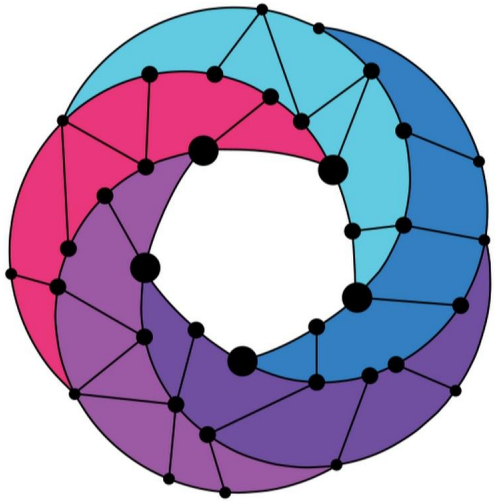


# Introduction to OSM & Orchestration Business Cases

Wajeeha Hamid (Canonical)
Ramesh Ramanathan (Tata Elxsi)
Mark Beierl (Canonical)

# Agenda

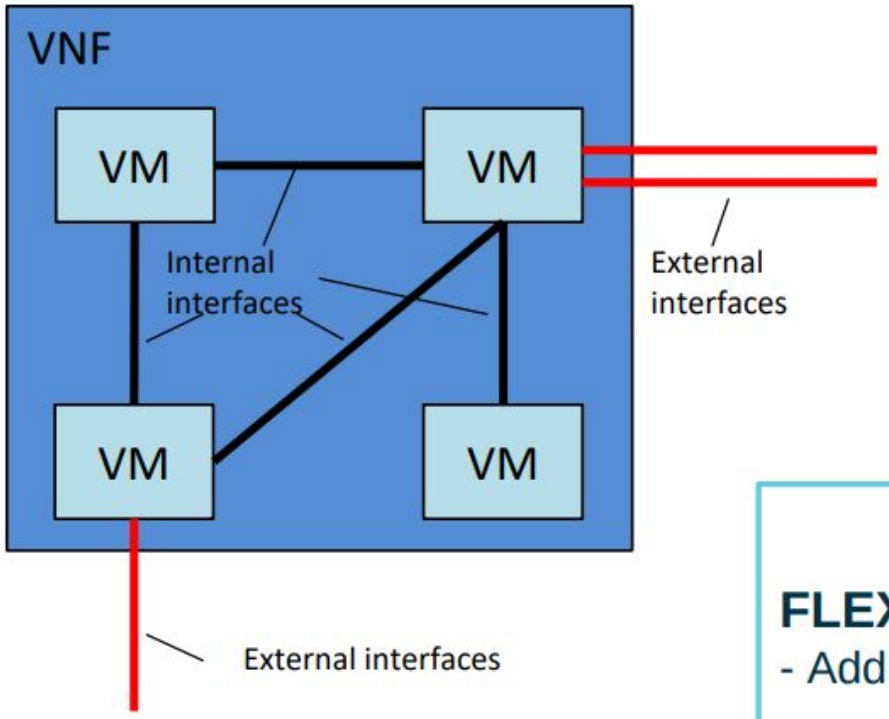
- Telco Challenges
- Overview of OSM
- Orchestration Business Cases
- Welcome to the Hackfest
- Hands on Time

# NFV adoption is increasing

Open Source MANO

More and more network functions become available (virtual, containerised, etc.)

# Network Functions

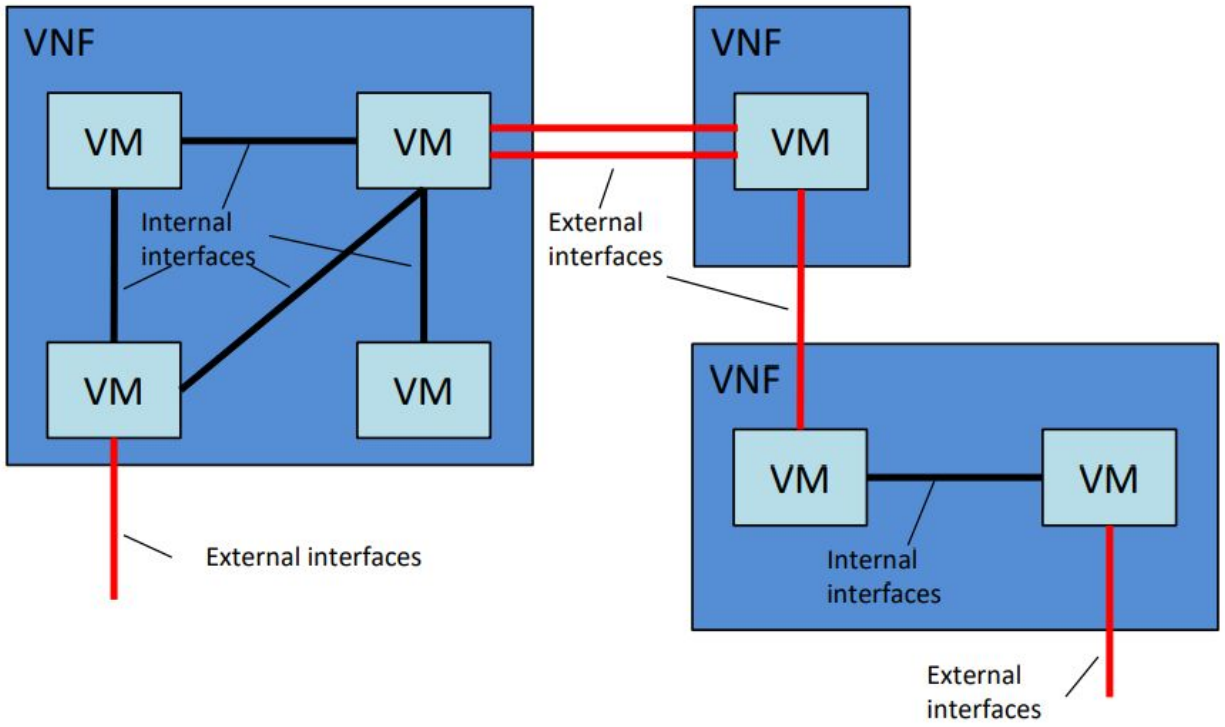



A network function is any network node (virtualized or containerized) with well defined interfaces and functions

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

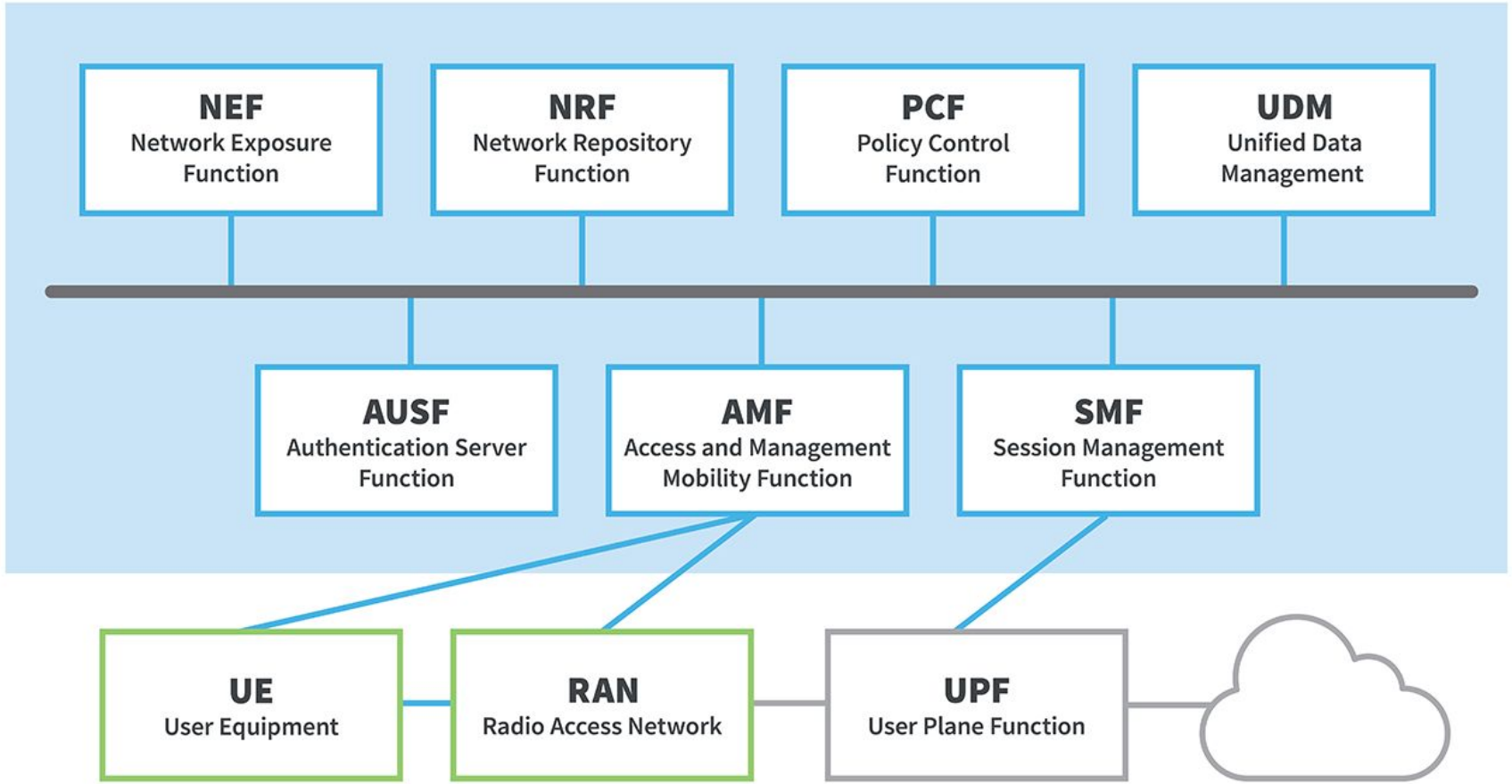
**SIMPLER ADDITION OF NEW FEATURES**
- Can be isolated in new VMs

# Network Services




A network service is any network node (virtualized or containerized) consisting of interconnected VNFs

# Network Functions in Telcos




5G network functions

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

Open Source MANO

All of them have to be

deployed, managed and orchestrated

Those network functions can be provided by multiple vendors

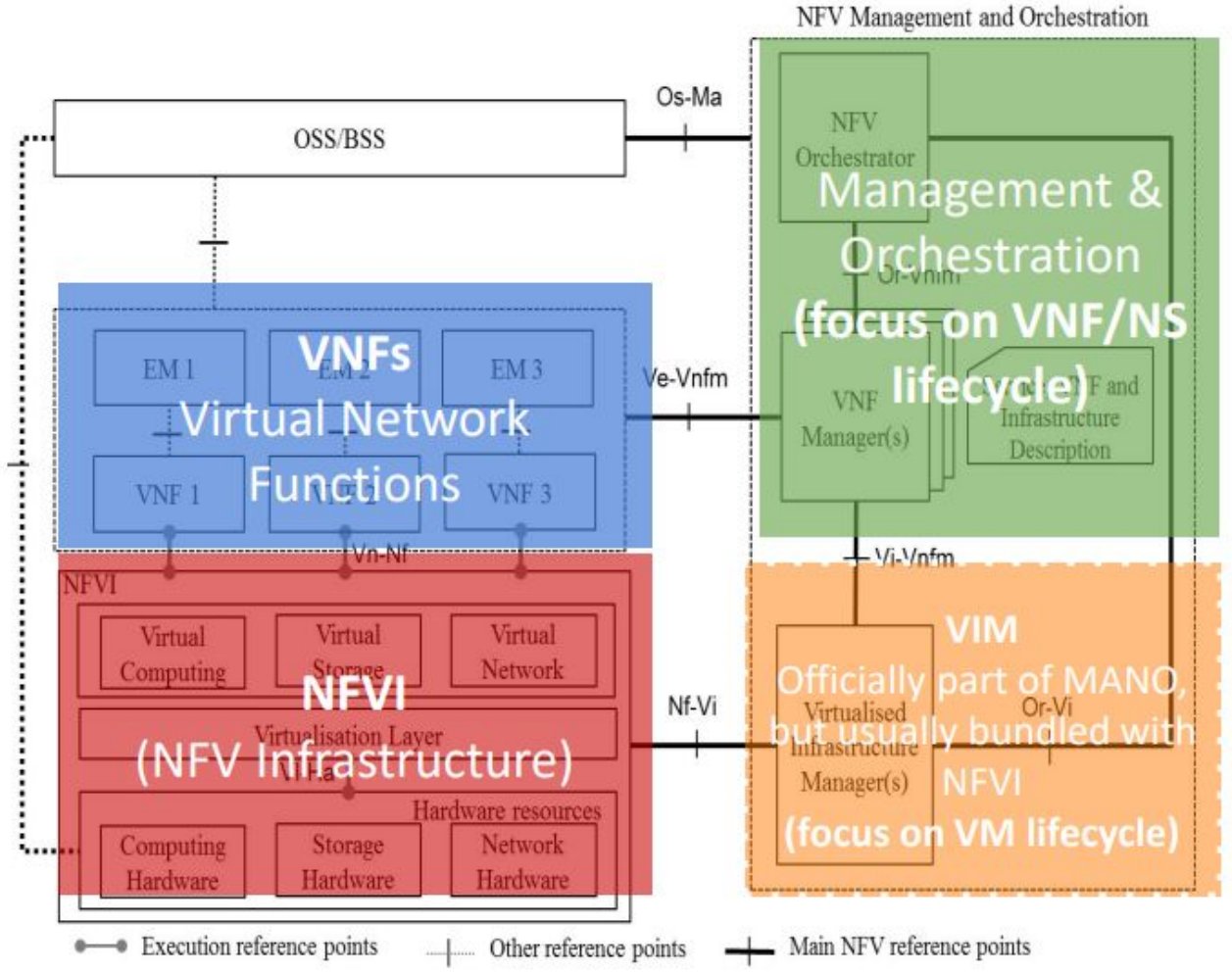
Open Source MANO

So, multiple vendors will provide multiple orchestrators

Open Source MANO

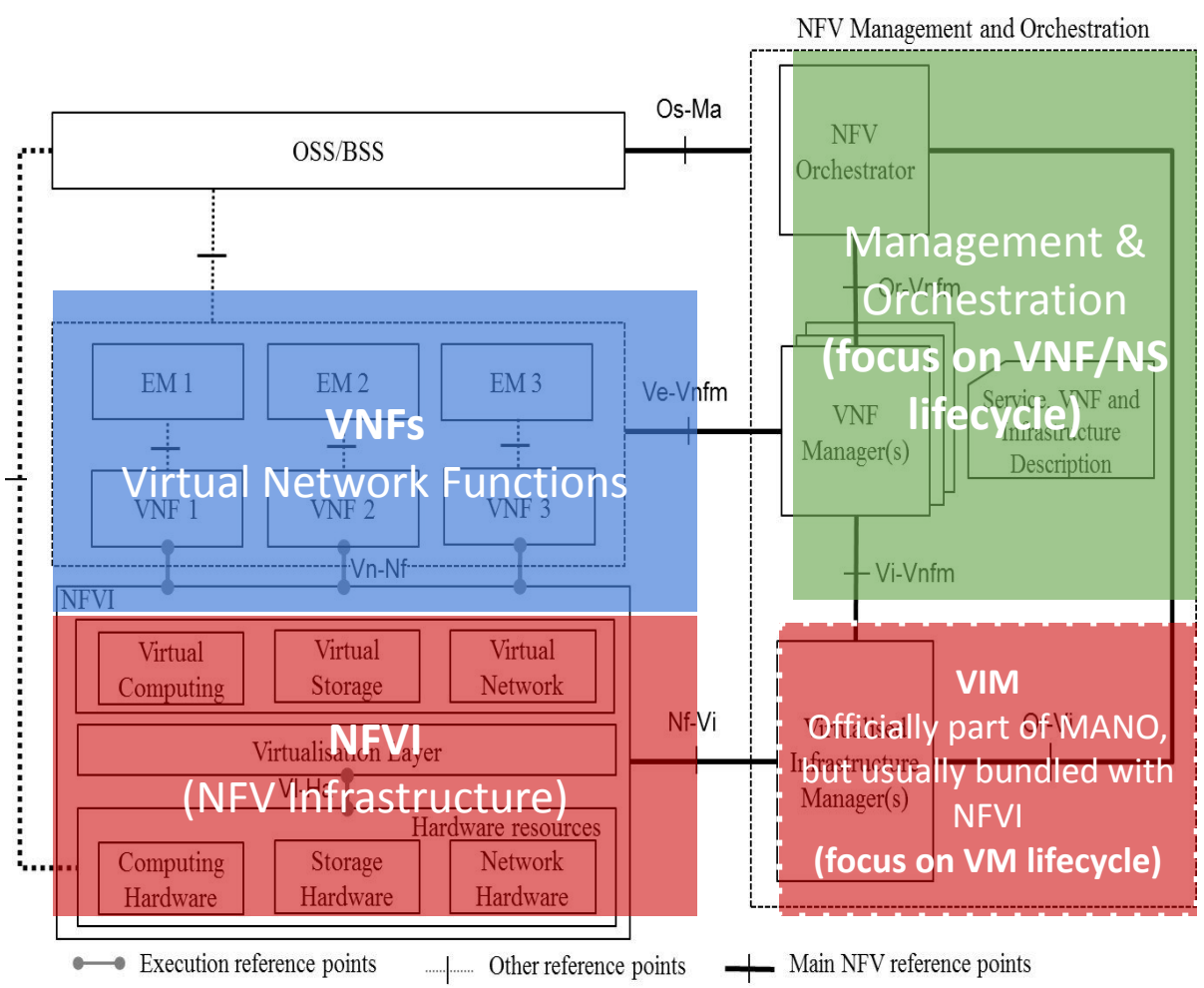
All of them need automated life-cycle management of network services for Day-0 to Day-N operations

