TSC Perspectives
ZERO TOUCH AUTOMATION CONGRESS - Madrid
March 26, 2019
Vanessa Little (VMware)
OSM TSC Chair
Introduction to OSM
OSM provides a production-quality MANO stack...

- Capable of consuming *openly published IM/DM*
- **Available for everyone**, to minimize uncertainties
- **Suitable for all VNFs**, capturing real production complexity
- **Operationally significant**: including Service Orchestration too!
- VIM-independent

**ALIGNED TO NFV ISG INFORMATION MODELS**
- ... but capable of providing **prompt and constructive feedback** whenever needed

**ENABLING AN ECO-SYSTEM OF IM-COMPLIANT VNF VENDORS**
- Ready to be offered to cloud and service providers
- No need of integration per- customer & MANO vendor basis
OSM Architectural Principles

Layering
Abstraction
Modularity
Simplicity
The Open Source MANO Project

Open Source MANO is an ETSI-hosted project to develop an Open Source NFV Management and Orchestration (MANO) software stack aligned with ETSI NFV.
Layered Model

A multilayered model, where each layer provides a “service object”, composed by service objects provided
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.
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 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)
OSM Release FIVE, reaching PRODUCTION READINESS...

- MWC demo (Feb)
- Kick-off (Apr)
- Release ONE (Oct)
- Release TWO (Apr)
- 2nd ETSI NFV Plugtest (Jan)

2016
- Release ZERO (May)
- 1st ETSI NFV Plugtest (Jan)

2017
- Release THREE (Oct)

2018
- Production Readiness
- Release FOUR (May)
...and launched Release FIVE in December 2018, with key features for 5G and production environments!

The most ambitious release so far!

• Support for hybrid Network Services! VNFs and PNFs
• Network Slicing for 5G
• Multi-site Inter-DC extensions
• Monitoring & Policy improvements (VNF + VIM metrics, autoscaling)
• Improved modelling of VNF networking (SFC, multi-VDU relations)
• Better user experience (GUI package composer, faster installation, events/logs GUI)
Release 5
Deep Dive and Components
Release FIVE Highlights

NETWORK SLICING FOR 5G
- Integrated Slice Manager
- IM extended to support NST and NSI

MULTI-SITE EXTENSIONS
- Dynamic inter-DC connections
- WIM plugin model
- Multi-VIM Enhancements

MONITORING IMPROVEMENTS
- Extended interop capabilities
- Policy support
- VNF + VIM Metrics Collection

IMPROVED MODELLING & NETWORKING
- Service Function Chaining (SFC)
- Physical Deployment Units
- Multi-VDU relations in VNF

USER EXPERIENCE & OPTIMIZATION
- GUI based NS composer
- Faster startup and responsiveness
- Better event and log visualization
- Docker, Vagrant and VM image install

Available at: osm.etsi.org
Release FIVE+ architectural view

- Unified Northbound Interface (SOL005-based), decoupled from LCM
- Lightweight Life Cycle Manager (LCM)
- Message bus for async communications
- Common DB, time-series DB and object storage
- Integrated components for policy, fault and performance management
- Complete control through CLI and stand-alone new UI
Release FIVE+ architecture

Microservice architecture to enable extensibility

[Diagram of the Release FIVE+ architecture with labels for OSM stack, ELK stack, Perf. Mon. stack, and Add here your stack components, along with a note on netOSM docker network.]
A single OSM NS/Slice can now span across different VIM+NFVI, Transports, and Physical Functions...

ETSI SOL005 + NS LCM calls

E2E Service Orchestration

IM integrated

T-SDN (TAPI, MEF-Legato...)

Or-Vi

PNFs & HNFs

TRANSPORT DOMAIN

VIRTUAL DOMAIN

© ETSI 2017
... with a unique and non-ambiguous IM, independent of the technologies southbound...
SFC Status in OSM

- Available since OSM Release 3
- SFC only available using: **Openstack Queens (or higher) with Networking-SFC**
- Only supports Asymmetrical Chains
- SFC Encapsulation using Network Service Headers (NSH)
OPNFV XCI Integration

- OPNFV has integrated OSM installation into their pipeline.

- The first advanced use case they want to implement is Service Function Chaining (previously done with Tacker)

  → Basic SFC has been integrated as of 31/Oct/2018

- Next step is to evolve OSM SFC features to achieve more use cases.

https://wiki.opnfv.org/display/sfc/OSM+guide
Separate ingress and egress ports

Modifying the Information Model and Resource Orchestrator

Status: Complete.
Symmetrical/Asymmetrical Chains

Currently only Asymmetrical Chains are supported. **Status:** In development.
Non-Transparent Service Functions

Currently not supported.
**Status:** Future Release
Branching and Joining

Currently not supported.  
**Status:** Future Release
Service Function Tap

Currently not supported.

**Status:** Future Release
SFC Management API

«The current service function deployment models are relatively static, coupled to network topology and physical resources, greatly reducing or eliminating the ability of an operator to introduce new services or dynamically create service function chains.»

IETF - RFC 7665 - Service Function Chaining (SFC) Architecture
SFC Management API

Automating the deployment and operation of Network services is a challenge that OSM is able to solve

FROM multiple manual touch points...

... TO a single entry point to drive full automation
Network Slicing Overview

• Different network slices addressing different types of usage requiring different levels of functionality, performance and reliability.

• For each type of usage there can be different:
  • The radio access technologies (RAT)
  • The list of activated core network features in the control plane and the user plane
  • Resource dimensioning and the location where they are deployed

Source: NGMN
Analysis of 3GPP and alignment of NFV architecture with it
ETSI GR NFV-EVE 012

Considerations:
- Network Slice Subnet can be considered as an NFV Network Service.
- Network Functions can be described as VNF and PNF.
Network Slicing in OSM

- Major development under 5G
- Two key attributes
  - Composition of NSs
    - ‘Normal’ NS in NS
  - Sharing of a single NS instance between slices
    - Quite different to normal NS in NS and is not normal containment relationship
- Dynamic behaviour in NSs and network slices
  - An instance can easily evolve well away from its original creation template
Network slicing in OSM

- Network slice instance: a set of network functions and the resources for these network functions which are arranged and configured, forming a complete logical network to meet certain network characteristics.

- The NSI contains:
  - NFs (e.g. belonging to AN and CN)
  - Information relevant to the interconnections between these NFs like topology of connections
  - Individual link requirements (e.g. QOS attributes),

- The NSI is defined by a Network Slice Template.
NST diagram
Network Slicing Assumptions in OSM

- Slice subnet (NSS) is supported by a NS (shared or not)
  - Reference to NSD
- Network Functions can be virtual or physical (we do not care)
- Include 5QI as constraint
- There are 2 new types of IM resource for supporting slices:
  - NST (Network Slice Template)
  - NSI (Network Slice Instance)
- NST will have connection points, in a similar way as Network Service external connection points.
- NSS can be interconnected with virtual links which are described in a NSSFG
  - netslice-vld: information at NST to declare how we plan to interconnect their NSS
  - netslicefgd: includes list of Rendered Service Paths and list of classifier rules.
OSM Components Impacted

Introducing an API to:

- Manage Rendered Service Paths (RSPs)
- Manage Flow Classifiers

Main problems:
- Loop detection and avoidance
- Scaling operations

Status:
In development.

Aligned with SOL005
First Ever OSM VNF DAY!

Hosted by **intel**

13<sup>th</sup> to 17<sup>th</sup> May 2019

Co-located with OSM#7

Registration is **OPEN**: [OSM-Hackfest#06 Santa Clara](#)