Introduction to OSM & Orchestration Business Cases

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Agenda

- Telco Challenges
- Overview of OSM
- Orchestration Business Cases
- Welcome to the Hackfest
- Hands on Time
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
OSM in the ETSI NFV Architecture

Open Source MANO (OSM) comprised of NFV Orchestrator and VNF Manager blocks

We are here!
OSM in the picture..
Open Source MANO Simplifies Telco Cloud Management...
How can OSM help to Telco Deployments?

- Infrastructure Management
- Network function On-boarding
- Network function Management
- Scaling and Business Continuity
Multiple types of Workloads, Single Engine

- **All VMs - Virtualized network function**
  - VNF
  - VM, VM, VM

- **All Containers - Cloud-native network function**
  - CNF
  - K8s, K8s, K8s

- **All Bare Metal - Physical network function**
  - PNF
  - Phy, Phy, Phy

- **VMs, Containers and Physical - Hybrid network function**
  - Hybrid
  - VM, K8s, Phy

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Multi-VIM support

- Public clouds
- Private clouds
- SDN Assist
Multi-Cloud Orchestration is a reality

DEPLOYMENTS:
- 5G NF #1 (x2 sites)
- 5G NF #2 (1 site)

PRIVATE TELCO CLOUD (PRODUCTION)
- @ West Europe
- @ On Prem

PRIVATE TELCO CLOUD (TEST LAB)
- @ West Europe

aws
@ West Europe

Open Source MANO

Google Cloud
@ West Europe

RKE 2

VMware

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How this is possible?

Parameterized topologies and day 1, day 2 operations
Model-driven, portable and reusable VNF packages

NS PACKAGES / SLICE PACKAGES:

DEPLOYED INSTANCES:

Upon instantiation, you just need to decide:
- The target VIM (or VIMs)
- Values for the parameters (IP addresses, keys, etc.)
Juju drives Application Operations

- Juju is a universal service modelling system
- Able to use various substrates (machines and kubernetes)
- Operations such as Install, update, configure, scale, integrate, and actions
Deploy your Network Service in 3 Steps…

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")
OSM Community and Ecosystem
OSM community is really **LARGE** and **DIVERSE**, with **150** members today, but always **OPEN** to new participants.

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

Charmed OSM

TeOSM

WhiteNFV
OSM Business Use Cases

B. Ramesh Ramanathan

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Agenda

- Traditional Operator Business Models
- Drivers for Change – SDN & NFV
- Open Source MANO and next Generation Networks
- Future Business Model Use Cases
Telecom Operator Woes
Telecom Operator Woes

Cheap Data and Voice

Mr. Kumar, CEO of Telecom Operator

Government Regulations

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More than speed, the main difference between 4G and 5G is the fact that 5G is an application aware network.
Traditional Network Functions & the Challenges

- Large and complex infrastructure, continuously evolving
- Vendor lock in ecosystem
- Network functions are on Proprietary Hardware
- Rigid, inflexible systems for scale
- Lacks deployment speed for go to market of new services
- Large investments on CAPEX and OPEX
Traditional Networking & the Challenges

Traditional Network
Use of integrated Hardware & Software

- Data or forwarding Plane
- Control Plane
- Management Plane

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The Holy Grail – SDN & NFV

NFV – Network Function Virtualization
SDN – Software Defined Networking
Magic of NFV – VNFs and CNFs

From This...
Monolithic vertical integrated box proprietary solutions

To This...
Networking Functions as VMs using standard COTS solutions

Virtual CPE
- Encryption
- DNS
- Firewall

NF Running in a VM
Advantages of NFV driven Telco Cloud

01 Seamless deployment of new Network Function and increased efficiency in terms of configuring services, monitoring and managing necessary resources from the platform for NFV services.

