ETSI Open Source MANO (OSM)

IoT-NGIN – 5th Plenary Meeting

15 February 2022

Reza Mosahebfard

Research Engineer

Software Network Area

i2cat
THE INTERNET RESEARCH CENTER

Never stop designing the digital future

i2CAT.net

tecnio catalonia | ACCIÓ Generalitat de Catalunya

Institució CERCA Centres de Recerca de Catalunya

Contents

1 Introduction to NFV

2 ETSI NFV Architectural Framework

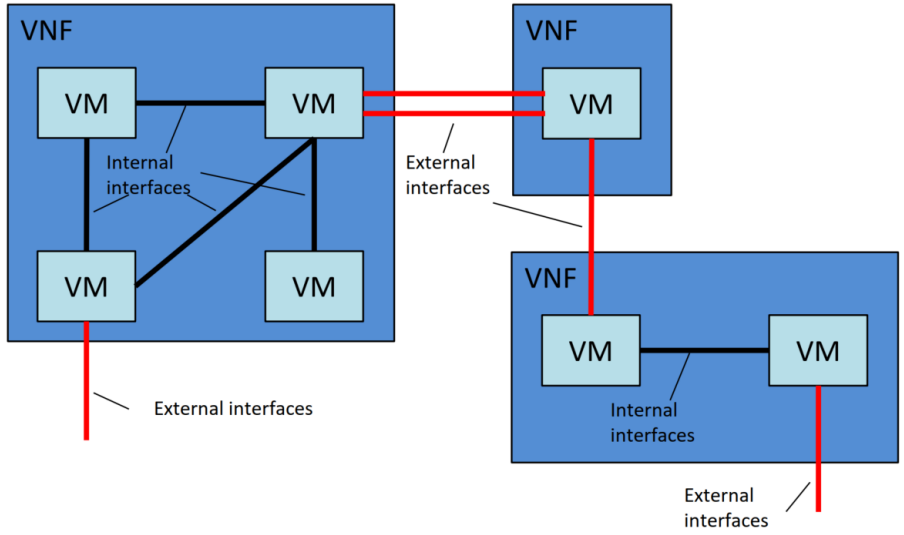
3 ETSI OSM Features

4 NS Deployment Example

5 OSM in IoT-NGIN

Network Function Virtualization (NFV)

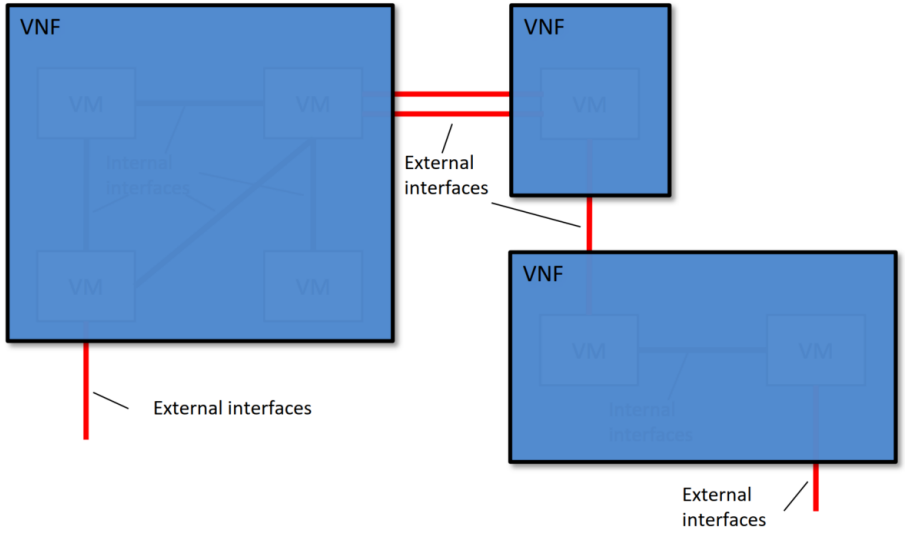
- Network Functions (NFs) are fully virtualized and run as software on top of commercially available off-the-shelf (COTS) hardware.
- Reduce network management complexity.
- Virtualized Network Functions (VNFs) are composed of a set of interconnected Virtual Machines (VMs) [1].
- Each Network Service (NS) is built of a set of interconnected VNFs through Virtual Links (VLs) [1].



Network Function Virtualization (NFV)

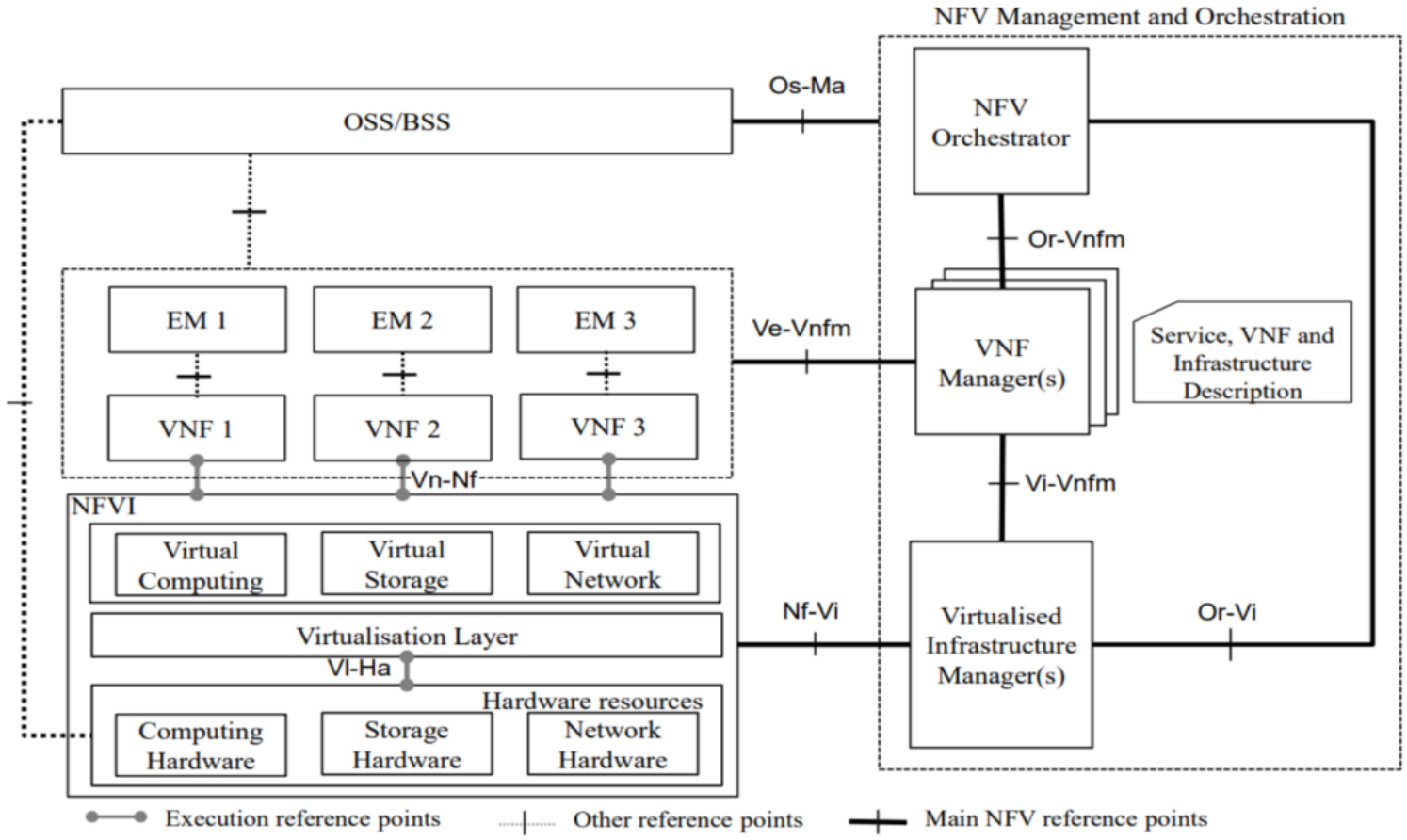
There is a need for a management and orchestration tool [1]:

