+ architecture

Microservice architecture to enable extensibility

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

LXD
- VCA (juju controller)

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/specifications.
- 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 **130** 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.

LEADERSHIP GROUP

TSC

MDG

Committers

Contributors

LG member
TSC Chair
TSC member
MDG lead

MARCOM TASK FORCE

VNF ONBOARDING TASK FORCE

END USER ADVISORY GROUP

Users
Why is OSM Awesome?

It is well organized for producing production-ready upstream code

LEADERSHIP GROUP

Francisco Javier Ramón
Andy Reid
Pål Grønsund
Why is OSM Awesome?

It is well organized for producing production-ready upstream code

LEADERSHIP GROUP

MARCOM TASK FORCE

TECHNICAL STEERING COMMITTEE

Vanessa Little
Gerardo García
Mark Shuttleworth
José Miguel Guzmán
Felipe Vicens

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Why is OSM Awesome?

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

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

**MARCOM TASK FORCE**
- VNF ONBOARDING TASK FORCE
  - DEVOPS MDL: Jayant Madhavi
  - N2VC MDL: Adam Israel
  - RO MDL: Alfonso Tierno
  - SA MDL: Gianpietro Lavado (interim)
  - UI TFL: Francesco Lombardo

**ETSI TE**
- Silvia Almagia
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!

**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

**DECEMBER 2018**
- Network Slicing
- Monitoring Improvements
- Multi-site Extensions
- Improved modeling
- Hybrid Network Services
- Auto-Scaling
- Enhanced usability
Why is OSM Awesome?

...and launched Release SIX in June 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>
<thead>
<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</td>
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Contributing to the Community
Joining the OSM Community

• Join [here](https://osm.etsi.org/about/how-to-join) as a company or individual contributor!
OSM Community Activities

• **Weekly Conference Calls**
  • Technical, MARCOM, DevOps, SA, and more!

• **Face to Face Meetings**
  • Plenaries and Mid-Release meetings (every 3 months)
  • Next location: Madrid (March 2020)

• **OSM Hackfests**
  • Co-located 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 in your area.
Thanks !
José Miguel Guzmán (Whitestack)
jmguzman@whitestack.com