02 Easier upgrades of network function and flexibility in deploying new services to open up new business value streams.

03 Reduction in CAPEX and OPEX due to usage of COTS hardware and ease of maintenance of network functions.

04 Interoperability of network functions from different vendors can be handled with ease as NFV provides standards and definitions which allows orchestrator to model and to maintain its lifecycle.

05 Software centric network enable large scale collection of data from multiple tap points for data correlation and associated assurance.
SDN – Delivering a Programmable Network

Features of SDN

- Makes Networking & IP Routing flexible
- Decoupling Control & Data plane
- Offloads brain to centralized controller
- Central view of Resources
- Programmable Network, Centrally Managed, Agile for any Need

SDN: Separation of Control & Data Layer

CONTROLLER

A
B
C
D
X
Y

Internet
Sounds great,
But hey, what’s the catch ??

• VNF’s, VM’s, virtualization … so many moving parts !!
• So many vendors, versions, resource lifecycles
• So many services built using these resources

How to manage this ??

A coalition government 😊
How to run it 😃
Open Source MANO & Next Gen Networks
Telco Cloud done right

5G TELCO CLOUD

VNF LAYER
- MME
- HSS
- SGW
- PCRF
- EMS
- ENUM
- USPS

VIRTUALIZATION LAYER
- VIRTUAL COMPUTE
- VIRTUAL STORAGE
- VIRTUAL NETWORK

PHYSICAL INFRASTRUCTURE
- COMPUTE, STORAGE AND NETWORK

NFV MANAGEMENT & ORCHESTRATION LAYER
- VNF CATALOG
- VNF INSTANCES
- NFVI RESOURCES
- VIM

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Automated and Orchestrated Telco Cloud Solution

ZERO TOUCH AUTOMATION

Management and Orchestration by OSM

Control, data and signaling plane

TELCO CLOUD/Mobile Services

VNF

CNF

PNF

OpenStack

K8S Distro

Multi-domain hybrid services

Hypervisor

COTS Hardware

Underlay Switches

Gateway Router
Open Source MANO & Business Use Case
Show me the money!

Operational Benefits
- Faster Time to Market
- Automated Life cycle management
- Better NPS

Business Benefits
- Network Slicing
- IOT
- Industry 4.0
- Private 5G
- Edge MEC Applications
Industry 4.0
Software Defined Vehicles
Smart Energy
Smart City
Progression of Telco Clouds
ETSI OSM relation to Reference Architectures
OSM in ETSI NFV Architecture
OSM in ETSI MEC Architecture

Potential Functionality in OSM

- MEC platform and MEC apps as NF for OSM
- NF LCM
  - NF Onboarding
  - NF Instantiation
  - NF Operation
Thank you
And...
Welcome to the Hackfest
Hackfest Environment

SSID: OSM_Hackfest
Password: WIFI4hackfest!

Hub for Interoperability and Validation at ETSI (HIVE)
Your Openstack Tenant
Hands On Time
Logging Into Remote Desktop

- ctrl-alt-t - Launch a terminal

SSID: OSM_Hackfest
Password: WIFI4hackfest!
Logging Into OSM

SSID: OSM_Hackfest
Password: WIFI4hackfest!

Remote Desktop

Username: admin
Password: hackfest

firefox https://ui.osm
Taking a Look Around
Hands On

cd osm-packages/Hackfest_Demos/OSM-MR13/1.1-Welcome/

./1.Build_Package.sh

========================================================================
Cleaning out any prior versions of the descriptors from OSM
========================================================================
========================================================================
Uploading packages
========================================================================
Validating package my_first_vnf
Validation OK
List of charms in the descriptor: {'my-first-charm'}
Adding File: my_first_vnf
Package created: ./my_first_vnf.tar.gz
94d25154-5809-4838-8395-00aa2e5b6e8e
Validating package my_first_ns
Validation OK
List of charms in the descriptor: set()
Adding File: my_first_ns
Package created: ./my_first_ns.tar.gz
653dc522-bc8d-4a23-ae75-d4f351024484

========================================================================
Done
========================================================================
Here is the new version 9.0.0.post78 of OSM!