# ETSI NFV stack



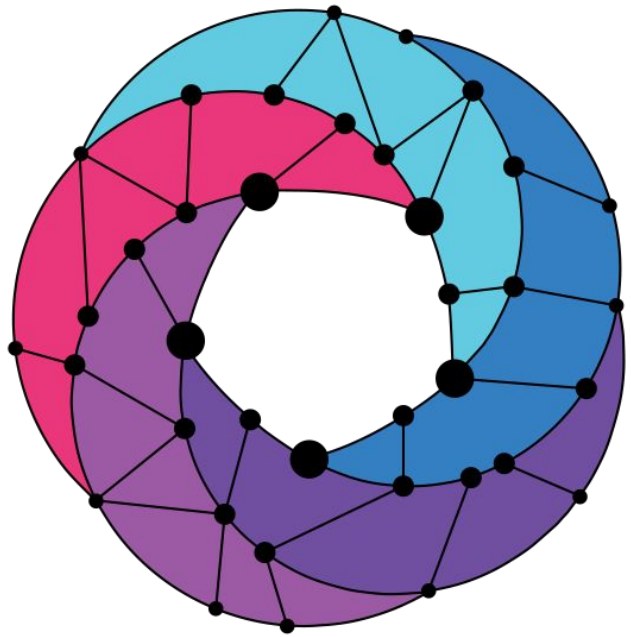

NFV Architecture defined in [NFV002]

# OSM in the ETSI NFV Architecture



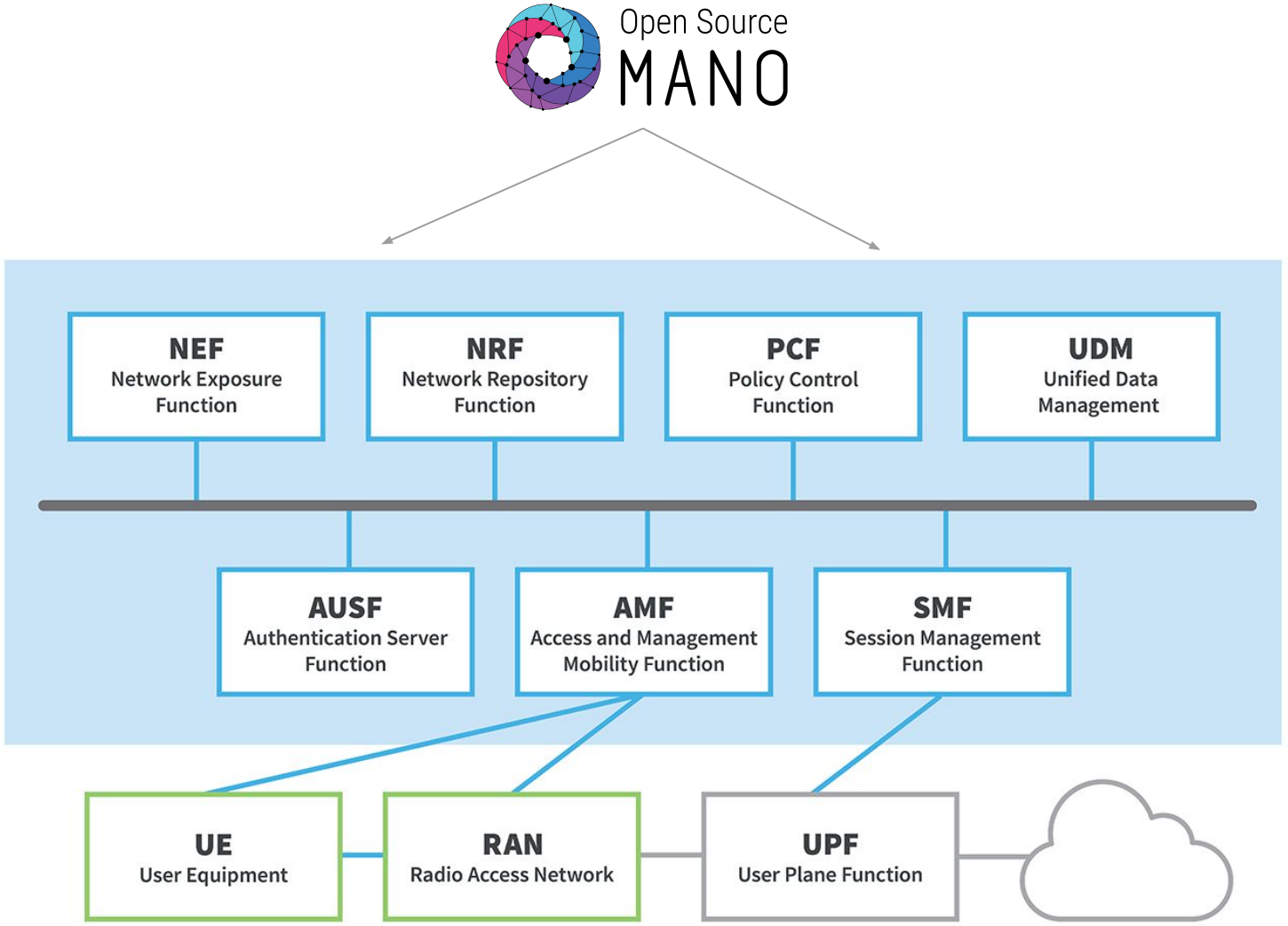

**We are here!**

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



# Open Source MANO

# OSM in the picture..



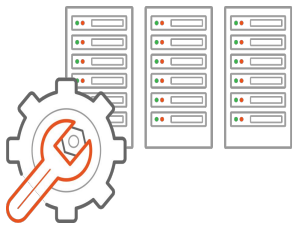

Open Source MANO

# Open Source MANO Simplifies Telco Cloud Management…

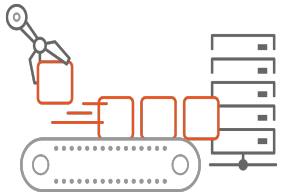
# How can OSM help to Telco Deployments?

Open Source MANO

Infrastructure Management

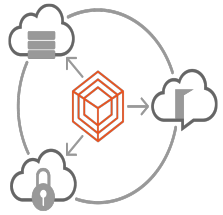


Network function On-boarding



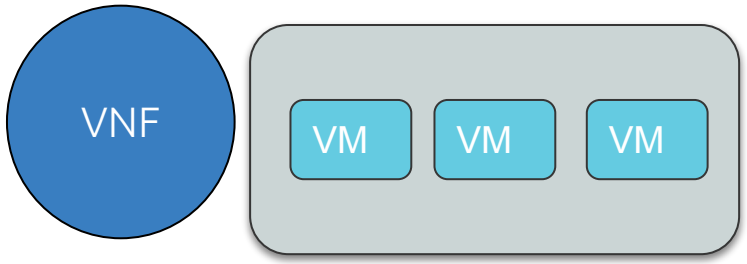
Network function Management

Scaling and Business Continuity

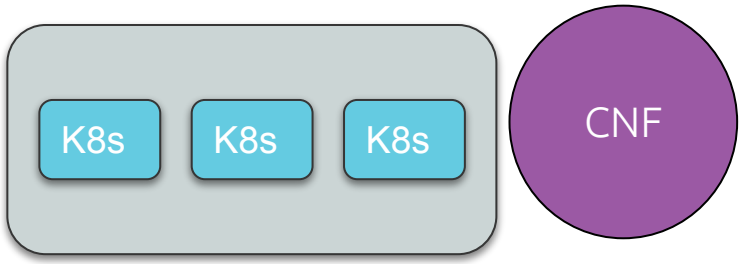


# Multiple types of Workloads, Single Engine

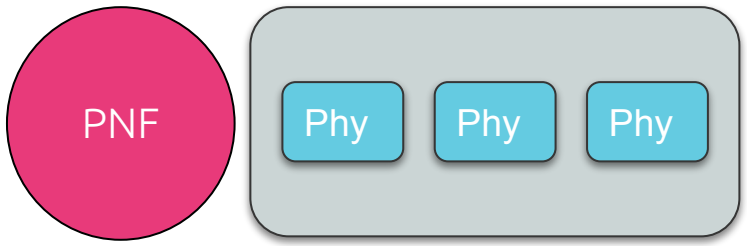
All VMs - Virtualized network function



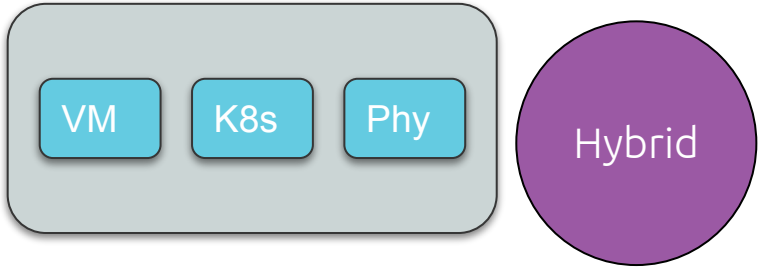

All Containers - Cloud-native network function



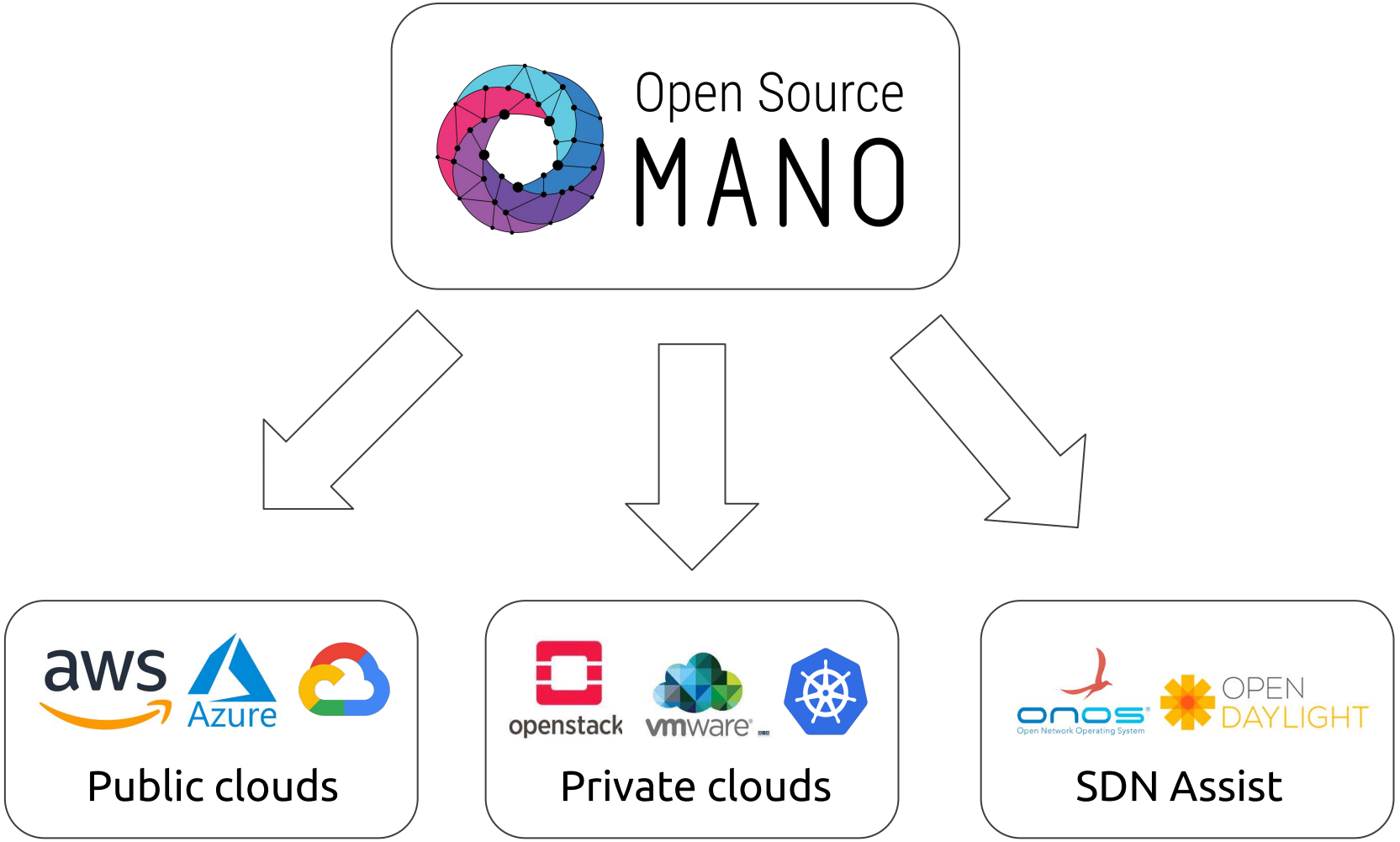

All Bare Metal - Physical network function



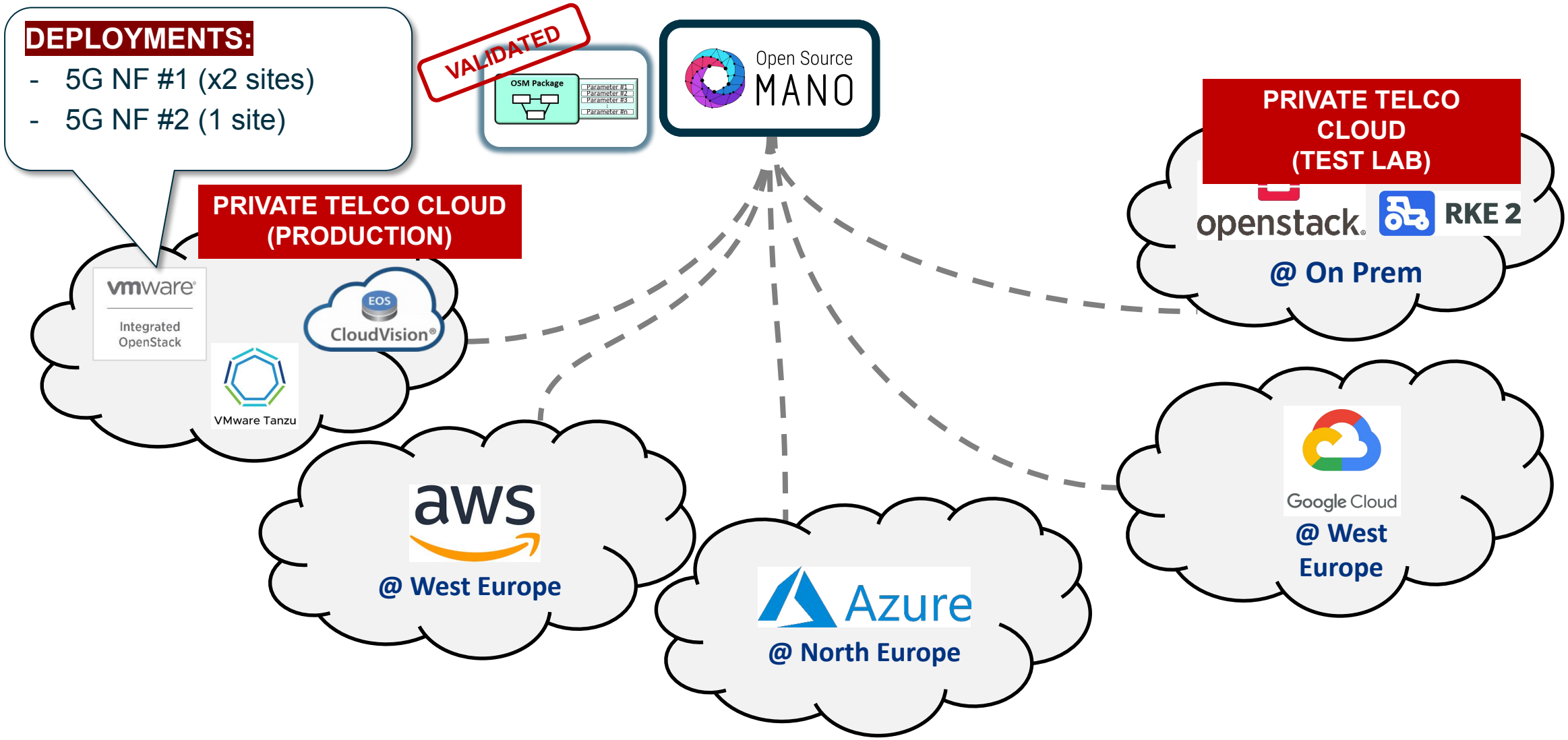

VMs, Containers and Physical - Hybrid network function



# Multi- VIM support



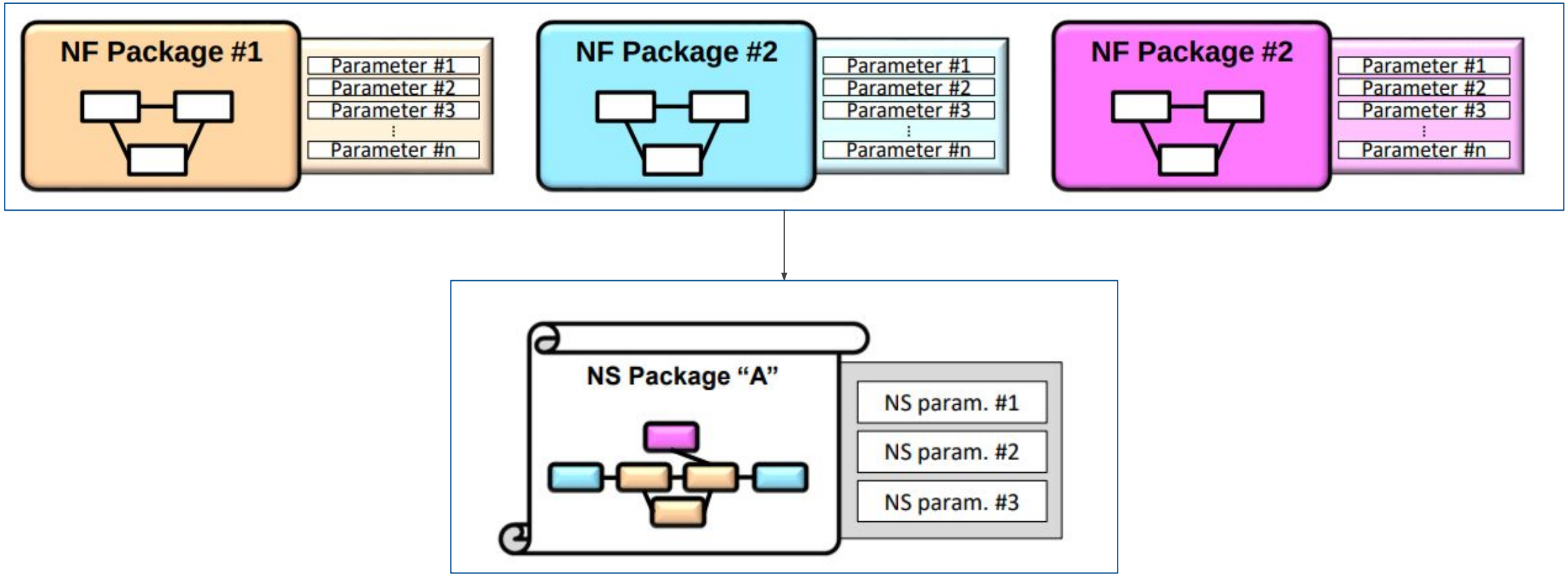
# Multi-Cloud Orchestration is a reality