- Hides the complexity → no need to worry about VMs!
- Automates network deployments
- Scalability → more resources as the number of users grows
- Simple addition of new features



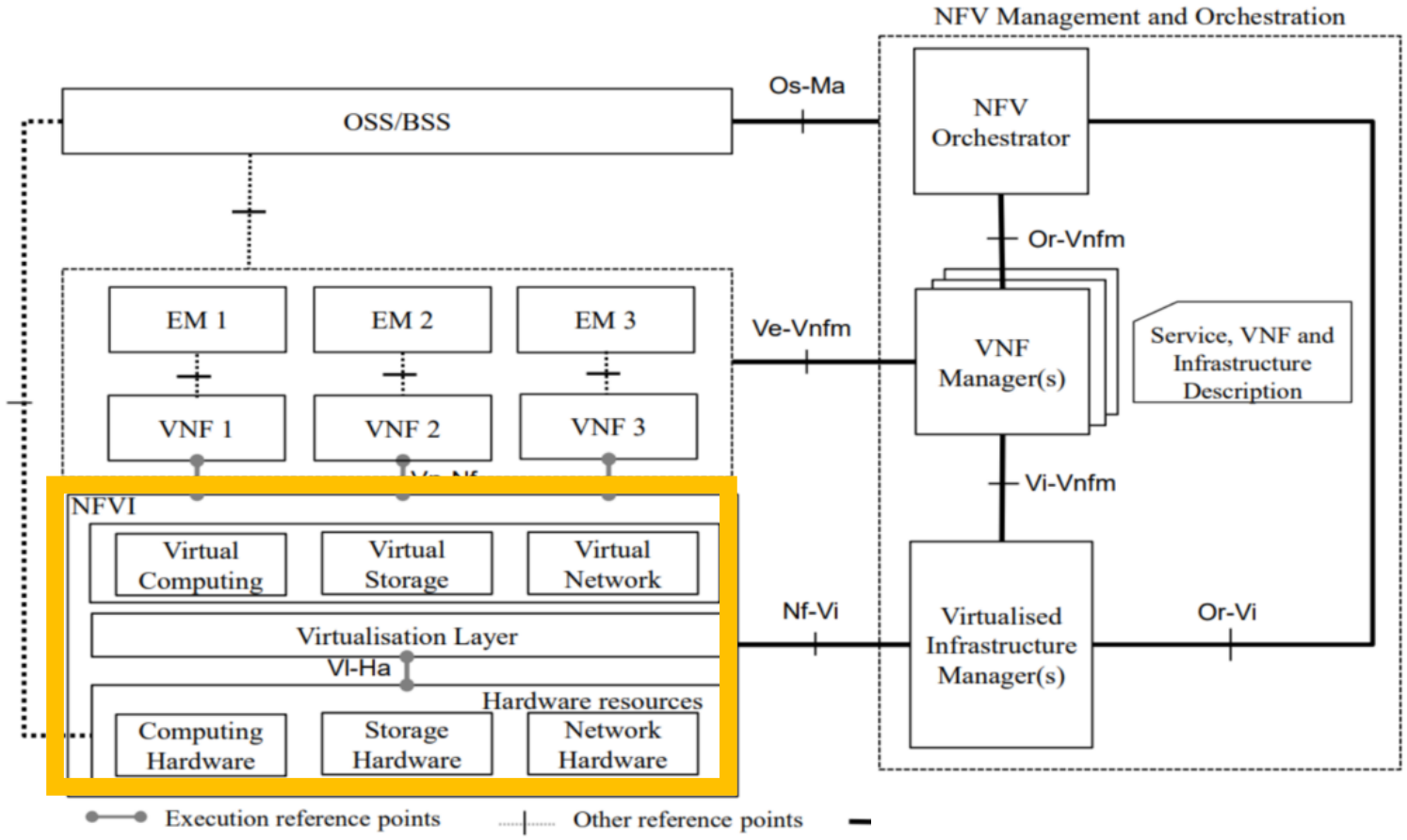
ETSI NFV Architectural Framework

- ETSI NFV ISG (2012)
- Created a common reference architecture for NFV technologies.
- Present architecture is based on ETSI GS NFV 002 v1.2.1 [2] and all the coming definitions are based on ETSI GS NFV 006 V2.1.1 [3].



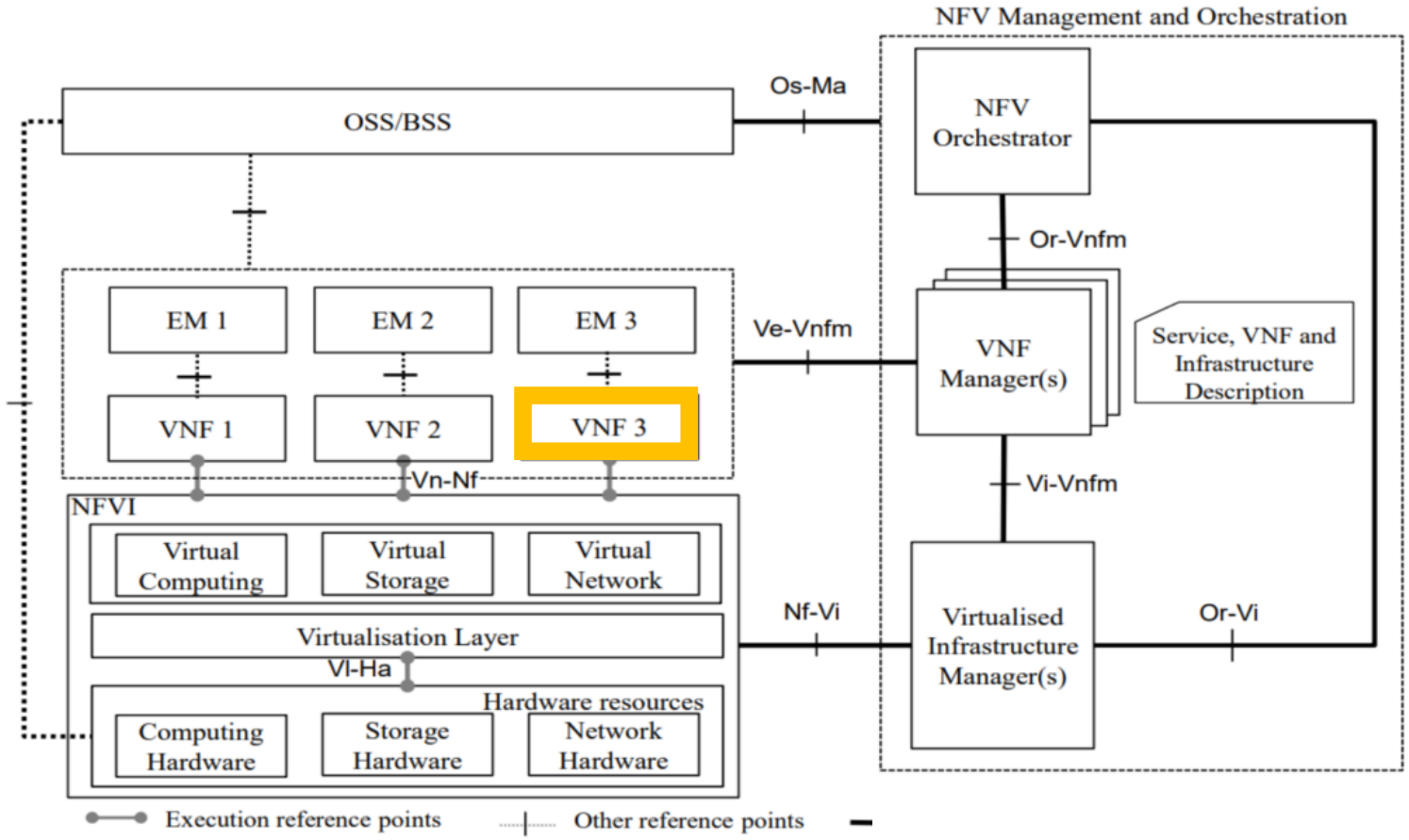
ETSI NFV Architectural Framework

- **NFV Infrastructure (NFVI)** exposes the infrastructure resources as virtualized resources .



