Introduction to Open Source MANO

Network function management and orchestration

Wajeeha Hamid, OSM MARCOM, Canonical
Network functionalities are fully defined by SW, minimising dependence on HW constraints

Traditional Network Model:
APPLIANCE APPROACH

- DPI
- BRAS
- GGSN/SGSN
- PE Router
- Firewall
- CG-NAT
- Session Border Controller
- Imagenio STB

- Network functionalities are based on specific HW with specific SW linked to HW vendors
- One physical node per role

Virtualised Network Model:
VIRTUAL APPLIANCE APPROACH

- DPI
- BRAS
- CG-NAT
- GGSN/SGSN
- Firewall
- PE Router

- Network functionalities are SW-based over COTS HW
- Multiple roles over same HW

ORCHESTRATED, AUTOMATIC
STANDARD HIGH VOLUME SERVERS & SWITCHES
Network Function Virtualization

VIRTUAL NETWORK FUNCTIONS

FUNCTION (semantics)
Decoupled

CAPACITY (resource mgmt)

COMMON HW
(Servers & Switches)

DPI
BRAS
Firewall
CG-NAT
PE Router
GGSN/SGSN
NFV adoption is increasing

More and more network functions become available (virtual, containerised, etc.)
A network function is any network node (virtualized or containerized) with well defined interfaces and functions.

**FLEXIBLE SCALING**
- Add more VMs as you grow

**SIMPLER ADDITION OF NEW FEATURES**
- Can be isolated in new VMs
A network service is any network node (virtualized or containerized) consisting of interconnected VNFs.
Network Functions in Telcos

NEF, NRF, PCF, UDM, AUSF, AMF and SMF in this 5G architecture are network functions

5G network functions
All of them have to be deployed, managed and orchestrated
Those network functions can be provided by multiple vendors
So, multiple vendors will provide *multiple orchestrators*
All of them need automated life-cycle management of network services for Day-0 to Day-N operations
ETSI NFV stack

NFV Architecture defined in NFV002
ETSI NFV stack

NFV Architecture defined in **NFV002**
What is OSM?
Os-Ma-Nfvo reference point (interface between OSS/BSS and NFVO)

Ve-Vnfm-em/vnf reference points (interface between VNFM and EM/VNF)

VNF and NS descriptors and packages
OSM in the picture..
Magma network functions with OSM
OSM features/capabilities
OSM capabilities

Infrastructure management

Network function On-boarding

Network function Management

Scaling and business continuity
Multiple types of workloads, single engine
All VMs - Virtualized network function

All Containers - Cloud-native network function

All Bare Metal - Physical network function

VMs and Containers - Hybrid network function
Multi-VIM support

- Public clouds
- Private clouds
- SDN Assist
Multi cloud orchestration

PRIVATE TELCO CLOUD
(TEST LAB)

@ On Prem

openstack.  RKE 2

@ West Europe

aws
@ West Europe

Google Cloud
@ West Europe

@ North Europe

Azure
How this is possible?

Parameterized topologies and day1, day 2 operations
Juju- Generic VNF Manager

Open source and Multi vendor VNFs
OSM Architecture
1. Unified Northbound Interface (SOL005-based), decoupled from LCM
2. E2E orchestration through Life Cycle Manager (LCM)
3. Message bus for async communications
4. Common DB, auth and object storage
5. Integrated components for policy, fault, performance management and placement
6. Complete control through CLI and UI
7. Execution environments for VNF configuration
Automated onboarding process

- Step 0: VNF/NS Packaging
- Step 1: Network service instantiation - Day 0 configurations
- Step 2: Network service initialization - Day 1 configurations
- Step 3: Network service reconfiguration - Day 2 configurations
VNF Package 1 (unique)

1. Instantiate Network Services/Slices, making VNFs manageable ("Day 0")

2. Initialize VNFs so they provide the expected service ("Day 1")

3. Operate the service: monitoring, reconfigurations and (closed-loop) actions ("Day 2")

Network Service Instance

1. Instantiation with optional parameters

VNF1

VNF2

openstack

vCloud

aws
OSM Community and Ecosystem
OSM community is really **LARGE AND DIVERSE**, with **148** members today.

- 15 Global Service Providers
- Leading IT/Cloud players
- VNF providers
OSM Ecosystem
OSM commercial distributions

Charmed OSM

RiftWare

TeOSM

WhiteNFV
OSM Releases and Events
Latest Releases

Release ELEVEN

- SOL004 and SOL007 package formats
- Brand-new support for Google Cloud
- Fine-grained operations in CNFs
- Better coordination across PNFs, VNFs, and CNFs
- CNF monitoring from Kubernetes metrics
- Enhanced installation process

Release TWELVE

- NF Healing (VDU healing, auto-healing)
- SOL003 support as G-VNFM
- Upgrade of charms and primitives
- Additional support for Anti-Affinity
- Extensions for CNF/K8s support
- Password security
LTS for OSM

Release TEN LTS

Release ELEVEN STS

Release TWELVE LTS

Release THIRTEEN STS

Release FOURTEEN LTS

Release FIFTEEN STS

<table>
<thead>
<tr>
<th>LTS Releases (Long Term Support)</th>
<th>STS Releases (Short Term Support)</th>
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<tbody>
<tr>
<td>24 months community support</td>
<td>6 months community support</td>
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<tr>
<td>Oriented to production</td>
<td>Oriented to innovation &amp; development</td>
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<tr>
<td>Focus on stability</td>
<td>Focus on innovation &amp; agility</td>
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<tr>
<td>Community grants upgrade between LTS's</td>
<td>Upgrade on a best effort basis</td>
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OSM Events

Hackfests

- OSM#12 Hackfest - Remote
- OSM-MR#11 Hackfest - Remote
- OSM#11 Hackfest - Remote
- OSM-MR#10 Hackfest - Remote
- OSM#10 Hackfest - Remote
- OSM-MR#9 Hackfest - Remote
- OSM#9 Hackfest - Remote
- OSM-MR#8 Hackfest - Remote
- 8th OSM Hackfest - Lucca (Italy)
- 7th OSM Hackfest - Patras (Greece)
- 6th OSM Hackfest - Santa Clara (CA, USA)
- 5th OSM Hackfest - Barcelona (Spain)
- 4th OSM Hackfest - Palo Alto (CA, USA)
- 3rd OSM Hackfest - Oslo (Norway)
- 2nd OSM Hackfest - Madrid (Spain)
- 1st OSM Hackfest - Sophia Antipolis (France)

Ecosystem days

- OSM-MR#12 Ecosystem Day 2022
- OSM#12 Ecosystem Day November 2021
- OSM-MR#10 Ecosystem Day March 2021
- OSM#10 Ecosystem Day December 2020
- OSM-MR#9 Ecosystem Day September 2020
- OSM#9 Ecosystem Day June 2020
- OSM-MR#8 Ecosystem Day March 2020
**K8s installer**

```
chmod +x install_osm.sh
./install_osm.sh
```

**Charmed installer**

```
chmod +x install_osm.sh
./install_osm.sh --charmed
```
Thank you

Questions?