# How this is possible?

Open Source MANO

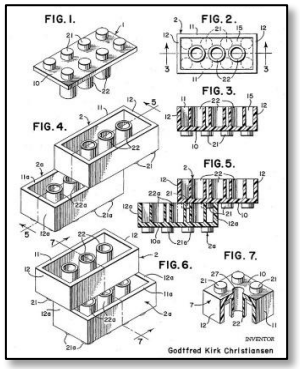
## Parameterized topologies and day1, day 2 operations

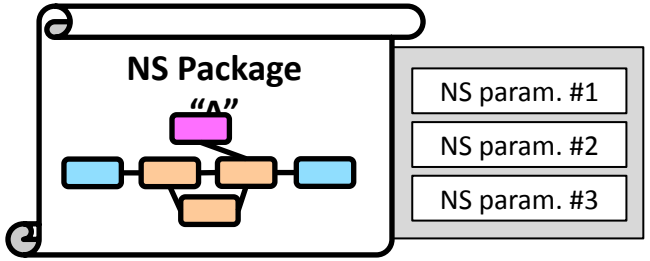


# Model-driven, portable and reusable VNF packages

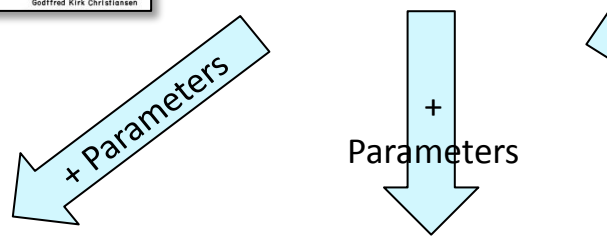
Open Source MANO

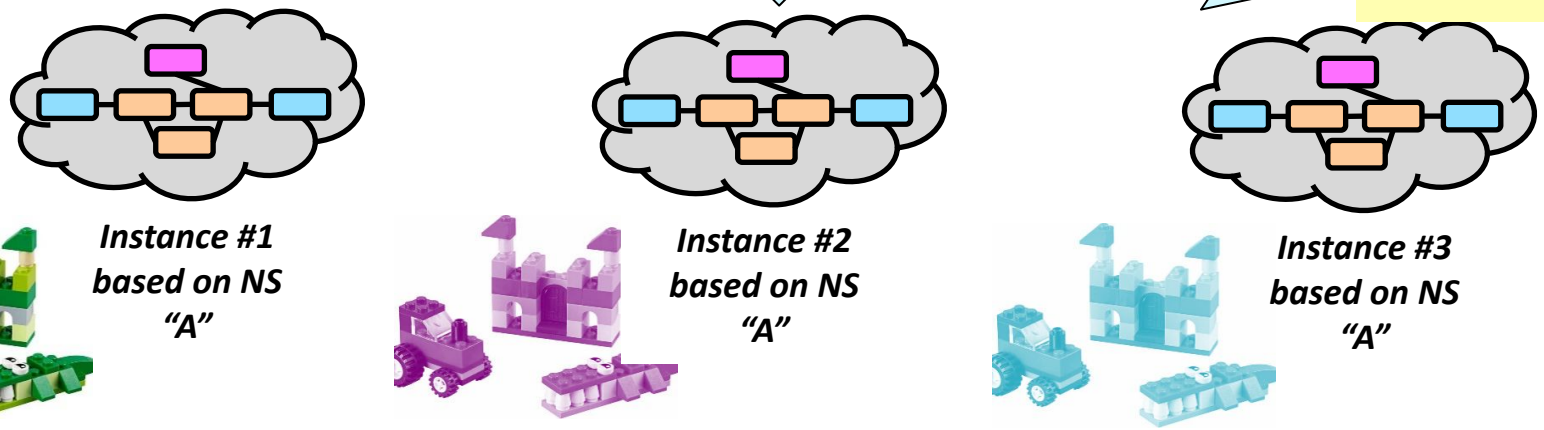
**NS PACKAGES / SLICE PACKAGES:**




**DEPLOYED INSTANCES:**



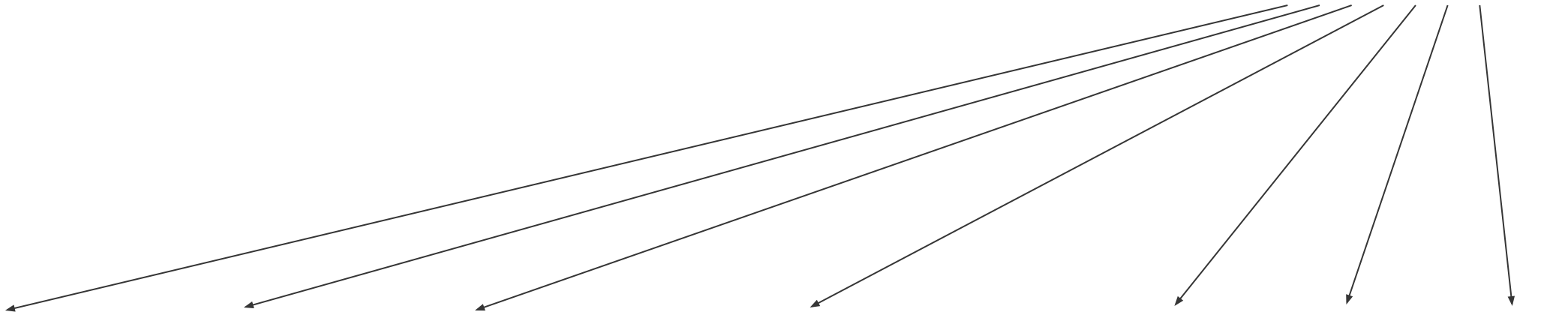

Upon instantiation, you just need to decide:

- The target VIM (or VIMs)
- Values for the parameters (IP addresses, keys, etc.)

# Juju drives Application Operations

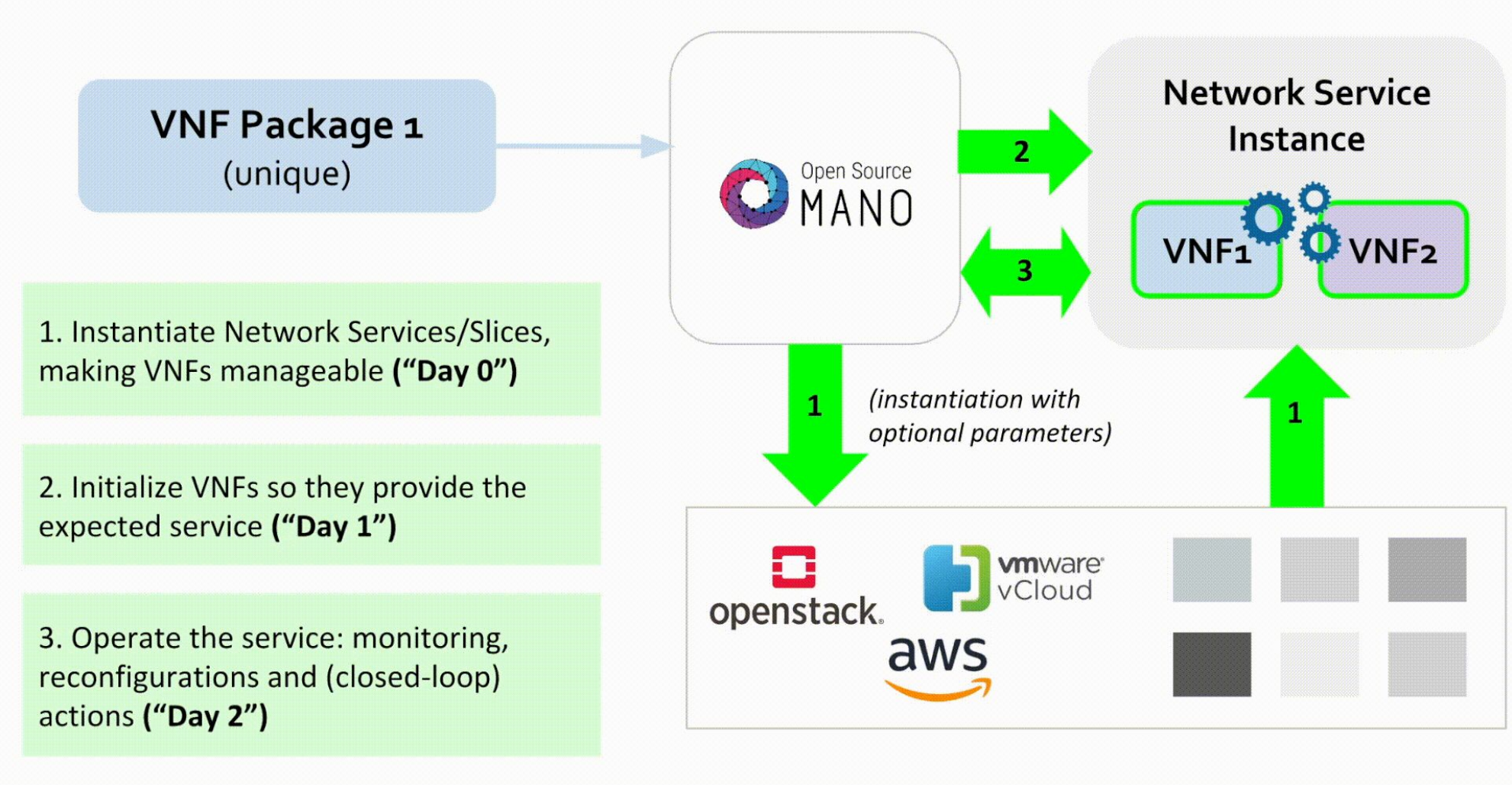
Open Source MANO

- 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




aws Microsoft Azure Google Cloud MAAS vmware openstack

# 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")**



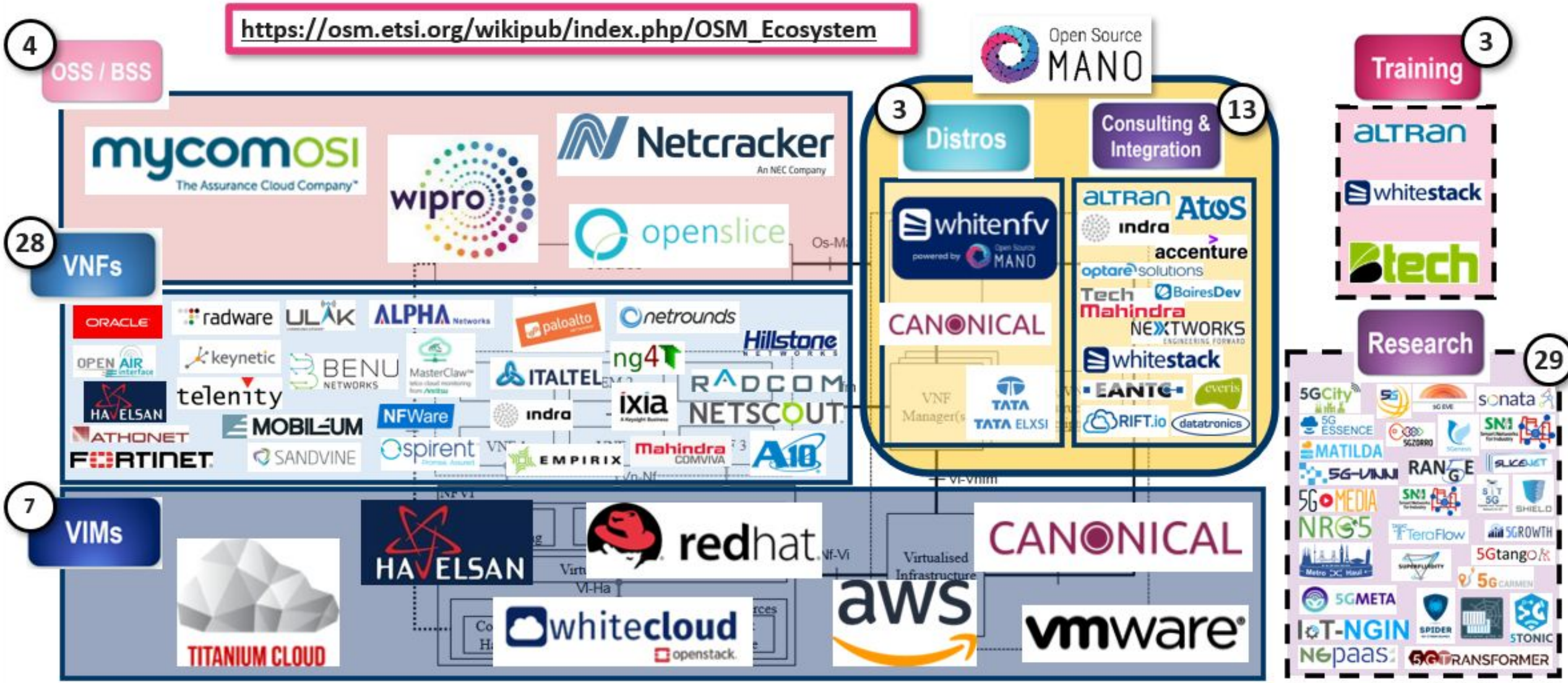
23

# OSM Community and Ecosystem

# OSM community is really **LARGE** and **DIVERSE**, with **150** members today, but always **OPEN** to new participants

Open Source MANO


# OSM Ecosystem



# OSM commercial distributions

Open Source MANO

[Charmed OSM](#)

CANONICAL

[TeOSM](#)

TATA

TATA ELXSI

[WhiteNFV](#)