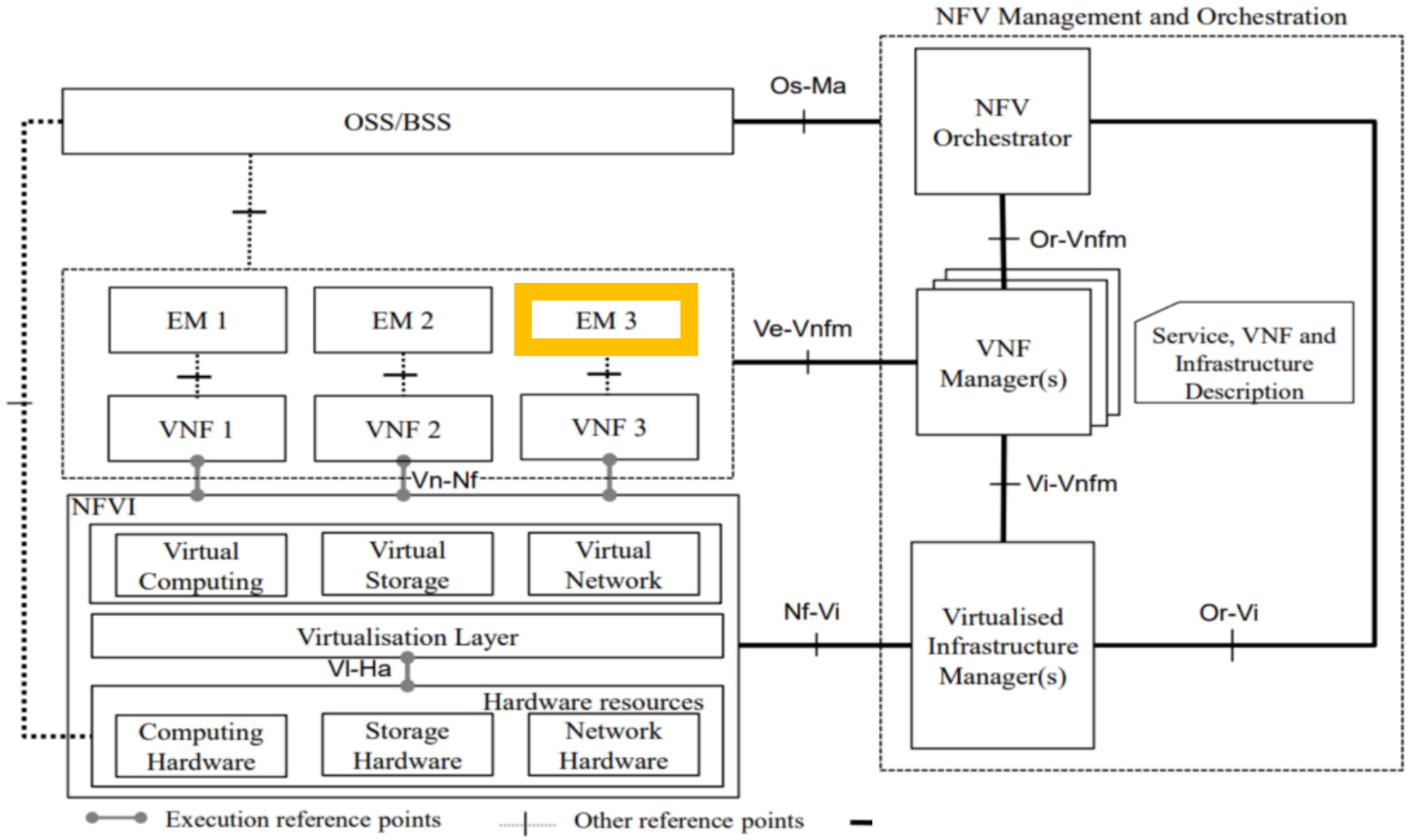
ETSI NFV Architectural Framework

- **NFV Infrastructure (NFVI)** exposes the infrastructure resources as virtualized resources.
- **VNF** is managed by VNFM and has an associated VNFD, which provides deployment and operational information.



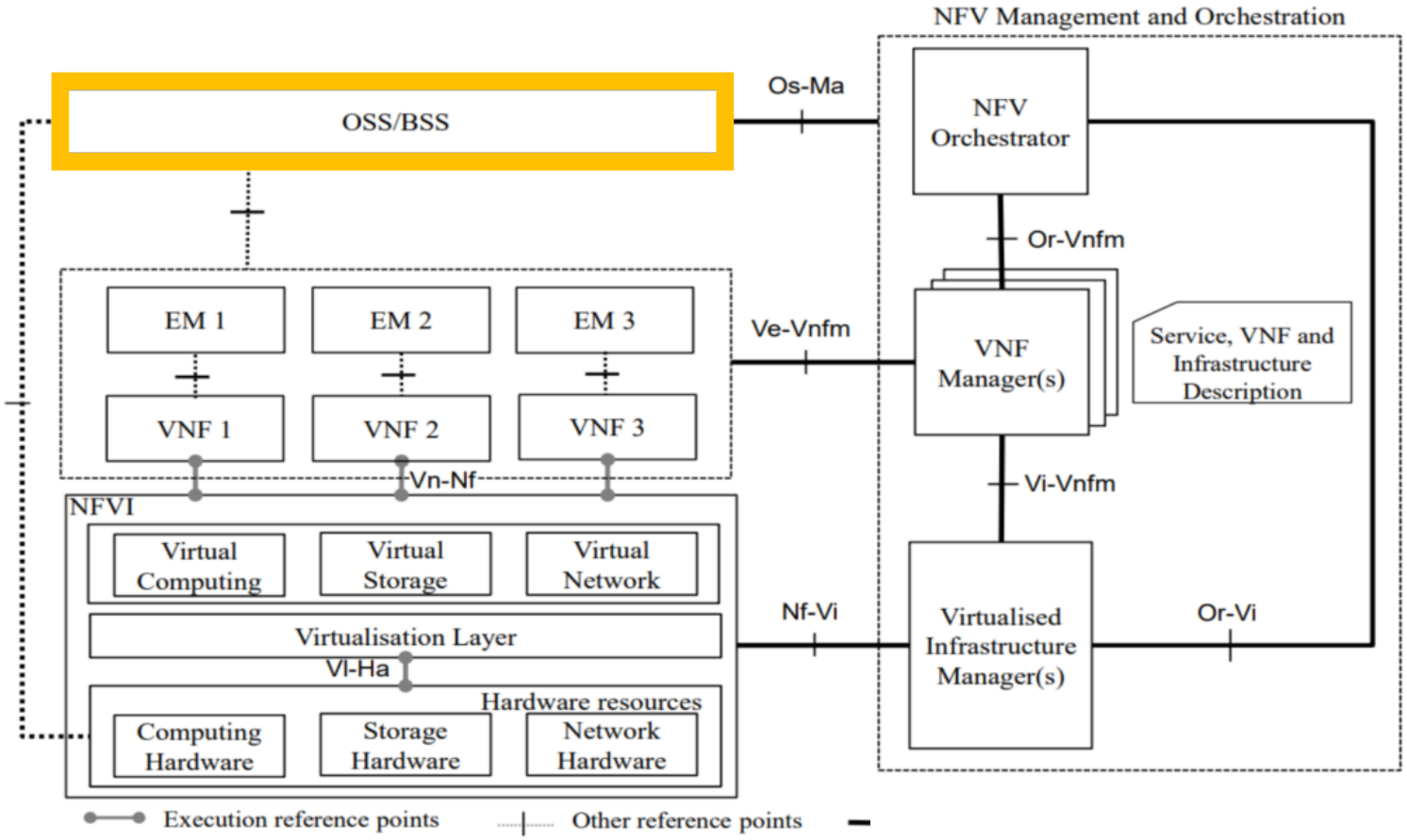
ETSI NFV Architectural Framework

- **NFV Infrastructure (NFVI)** exposes the infrastructure resources as virtualized resources.
- **VNF** is managed by VNFM and has an associated VNFD, which provides deployment and operational information.
- **EM** performs the FCAPS management for the application functions of the VNF.