NS Packages

Just drag and drop files or click here to upload files

<table>
<thead>
<tr>
<th>Name</th>
<th>Identifier</th>
<th>Version</th>
<th>Designer</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>my_first_ns</td>
<td>653xk522:</td>
<td>1.0</td>
<td>Canonical</td>
<td>A very simple network service that deploys 1 VM</td>
</tr>
</tbody>
</table>
Hands On

./2.Launch_Network_Service.sh

Launching network service

2a1933cd-4e77-4957-9683-28bba515945b

Done
Here is the new version 9.0.0.post78 of OSM!
Instances

Displaying 4 items

<table>
<thead>
<tr>
<th>Instance Name</th>
<th>Image Name</th>
<th>IP Address</th>
<th>Flavor</th>
<th>Key Pair</th>
<th>Status</th>
<th>Availability Zone</th>
<th>Task</th>
<th>Power State</th>
<th>Age</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>my_first</td>
<td>u20.0</td>
<td>10.0.0.177</td>
<td>mgmtVM-vmf1-1-flv</td>
<td>hackfest</td>
<td>Active</td>
<td>None</td>
<td>Running</td>
<td>5 minutes</td>
<td></td>
<td>Create</td>
</tr>
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<td></td>
<td>Create</td>
</tr>
</tbody>
</table>
Congratulations!

./3. Get_IP_Address.sh

Waiting for deployment to finish

| my_first_ns | bb114a6b-7dec-439a-8e2d-01cd72680784 | 2022-10-14T12:14:22 | READY | IDLE (None) | N/A |

Getting IP Address of VNF

Your VNF is reachable at 10.0.0.169
To log in, use
ssh ubuntu@10.0.0.169

Done
Run Some Actions

```bash
./4.Run_Actions.sh

osm ns-action my_first_ns --wait --vnf_name my_first_vnf --action_name reboot
osm ns-action my_first_ns --wait --vnf_name my_first_vnf --action_name cancel-reboot

Log into your VNF vm, then try traceroute google.com

osm ns-action my_first_ns --wait --vnf_name my_first_vnf --action_name add-package --params '{package: traceroute}'
osm ns-action my_first_ns --wait --vnf_name my_first_vnf --action_name remove-package --params '{package: traceroute}'

osm ns-action my_first_ns --wait --vnf_name my_first_vnf --action_name update-system
```
Let’s Edit Some Code

./5.Edit_Code.sh
Upload New Version

./6.Change_Package.sh

========================================================================
Uploading new package content
========================================================================
Validating package my_first_vnf
Validation OK
List of charms in the descriptor: {'my-first-charm'}
Adding File: my_first_vnf
Package created: ./my_first_vnf.tar.gz
./my_first_vnf.tar.gz
Updated
========================================================================
Done
========================================================================
Deploy the New Software

./7.Update_NS.sh

========================================================================
Performing software update
========================================================================
detailed-status: Done
479d1336-ba29-4378-9a3d-f4ce6f92c866
========================================================================
Done
========================================================================
Say “Hi” To Yourself

./8.Run_Actions.sh

osm ns-action --v nf_name my_first_vnf --action_name announce --params "{message: hi}" my_first_ns

0 updates can be applied immediately.

Last login: Fri Oct 14 18:53:09 2022 from 10.0.0.10

Broadcast message from ubuntu@my-first-ns-my-first-vnf-my-first-vnf-0 (pts/2) {

hi
Cleanup Time

./9.Remove_NS.sh

osm ns-delete my_first_ns

- VM Removed from Openstack
- Resources freed
- No longer showing in Instances
Try OSM...

Community installer

chmod +x install_osm.sh
./install_osm.sh

Charmed installer

chmod +x install_osm.sh
./install_osm.sh --charmed
Join us!

ETSI members, non-members, individual developers and users.

Learn [how to join](#)
Thank You!