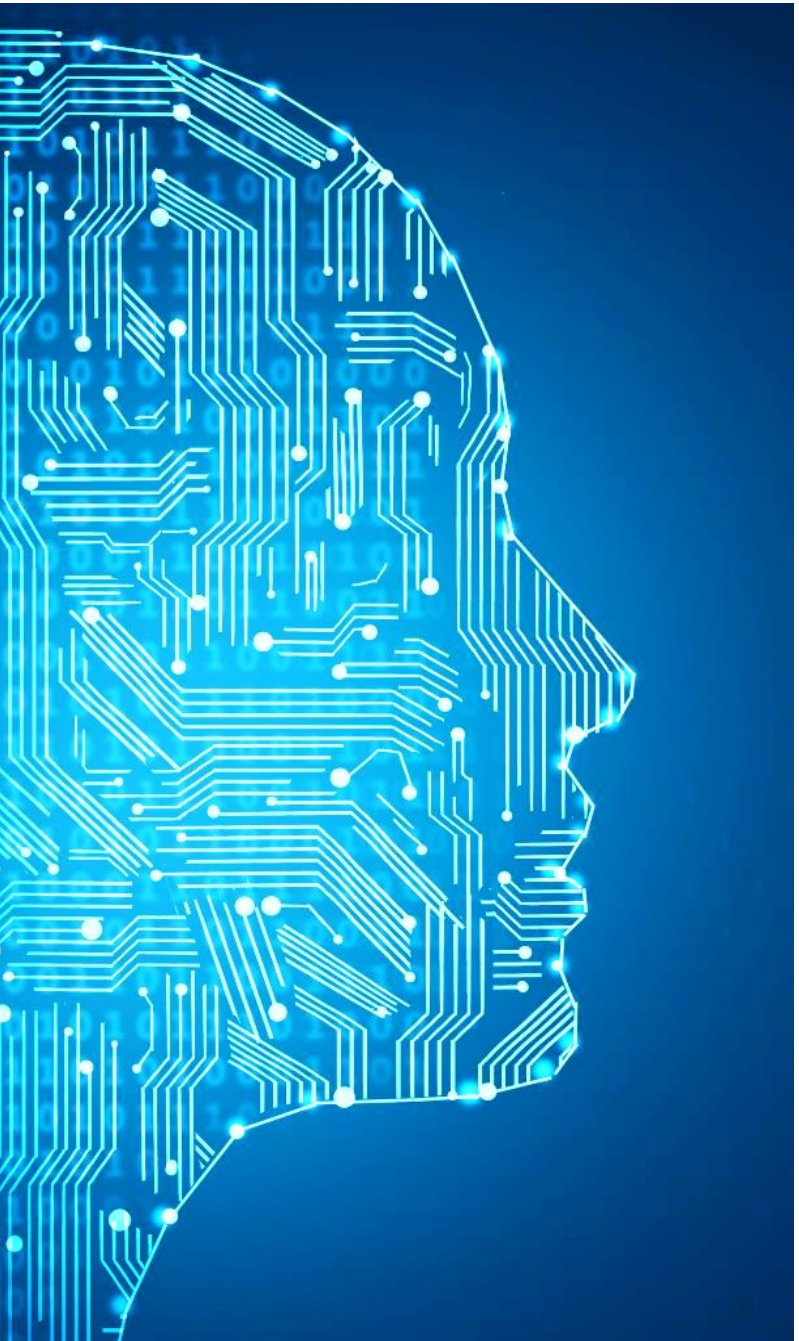
whitestack

Open Source MANO

# OSM Business Use Cases

B. Ramesh Ramanathan

TATA ELXSI



# Agenda

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

Open Source
MANO

# Telecom Operator Woes

# Telecom Operator Woes

Cheap Data and Voice

**Mr. Kumar**, CEO of Telecom Operator

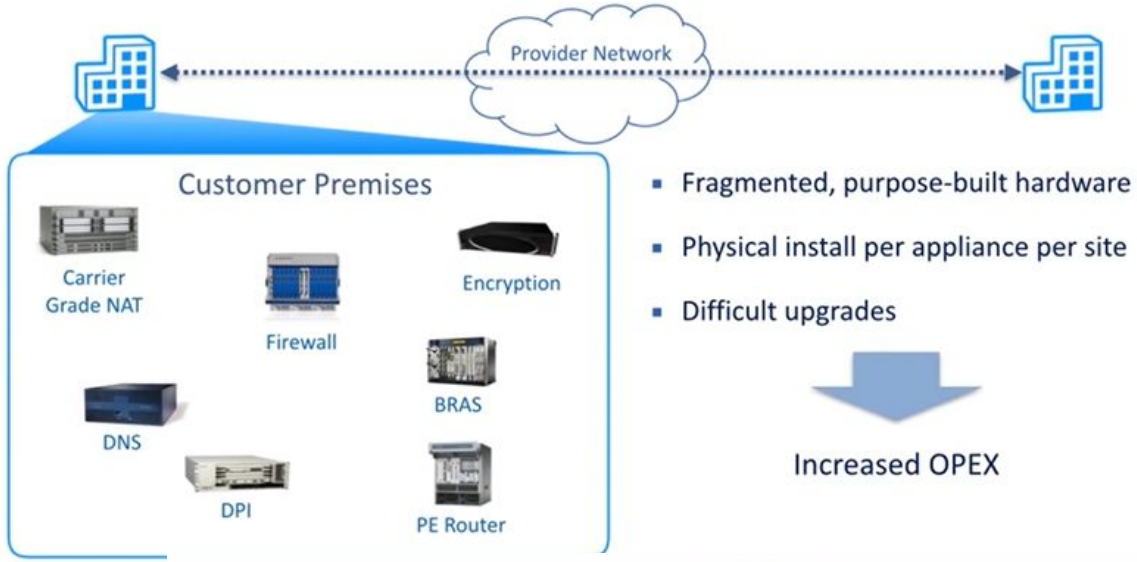

Government Regulations

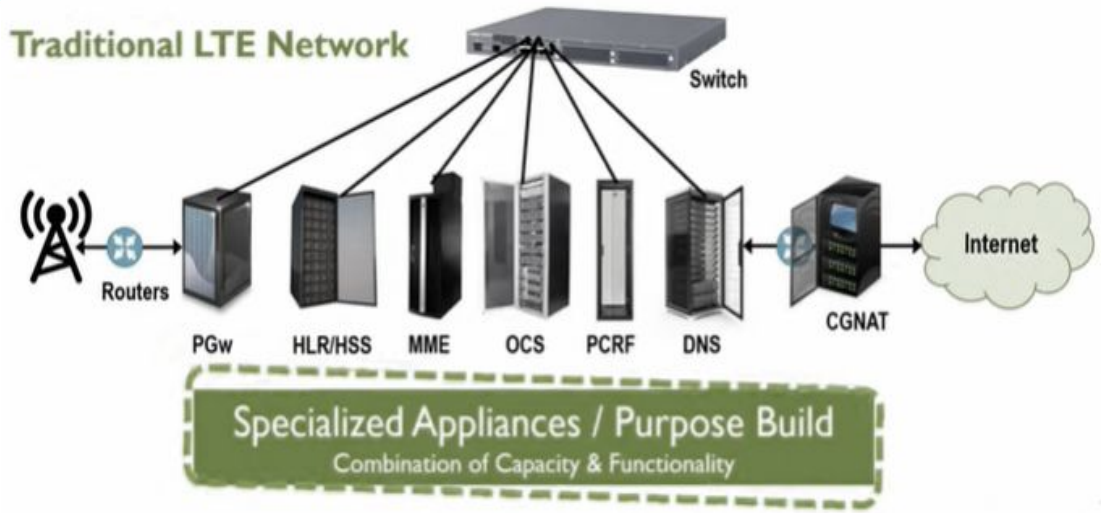
# Customer Interests



More than speed, the main difference between 4G and 5G is the fact that 5G is an application aware network

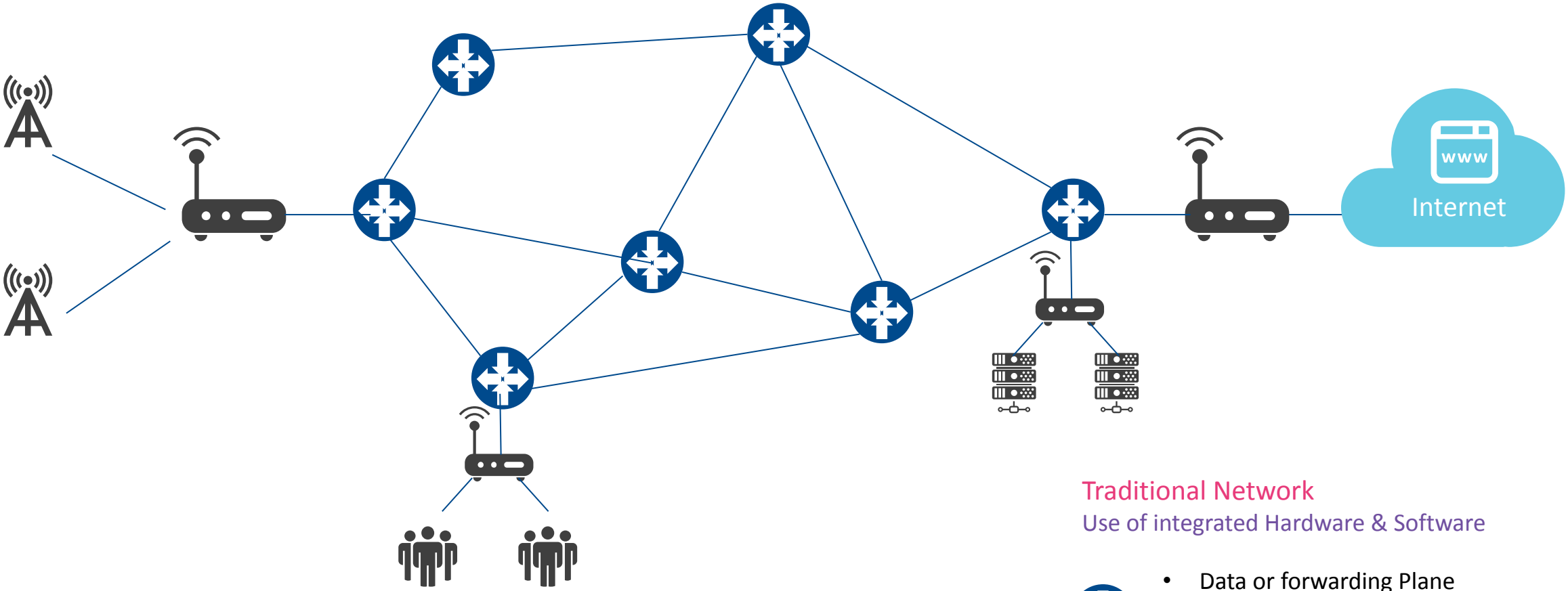
# Traditional Network Functions & the Challenges




- 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

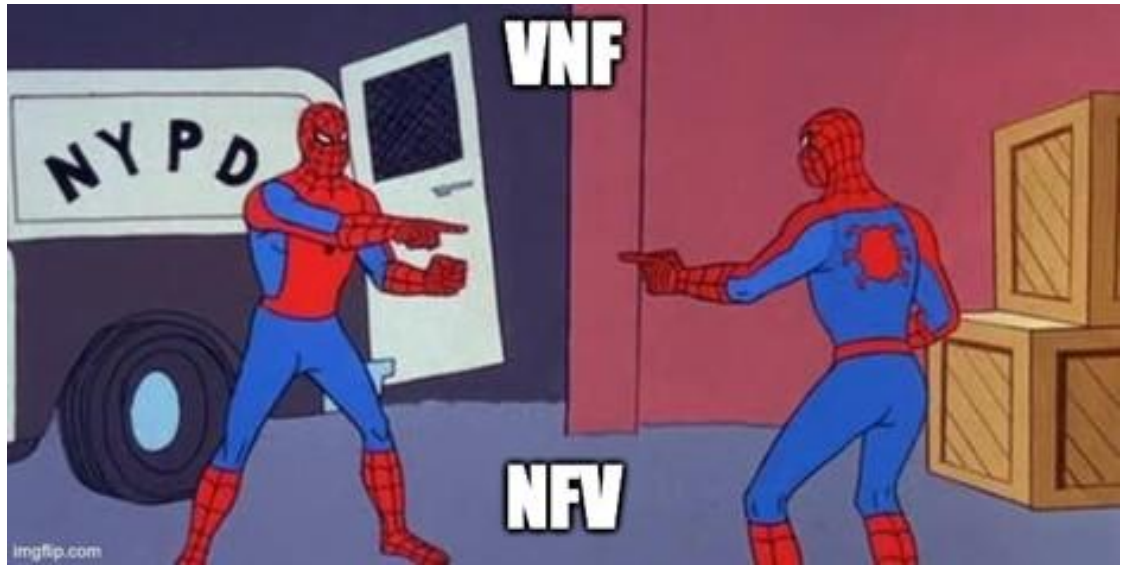


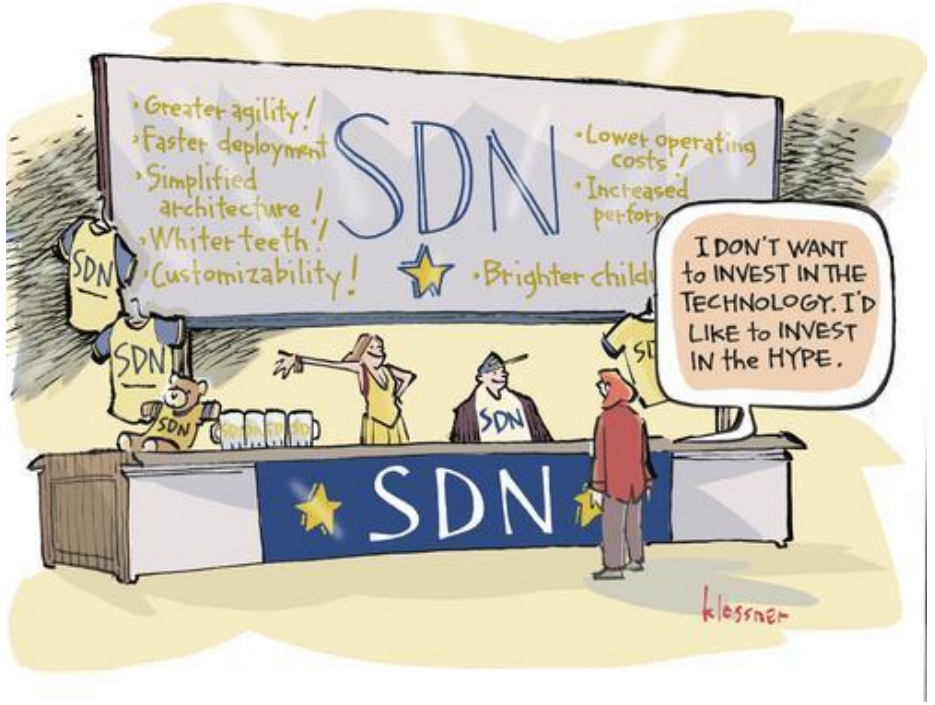

Traditional Network

Use of integrated Hardware & Software

- Data or forwarding Plane
- Control Plane
- Management PLane

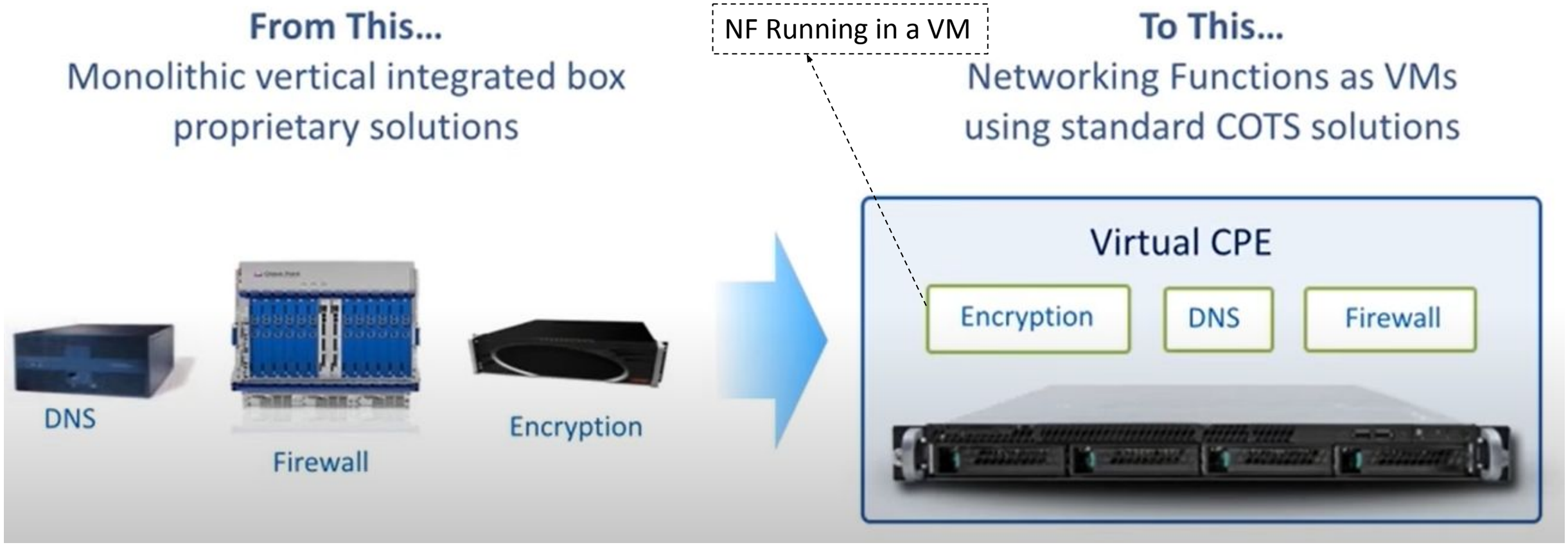
# The Holy Grail – SDN & NFV



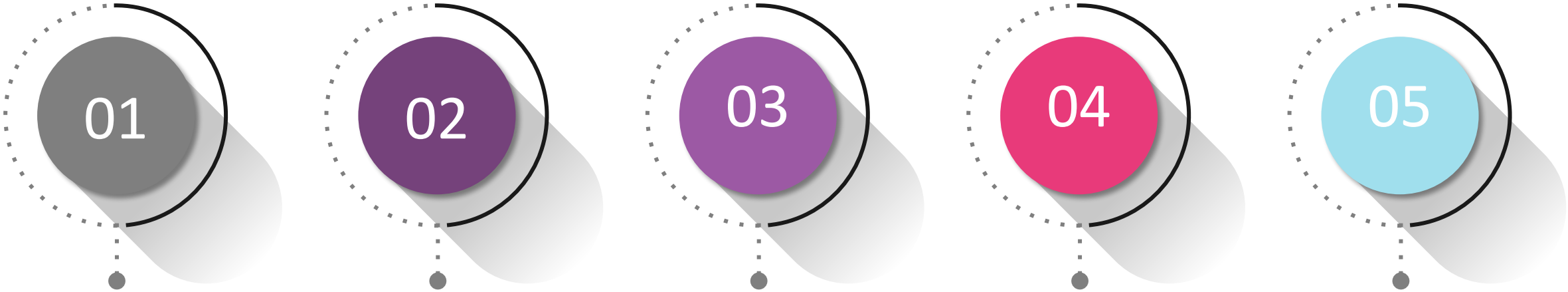

**NFV** – Network Function Virtualization
**SDN** – Software Defined Networking

# Magic of NFV – VNFs and CNFs



# Advantages of NFV driven Telco Cloud

Open Source MANO




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.

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

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

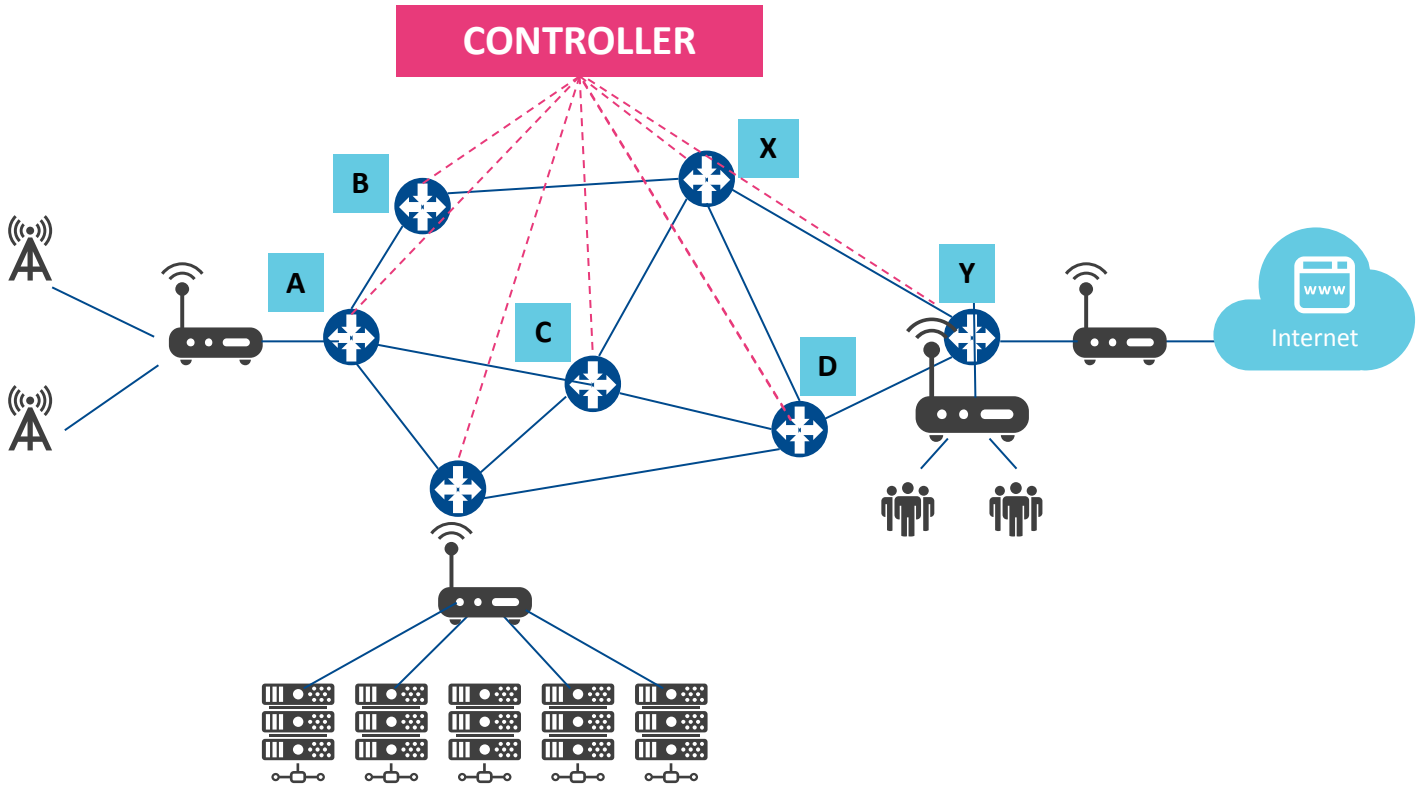
Interoperability of network functions from different vendors can be handled with ease as NFV provides standards and definitions which allows orchestrator to model and to maintain its lifecycle.