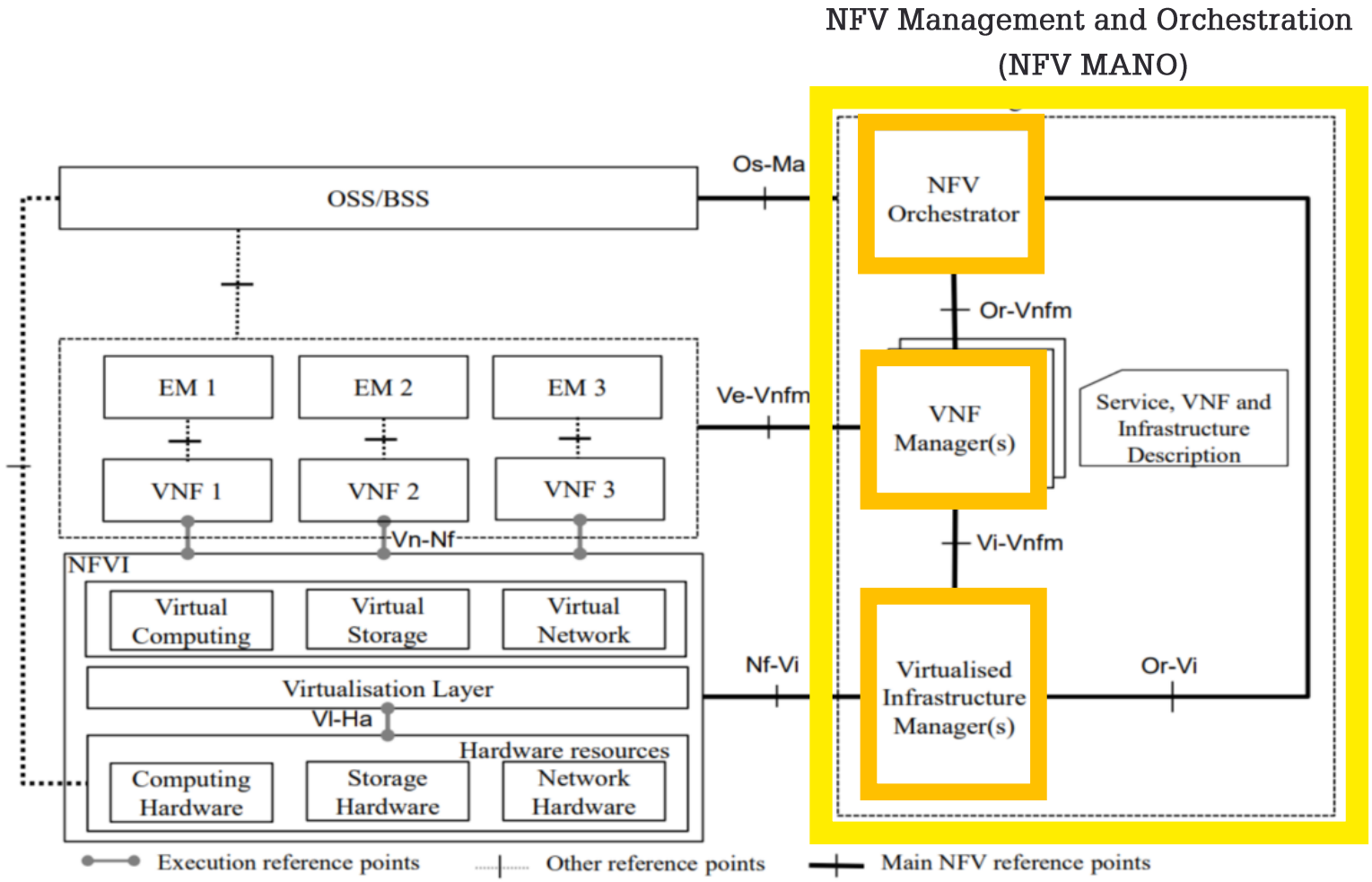
ETSI NFV Architectural Framework

- **NFV Infrastructure (NFVI)** exposes the infrastructure resources as virtualized resources.
- **VNF** is managed by VNFM and has an associated VNFD, which provides deployment and operational information.
- **EM** performs the FCAPS management for the application functions of the VNF.
- **Operational Support Systems (OSS)** interacts with NFVO to deploy the service and with NFVI for monitoring purposes.
- **Business Support Systems (BSS)** is related to commercial activities and customer-facing interactions within operations.



ETSI NFV Architectural Framework

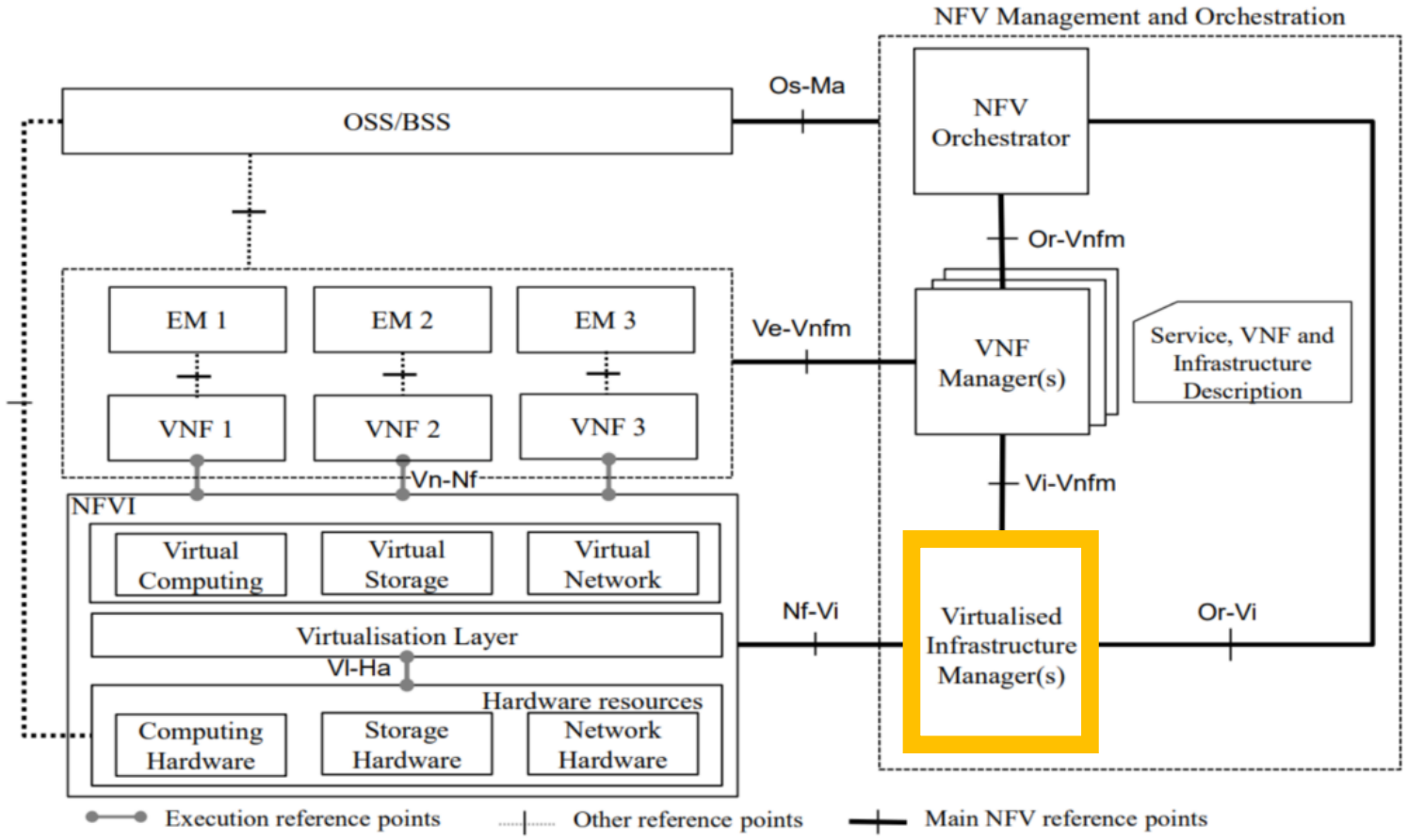
- An architectural framework for the coordination of network resources
- Cloud-based applications and the lifecycle management (LCM) of virtual network functions (VNFs) and Network Services (NS).
- NFV MANO main elements:
  - NFVO
  - VNFM
  - VIM



ETSI NFV Architectural Framework

Virtualized Infrastructure Manager (VIM)

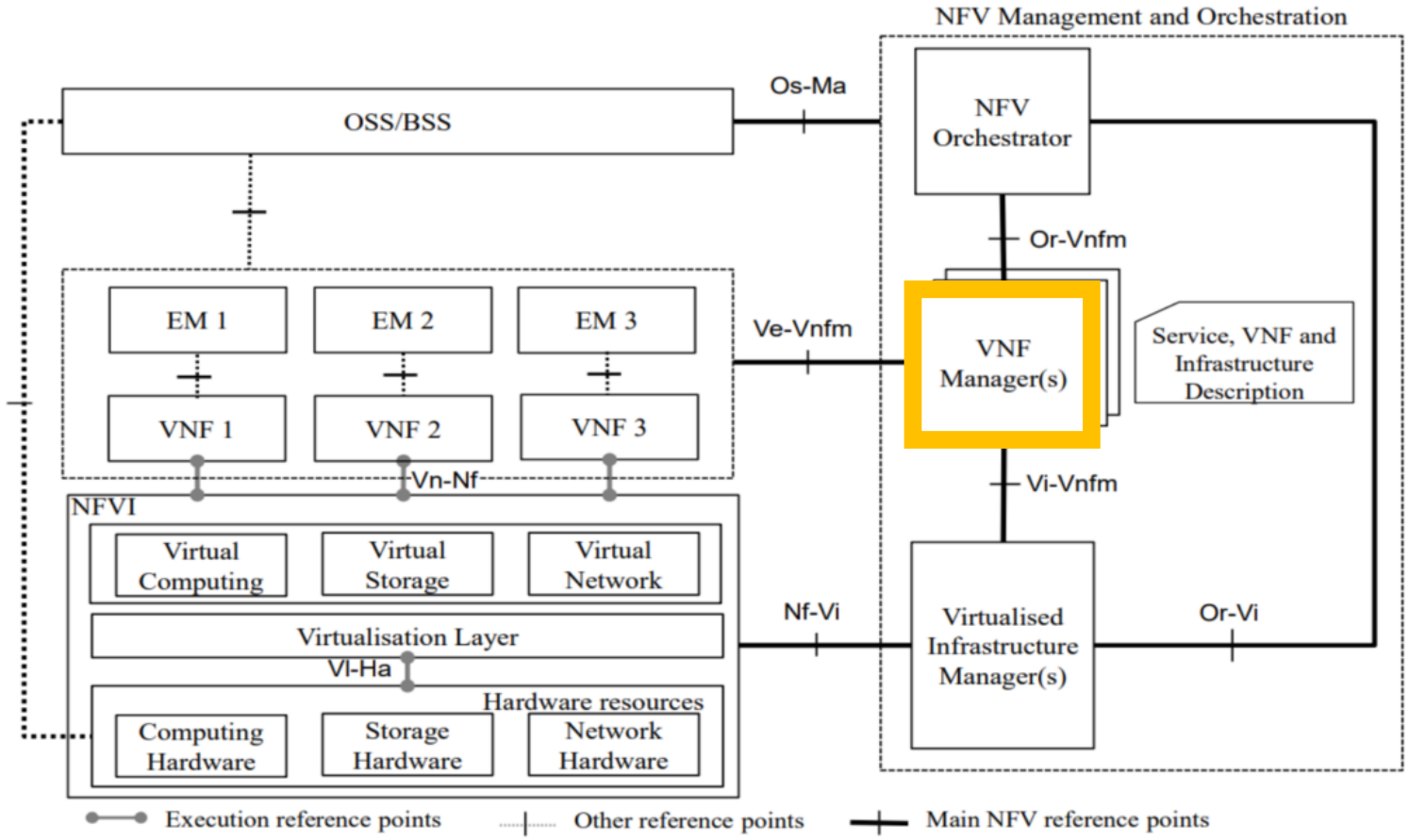
- Control and manage the NFVI virtual resources used by VNFs and VLs
- Certain type of NFVI resource (compute-only, storage-only, network only), or multiple types of NFVI resources
- Software image management



ETSI NFV Architectural Framework

VNF Manager (VNFM)

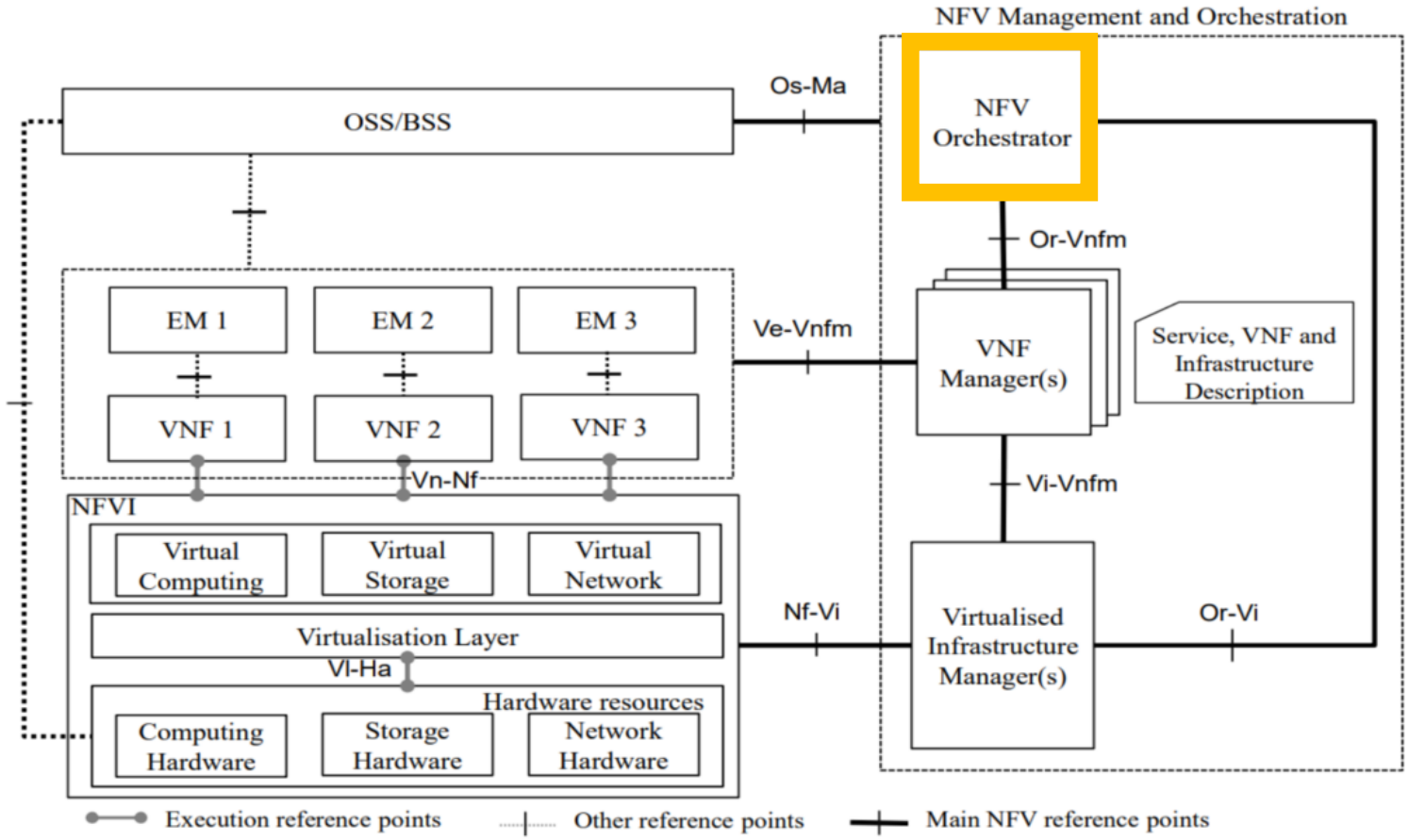
- VNF Lifecycle Management (LCM)
- VNF performance/configuration/fault Management
- Gathers and offers information on VNF's behavior in the form of VNF indicators, supplied by Element Management (EM)