Software centric network enable large scale collection of data from multiple tap points for data correlation and associated assurance.

# SDN – Delivering a Programmable Network

Open Source MANO

## SDN: Separation of Control & Data Layer




## 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

## 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

OSM Admin Portal

NFV MANAGEMENT & ORCHESTRATION LAYER

Open Source MANO by ETSI

VNF CATALOG

VNF INSTANCES

NFVI RESOURCES

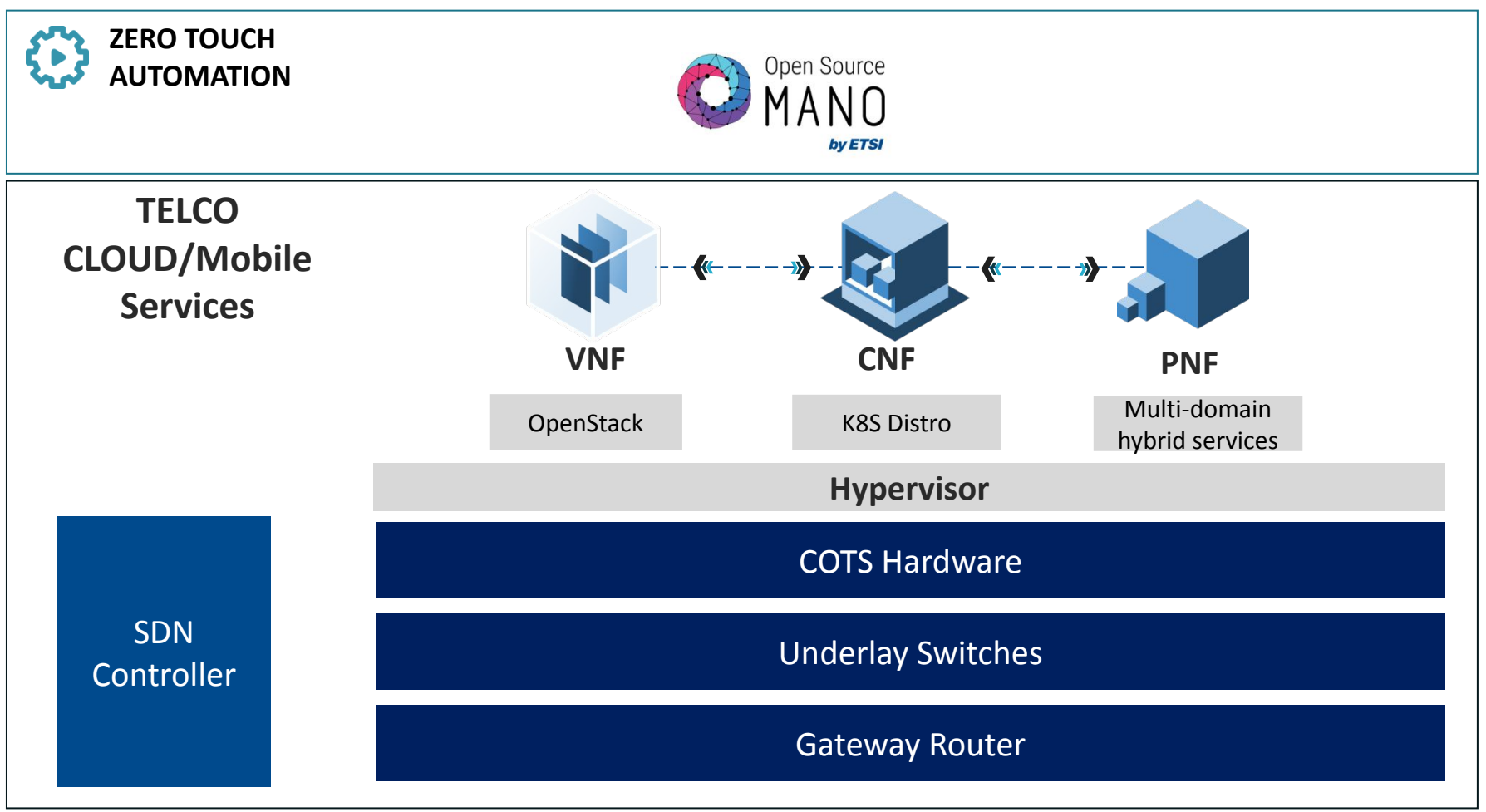
VIM

# Automated and Orchestrated Telco Cloud Solution

Open Source MANO

Management and Orchestration by **OSM**

Control, data and signaling plane



Open Source
MANO

# Open Source MANO & Business Use Case

# Show me the money!

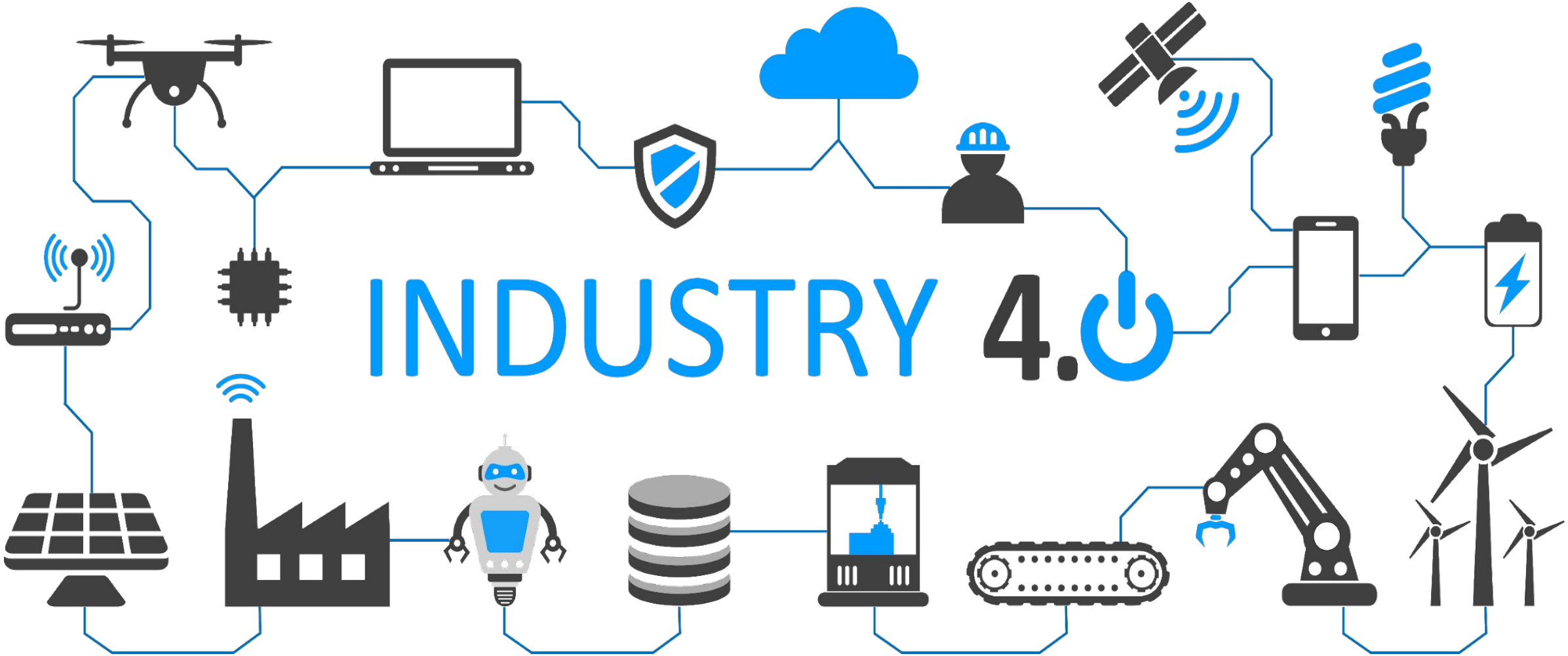