ETSI NFV Architectural Framework

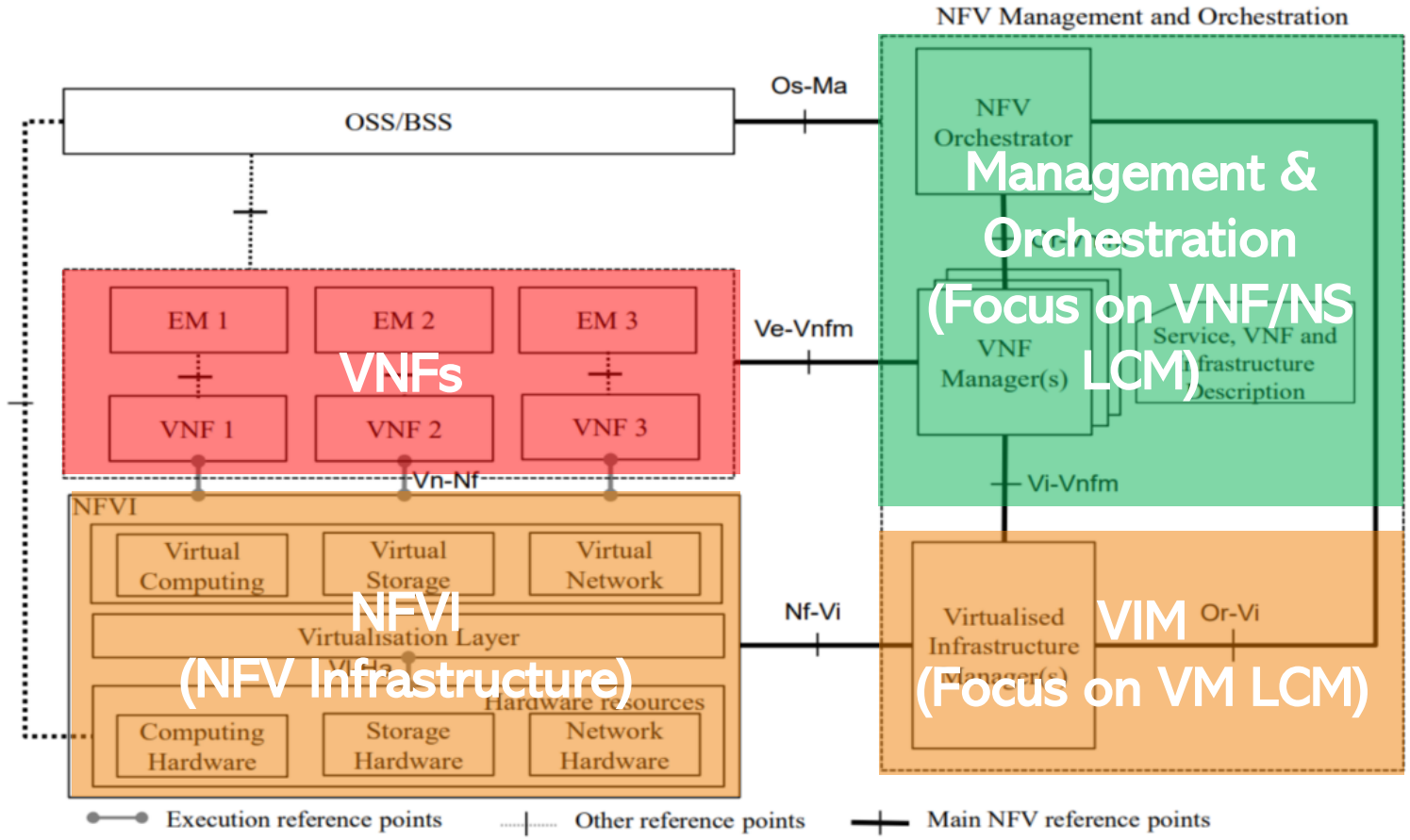
NFV Orchestrator (NFVO)

- Orchestrate NS
  - LCM
  - On-boarding and management of NS Descriptors (NSDs)
  - Performance and fault management
- Track VIM resources allocation and availability
- Provide performance metrics associated to virtualized resources, VNFs and NSs



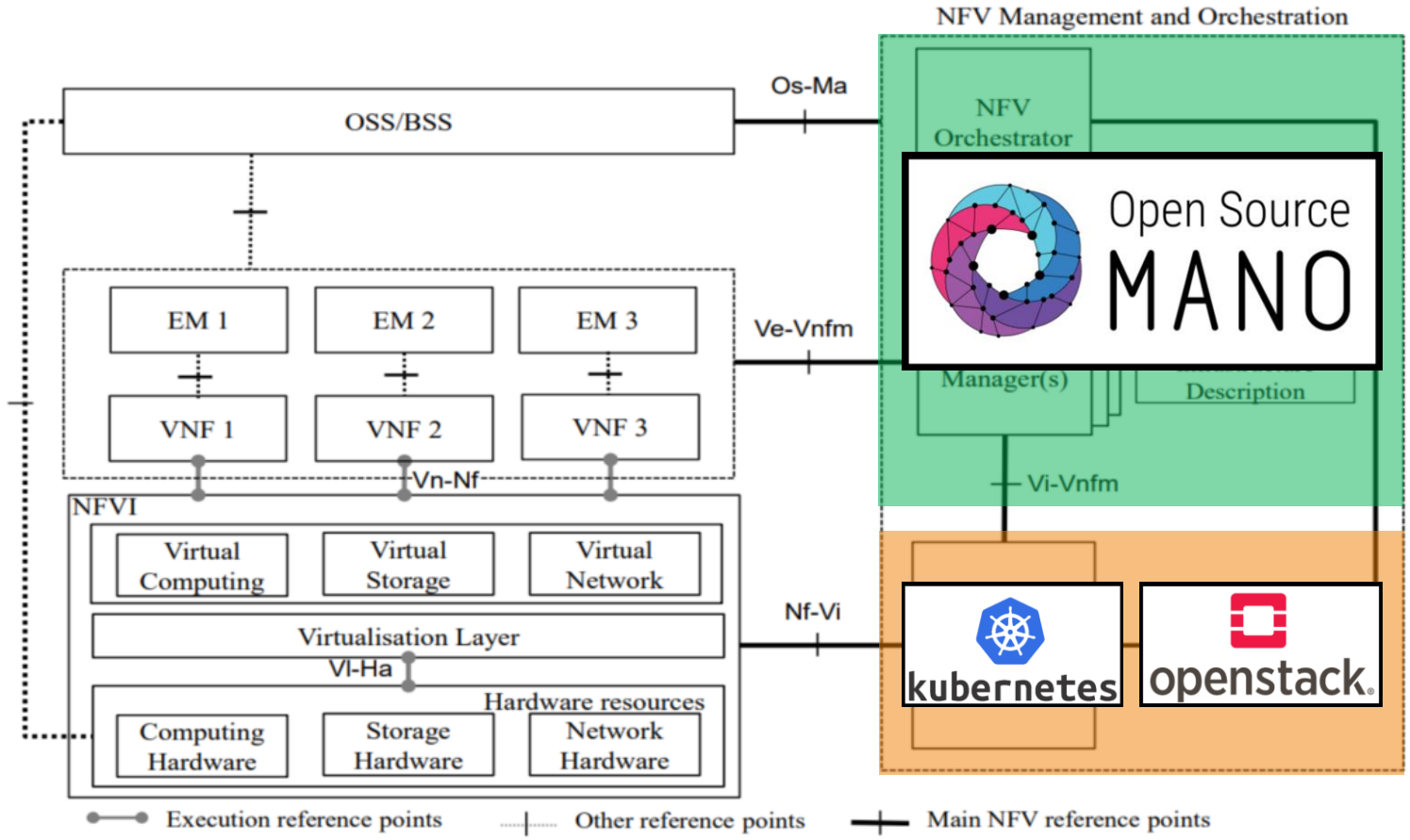
ETSI OSM

- ETSI NFV: Industry Specification Group that elaborates specifications on Network Functions Virtualization
- Developed in ETSI open source group as a MANO
- VIM is officially a part of MANO, but in ETSI OSM implementation it is bundled with NFVI