## Operational Benefits

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

## Business Benefits

- Network Slicing
- IOT
- Industry 4.0
- Private 5G
- Edge MEC Applications

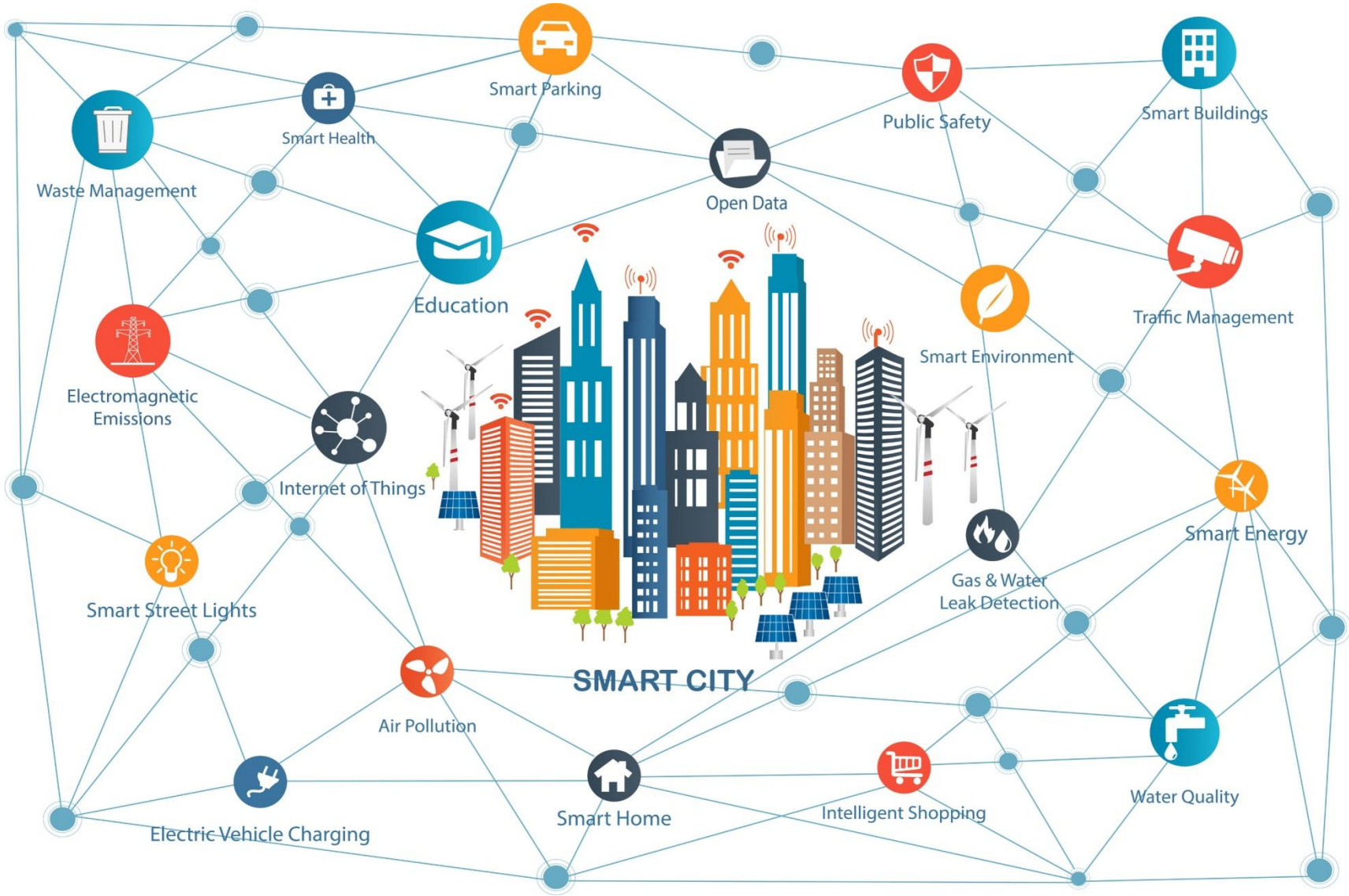
# Industry 4.0



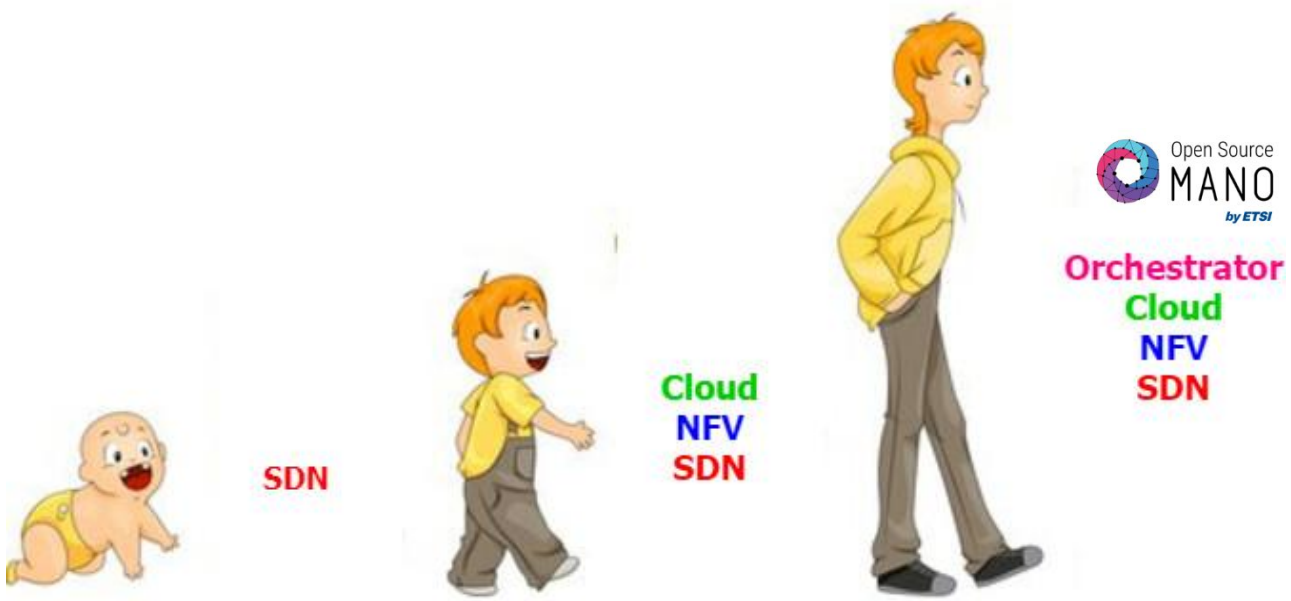
# Software Defined Vehicles

# Smart Energy

# Smart City

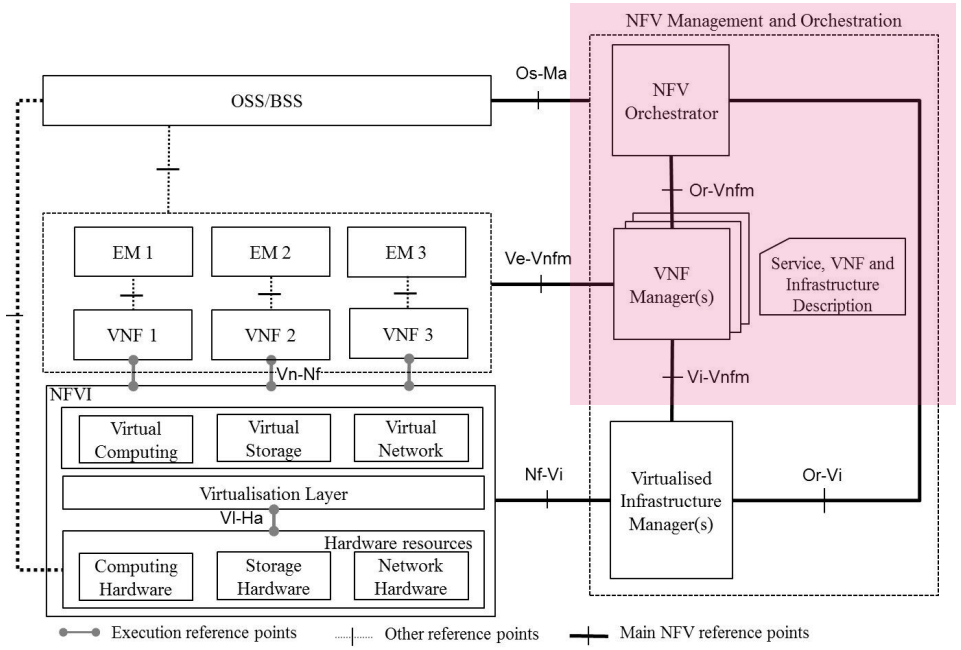


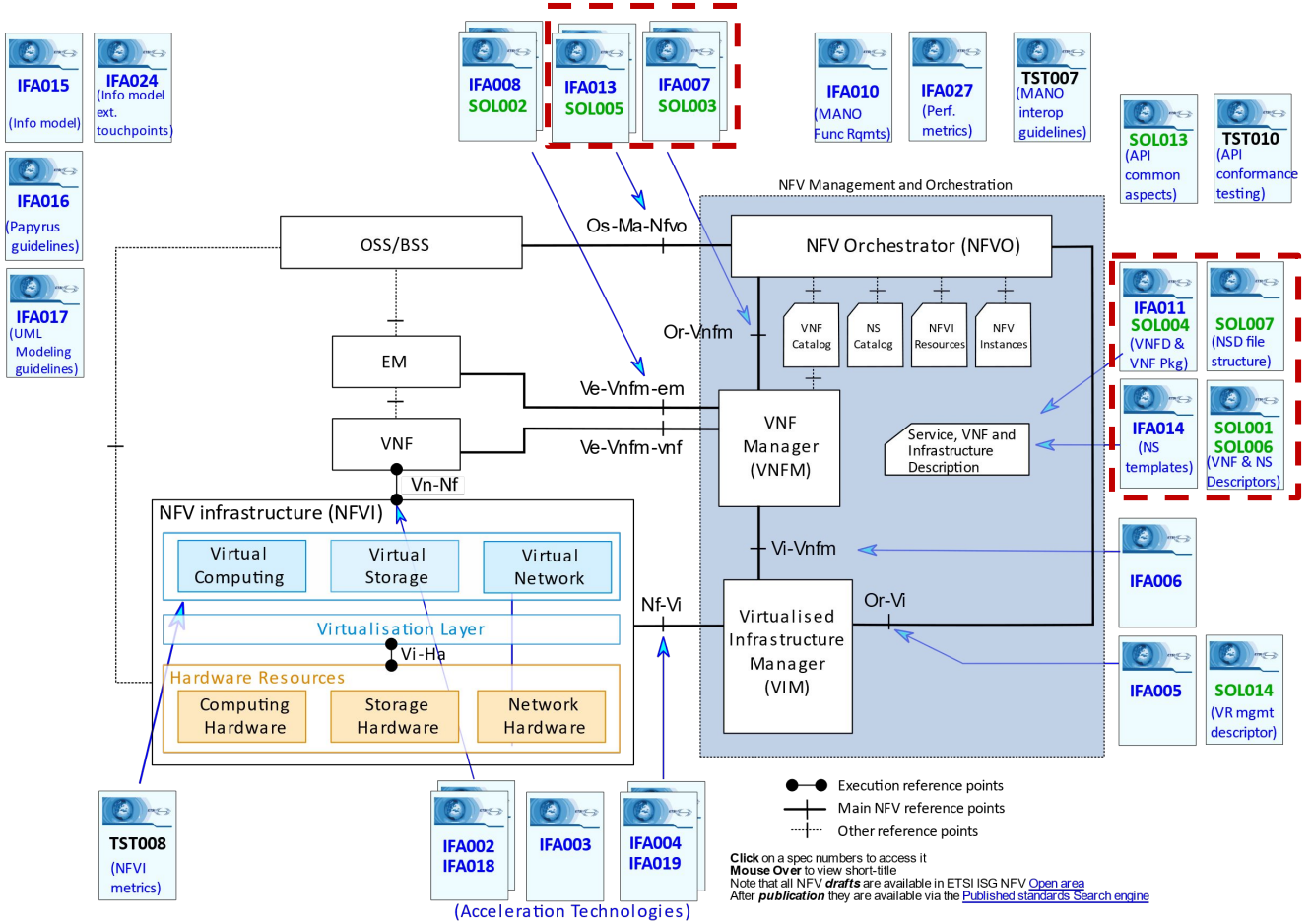
# Progression of Telco Clouds



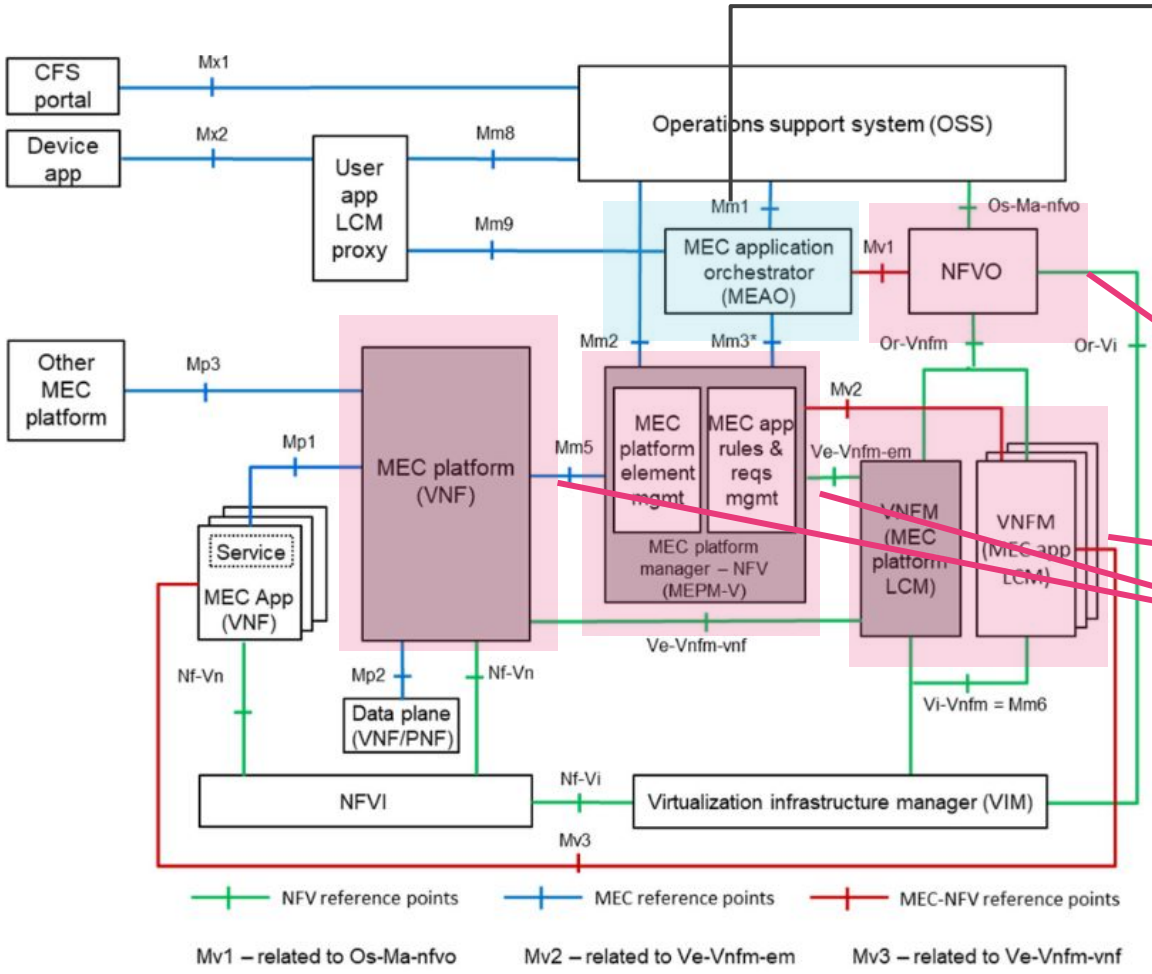
# ETSI OSM relation to Reference Architectures

# OSM in ETSI NFV Architecture



# OSM in ETSI MEC Architecture




Potential Functionality in OSM

OSM is here!!

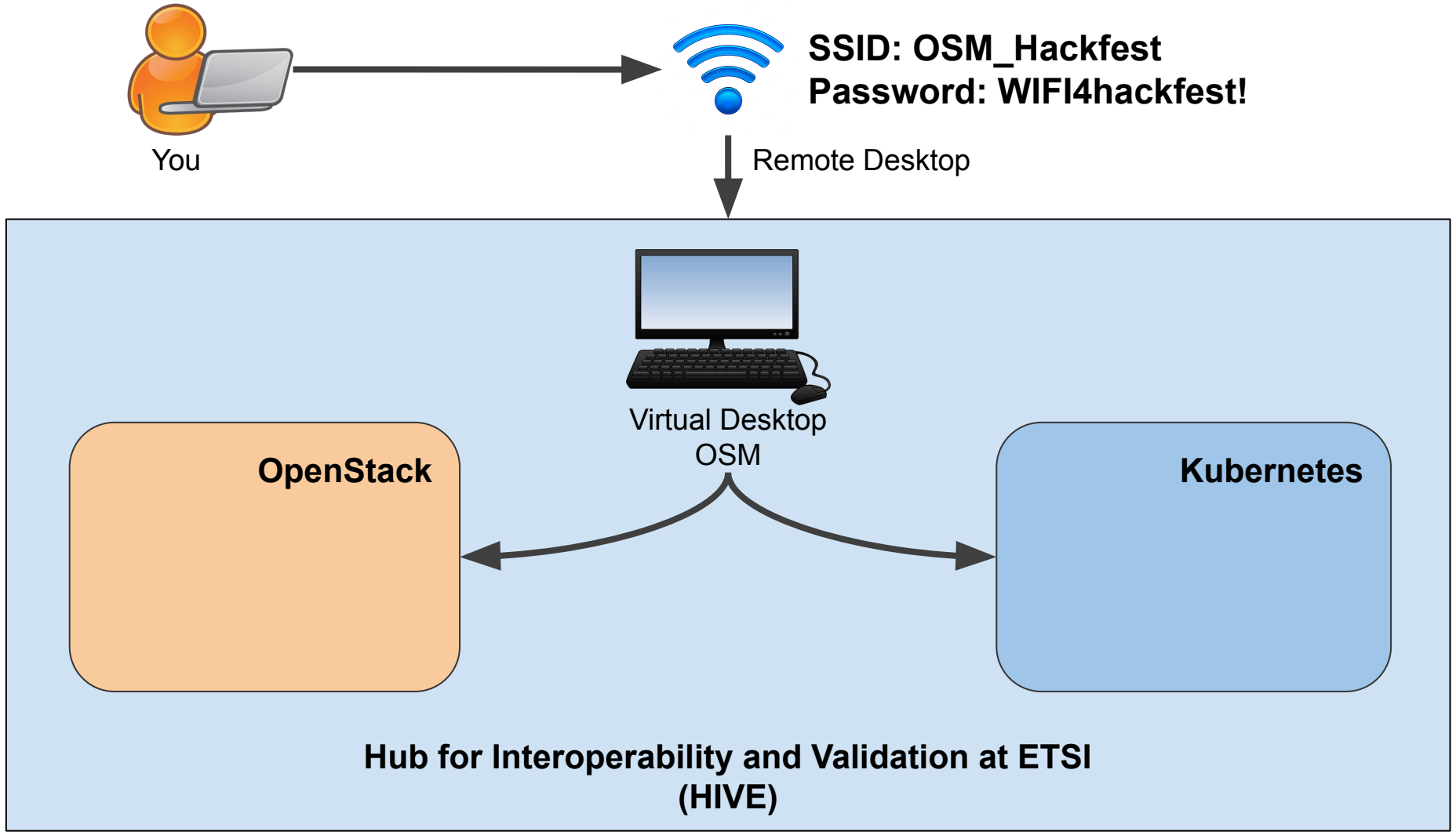
- MEC platform and MEC apps as NF for OSM
- NF LCM
  - NF Onboarding
  - NF Instantiation
  - NF Operation

Open Source MANO

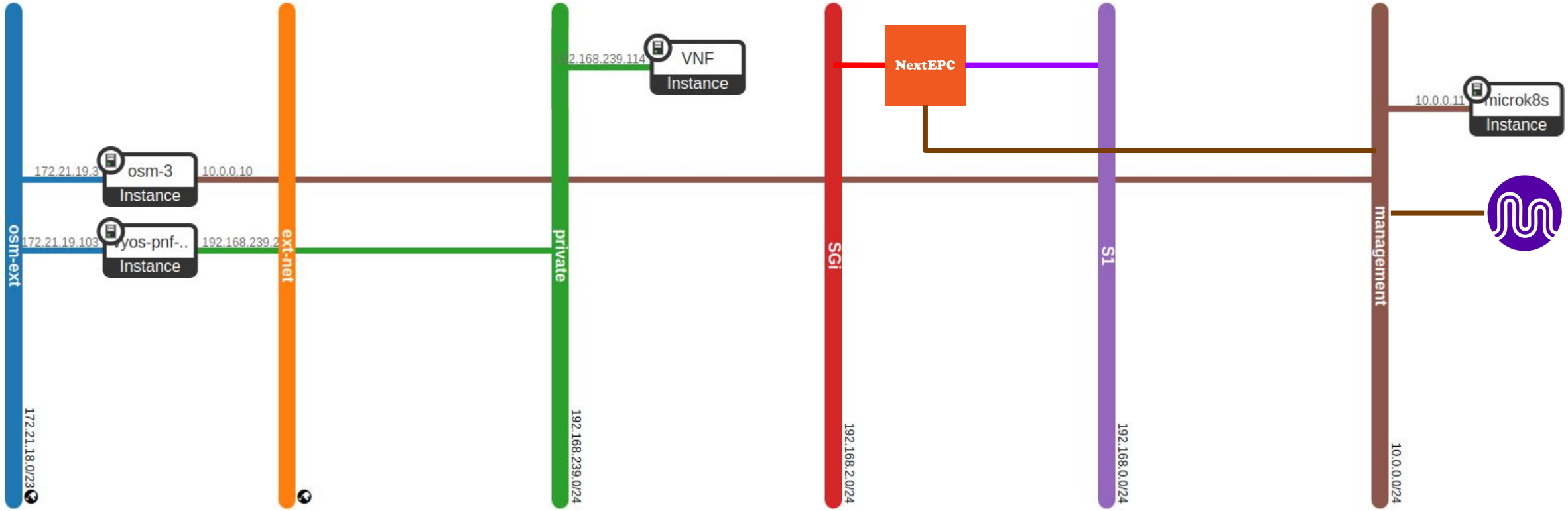
# Thank you

# And…
# Welcome to the Hackfest

# Hackfest Environment



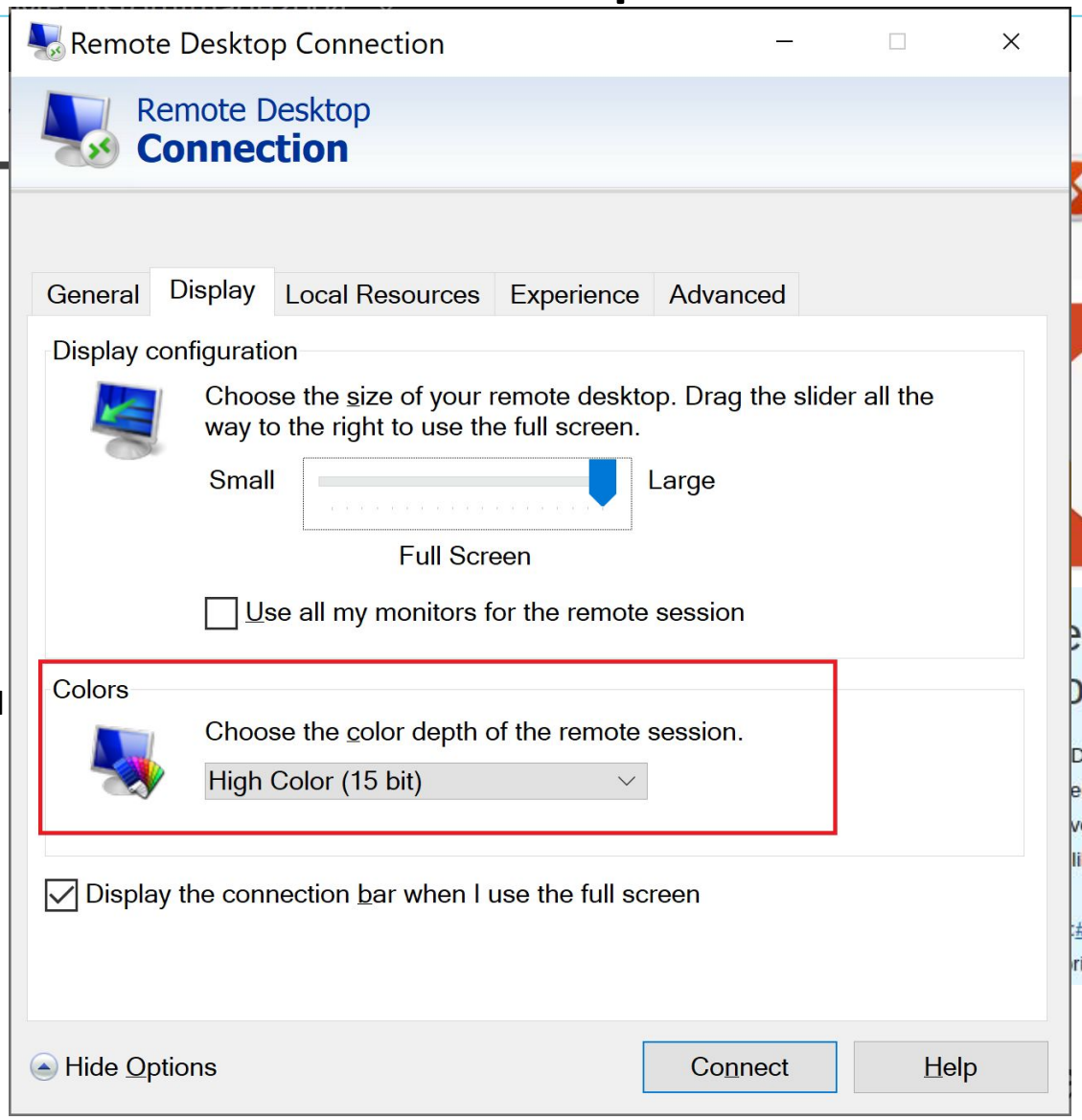
# Your Openstack Tenant

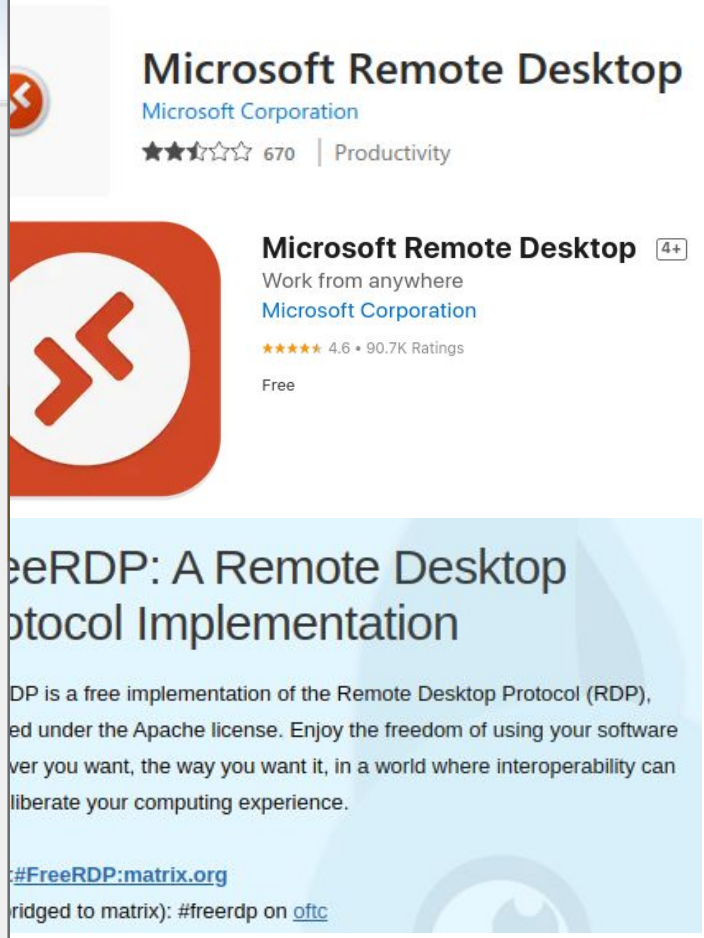


# Hands On Time

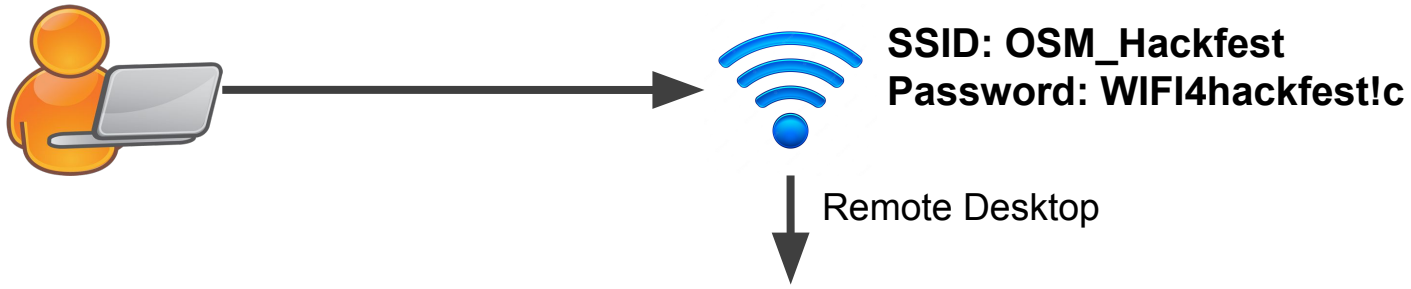
# Logging Into Remote Desktop

ctrl-alt-t - Launch a terminal

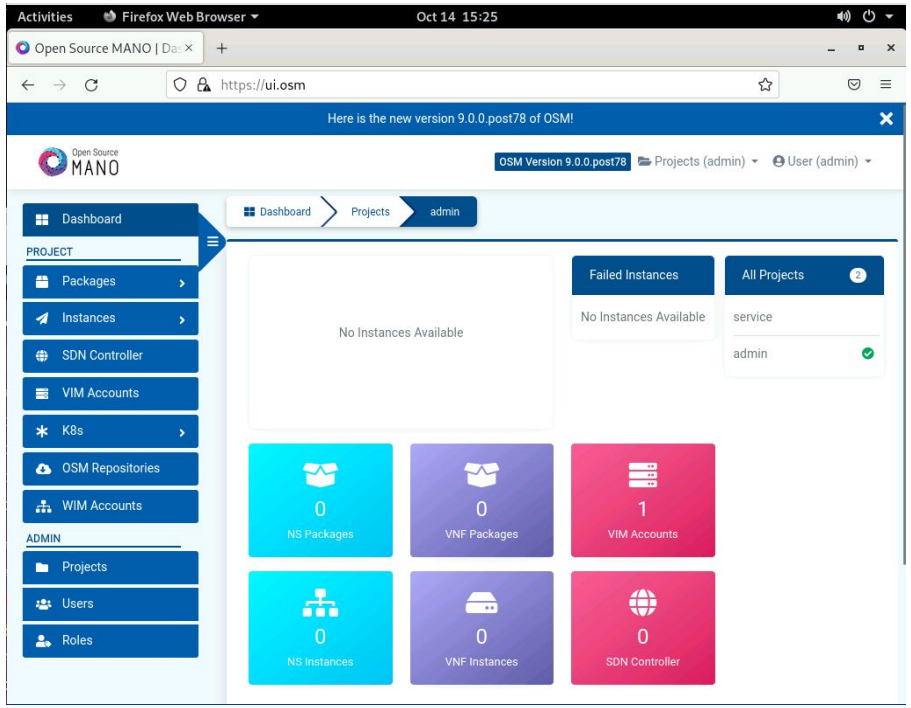


# Logging Into OSM

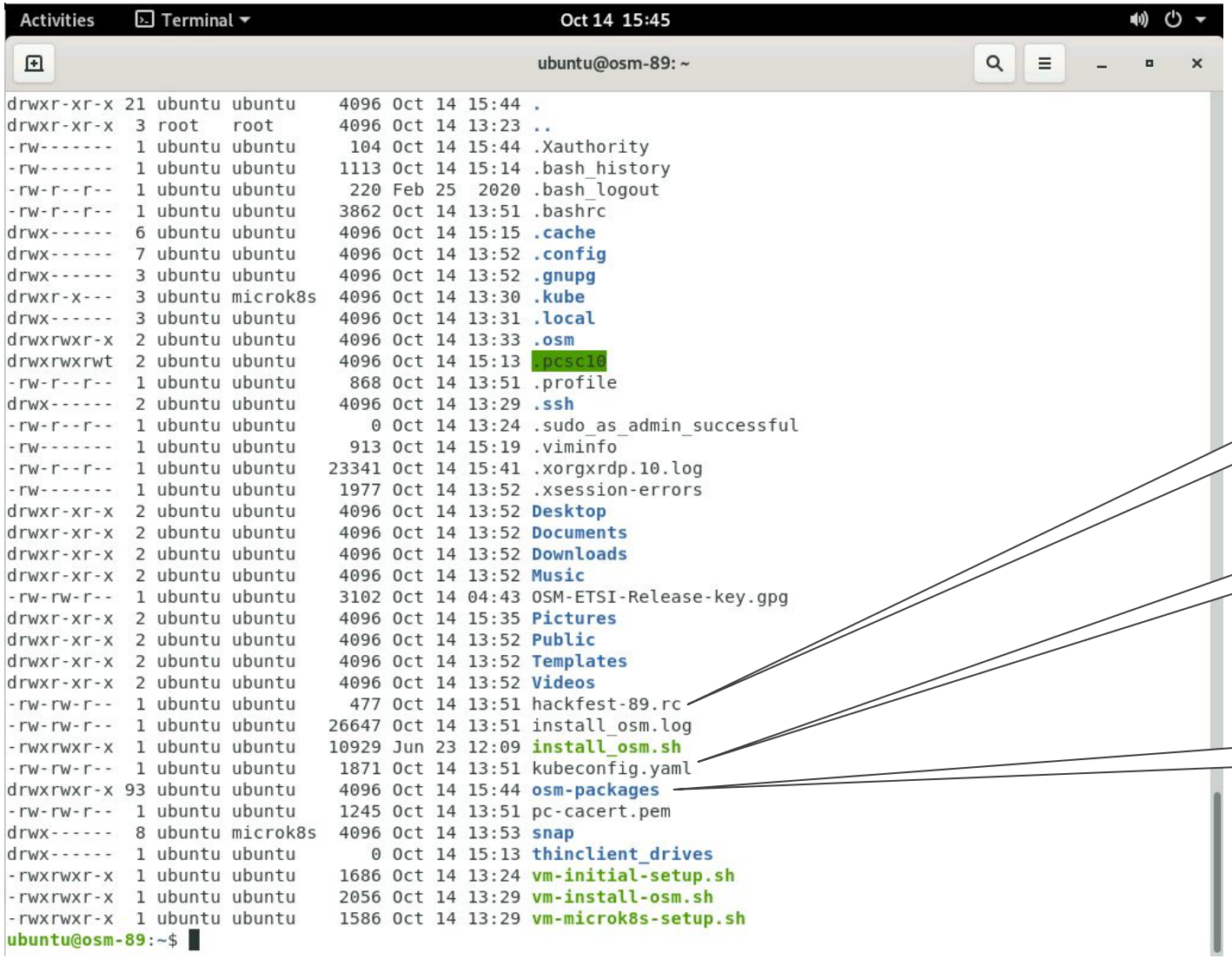



firefox https://ui.osm




Username: admin
Password: hackfest

# Taking a Look Around



# Hands On

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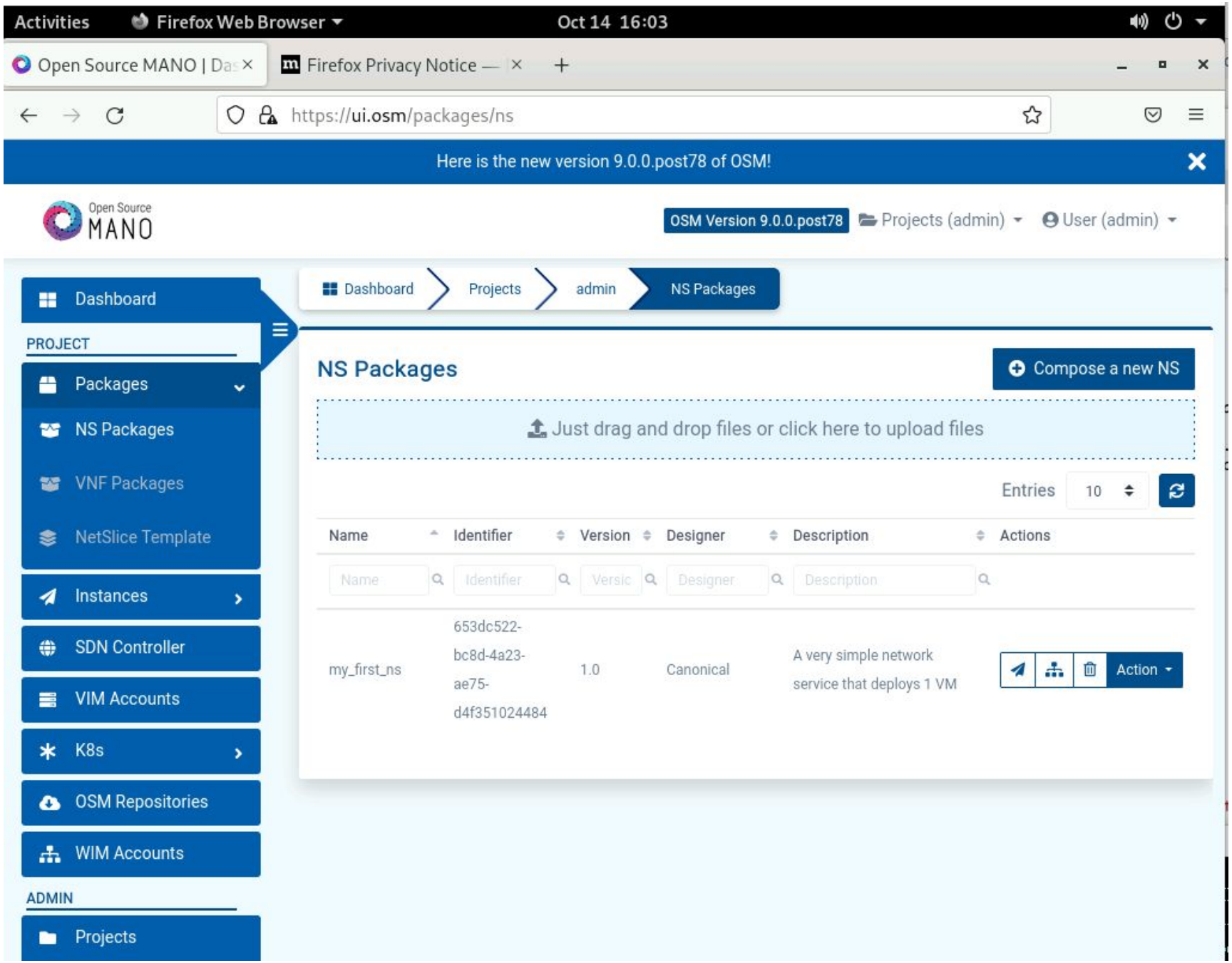
```
cd osm-packages/Hackfest_Demos/OSM-MR13/1.1-Welcome/
```

```
./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
================================================================================
```

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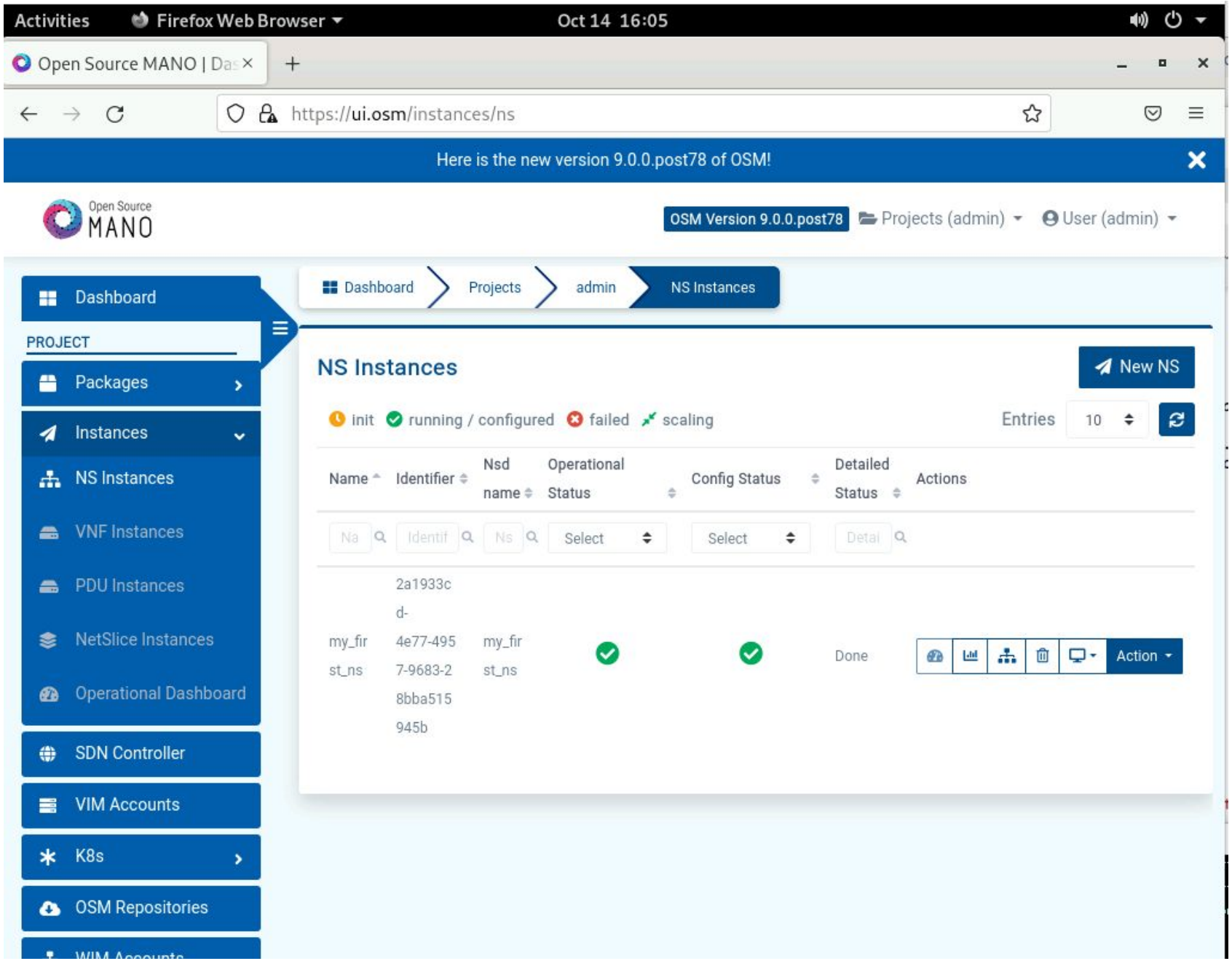
# Hands On

./2.Launch_Network_Service.sh

```
========================================================================
Launching network service
========================================================================
2a1933cd-4e77-4957-9683-28bba515945b
========================================================================
Done
========================================================================
```