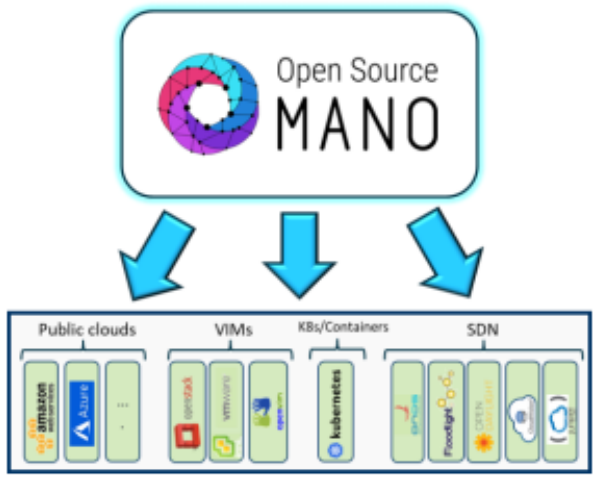
ETSI OSM

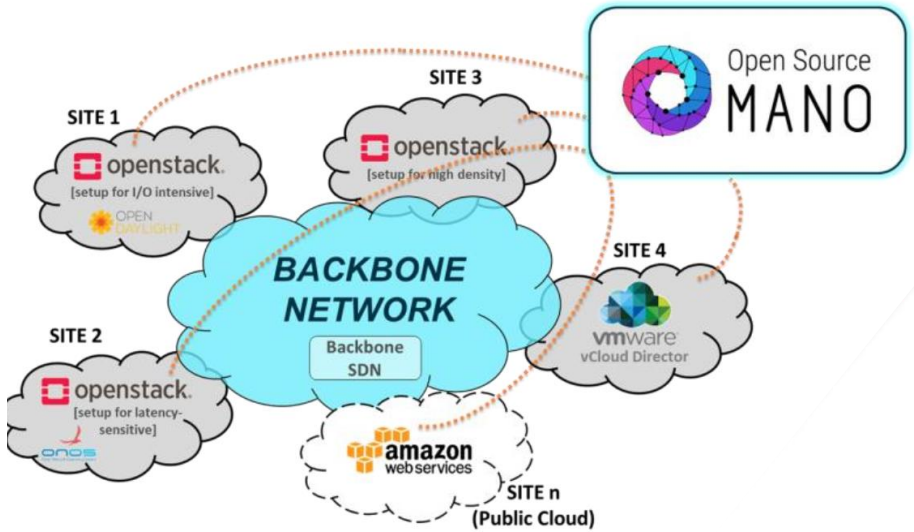
- ETSI NFV: Industry Specification Group that elaborates specifications on Network Functions Virtualization
- OSM was developed in ETSI open source group as a MANO stack aligned with ETSI NFV architectural framework
- VIM is officially a part of MANO, but in ETSI OSM implementation it is bundled with NFVI

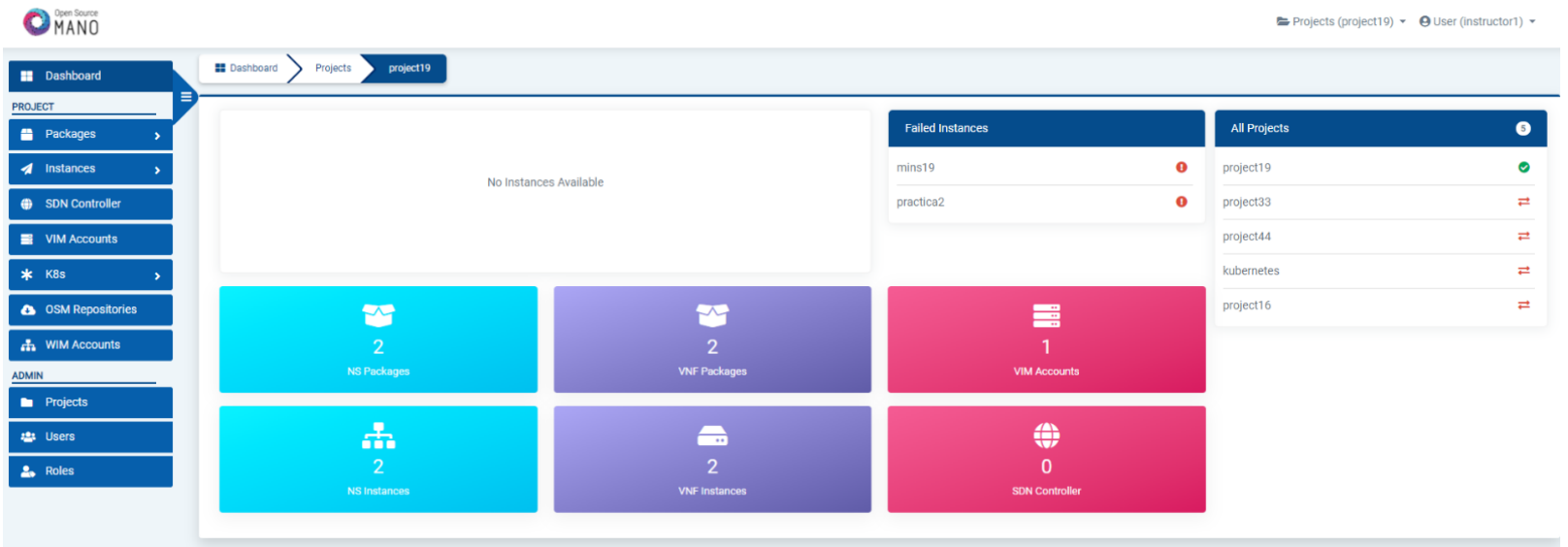


ETSI OSM - Features

- VIM and Cloud agnostic
- Across different locations
- Scalability
- Dashboard
  - Add new VIM accounts
  - Day-1 and Day-2 operations





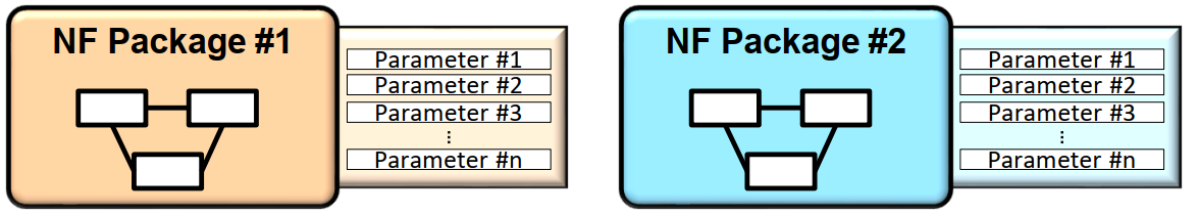


ETSI OSM - VNF Package

- A zip file
  - VNF Descriptor (VNFD)
  - Software images for VM

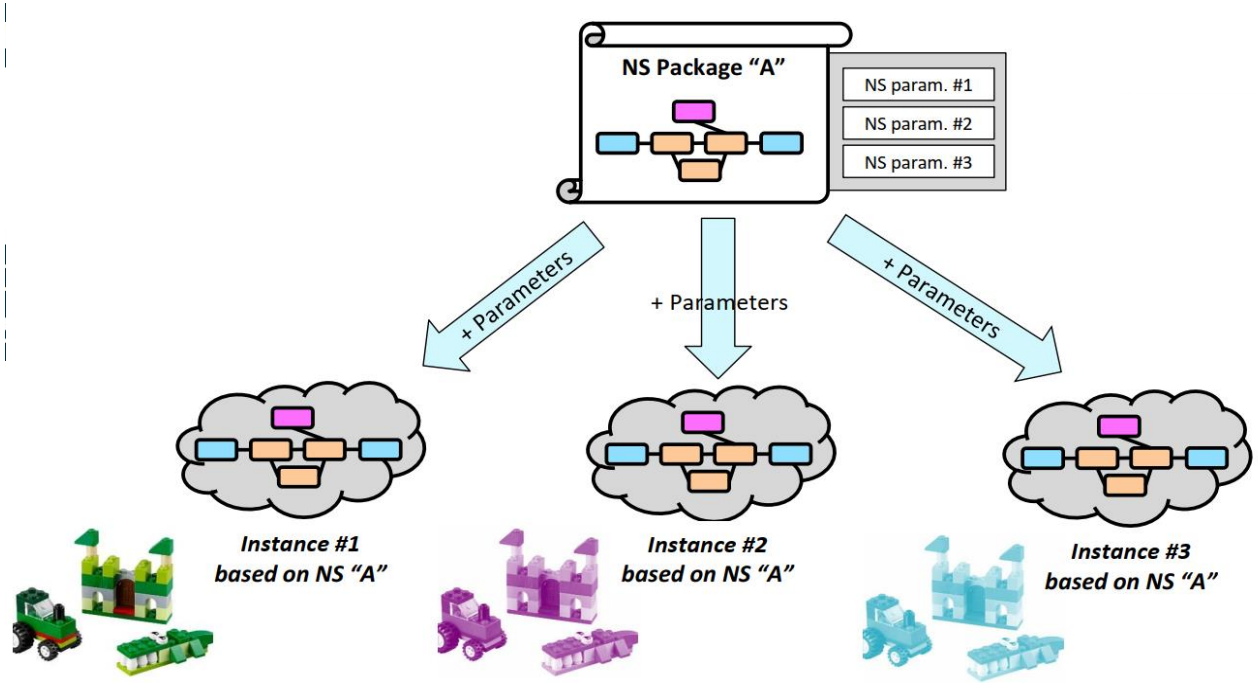
- Provided by the vendor
  - Topology
  - Parameters