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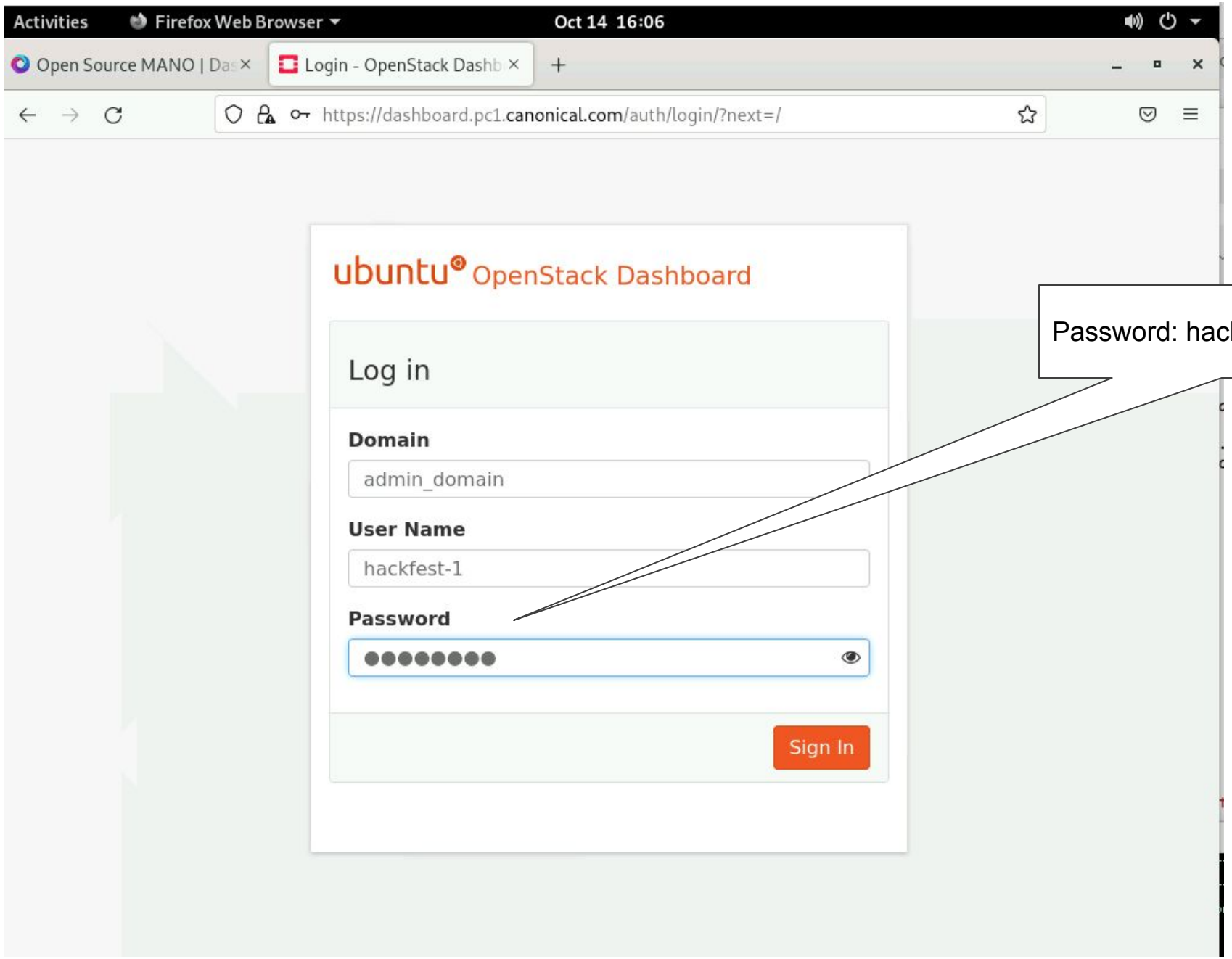
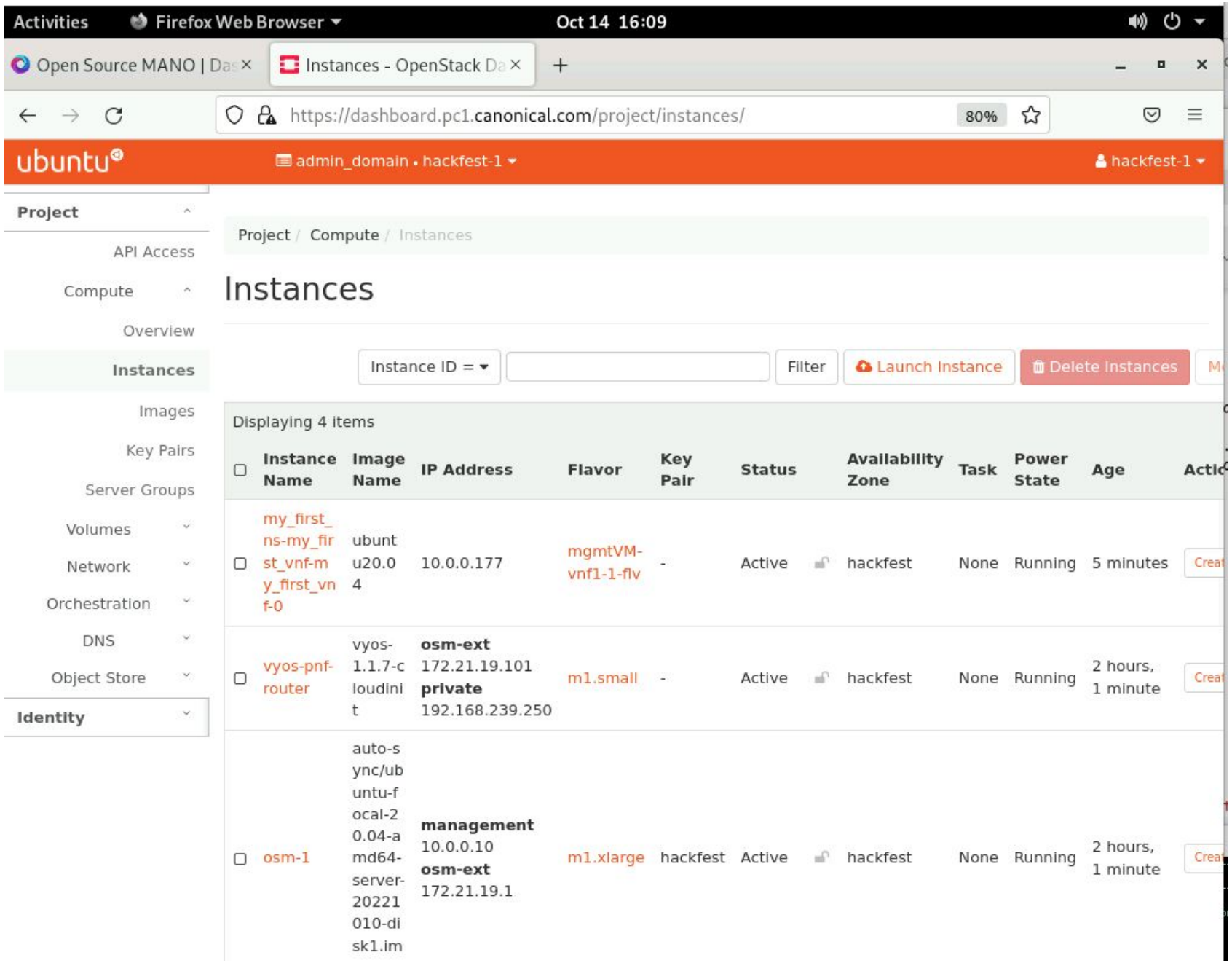

Activities
Firefox Web Browser
Oct 14 16:06
Open Source MANO | Das
Login - OpenStack Dashb
https://dashboard.pc1.canonical.com/auth/login/?next=/
ubuntu OpenStack Dashboard
Log in
Domain
admin_domain
User Name
hackfest-1
Password
Sign In
Password: hackfest

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# Congratulations!

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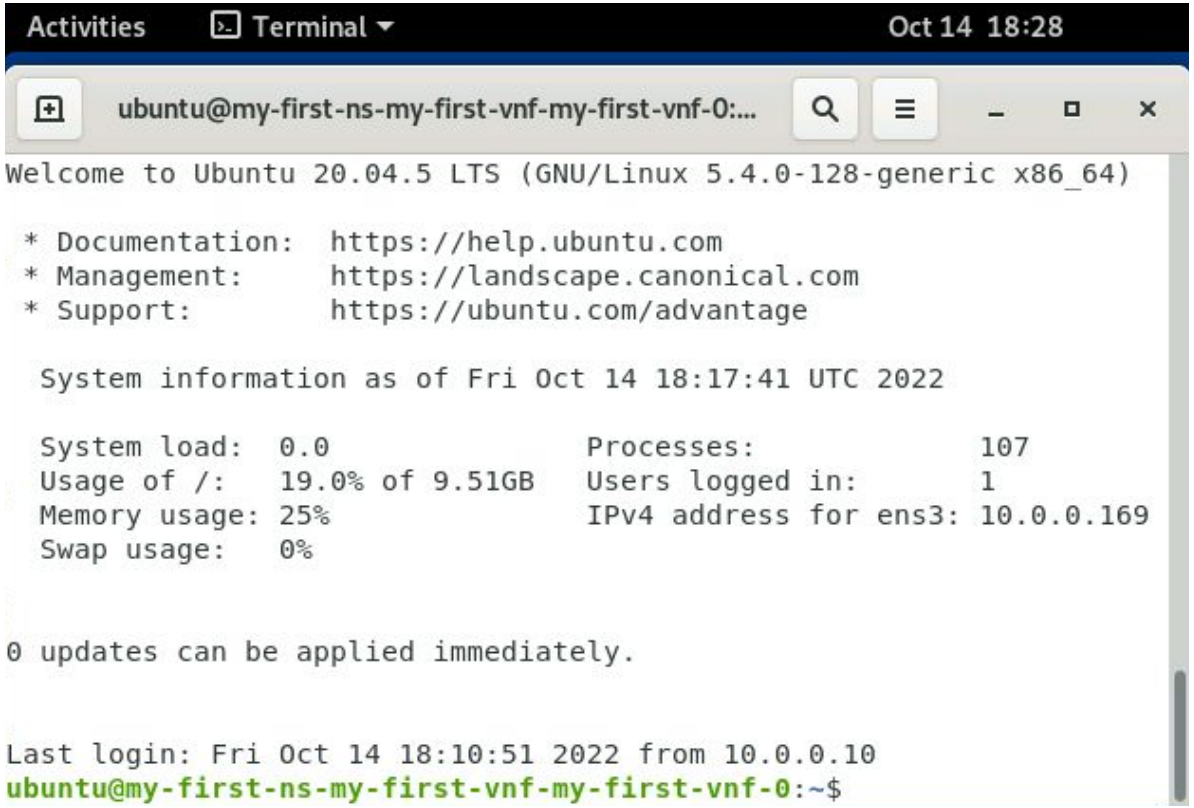
```
./3.Get_IP_Address.sh
============================================================
Waiting for deployment to finish
============================================================
| my_first_ns | bb114a6b-7dec-439a-8e2d-01cd72680784 | 2022-10-14T12:14:22 | READY | IDLE (None) | N/A |
============================================================
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

## ./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

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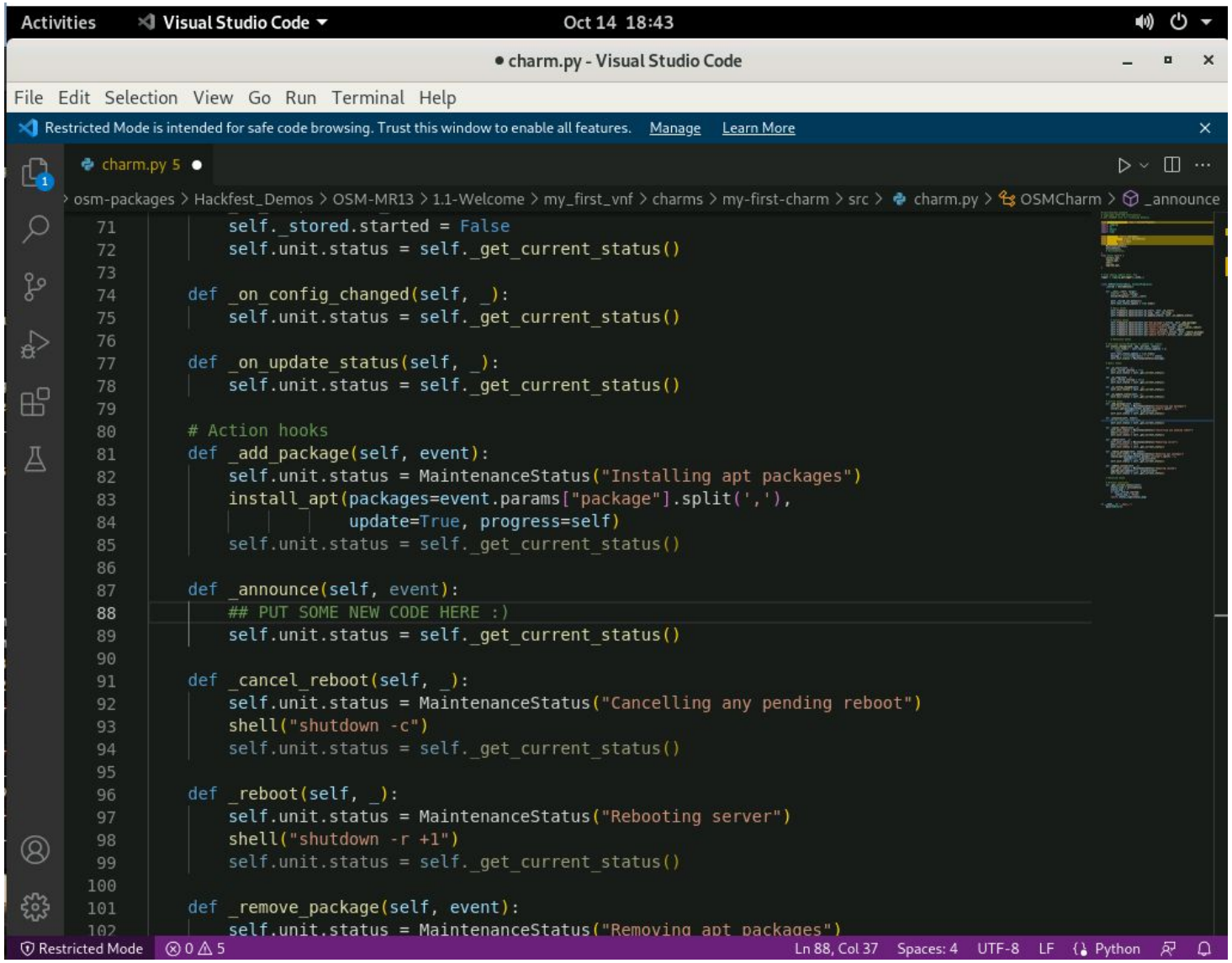
```
./5.Edit_Code.sh
```



# 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

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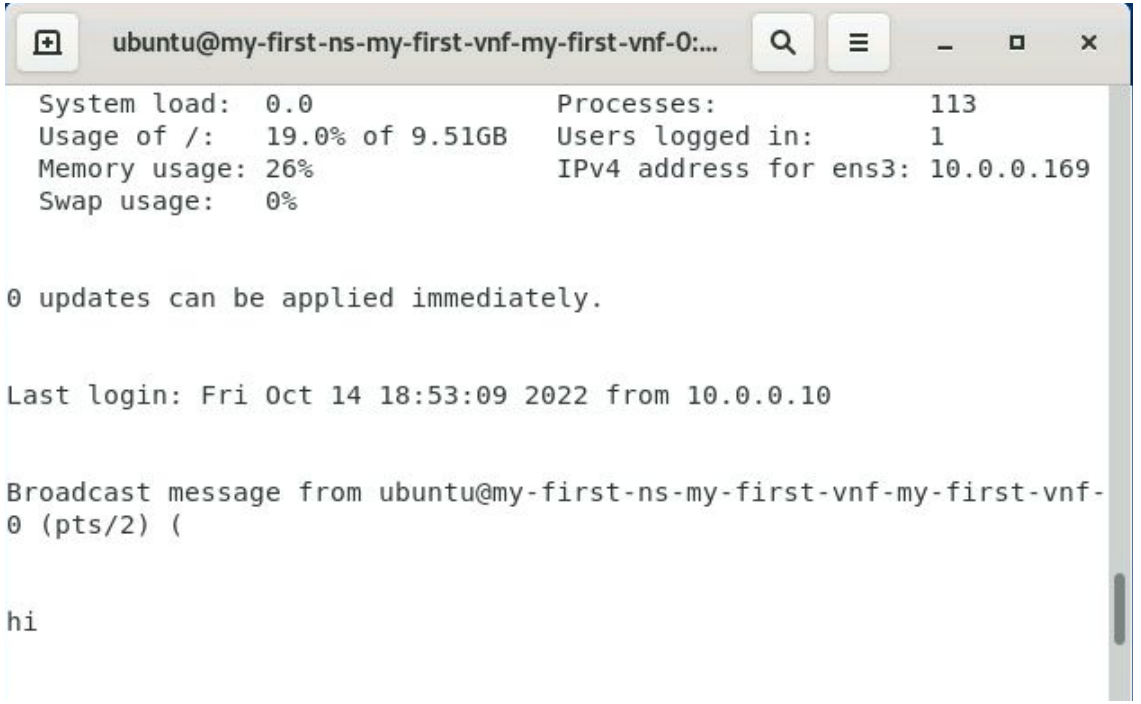
```
./7.Update_NS.sh
```

```
========================================================================
Performing software update
========================================================================
detailed-status: Done
479d1336-ba29-4378-9a3d-f4ce6f92c866
========================================================================
Done
========================================================================
```

# Say “Hi” To Yourself

./8.Run_Actions.sh

```
osm ns-action --vnf_name my_first_vnf --action_name announce --params "{message: hi}" my_first_ns
```



# Cleanup Time

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`./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

```
wget
https://osm-download.etsi.org/ftp/osm-12.0-twelve/install_osm.sh
chmod +x install_osm.sh
  ./install_osm.sh
```

## Charmed installer

```
wget
https://osm-download.etsi.org/ftp/osm-12.0-twelve/install_osm.sh
chmod +x install_osm.sh
  ./install_osm.sh --charmed
```

# Join us!


ETSI members, non-members,

individual developers and users.

Learn how to join

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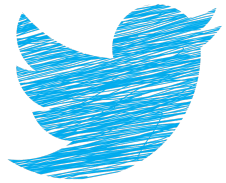
# Follow us!



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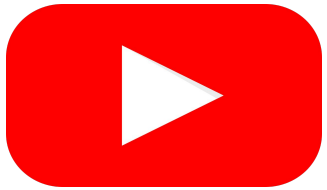

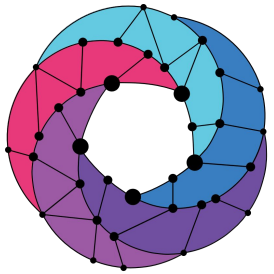

Open Source
MANO
by ETSI

# Thank You!