- No need to know any extra detail about the target infrastructure or other components that will be part of the scenario [3]



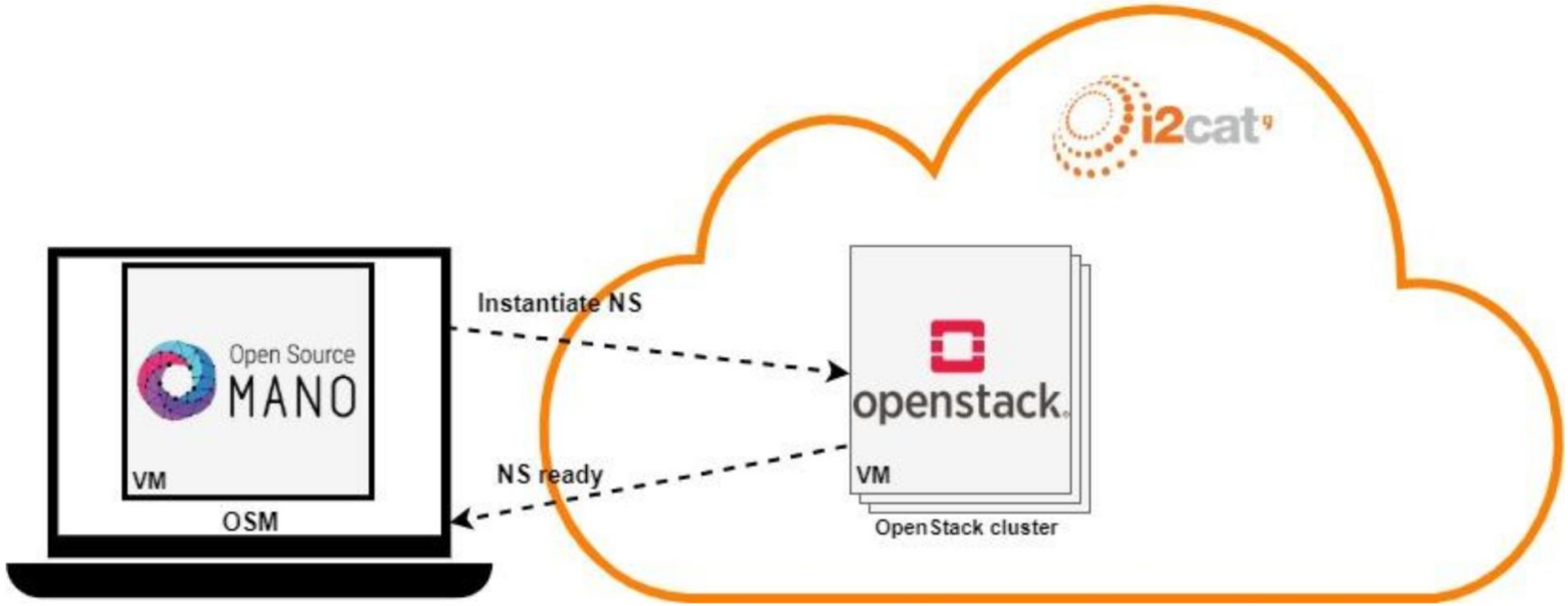
ETSI OSM – NS Package

- Describes how to combine a set of VNF packages
- Parametrized
- Can be easily customized upon instantiation
- Just need to decide [3]:
  - The target VIM (or VIMs)
  - Values for the parameters (IP addresses, etc.)



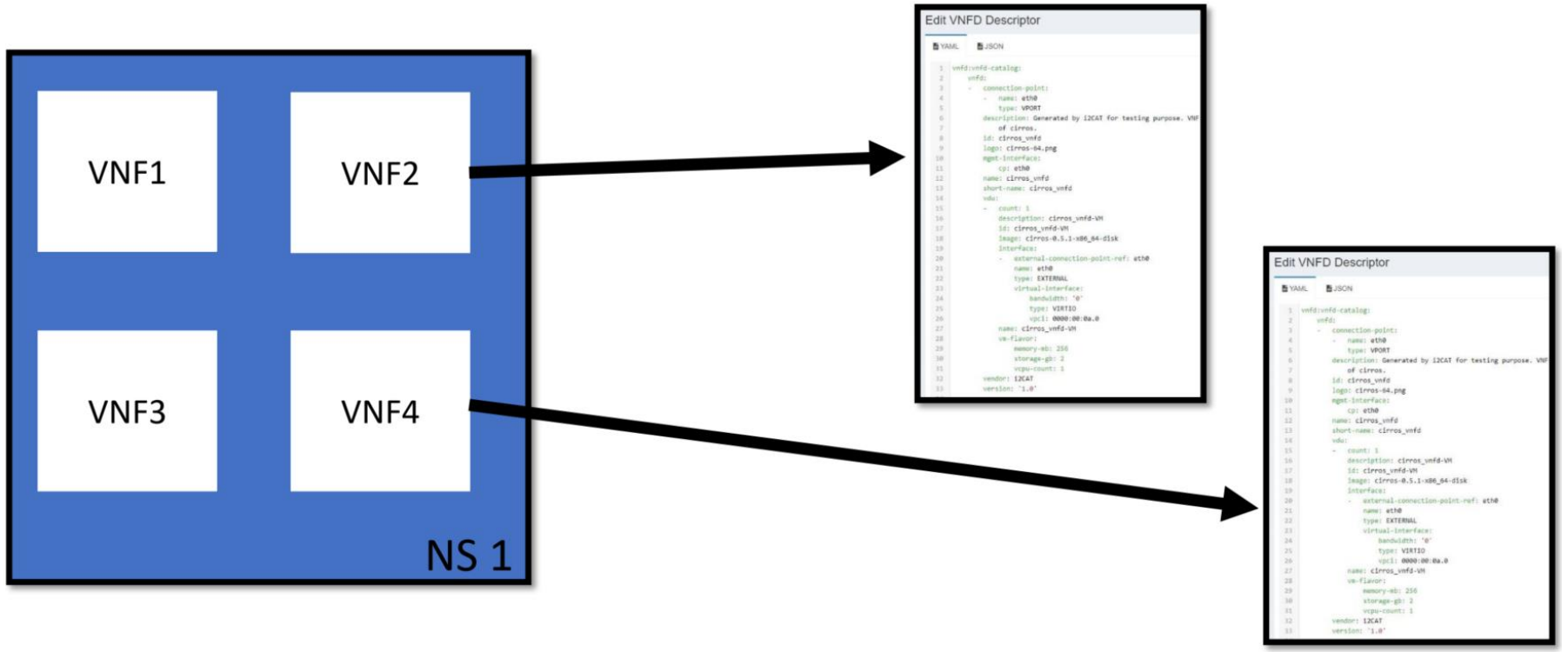
Example: NS Deployment (I)

OSM-OpenStack Testbed



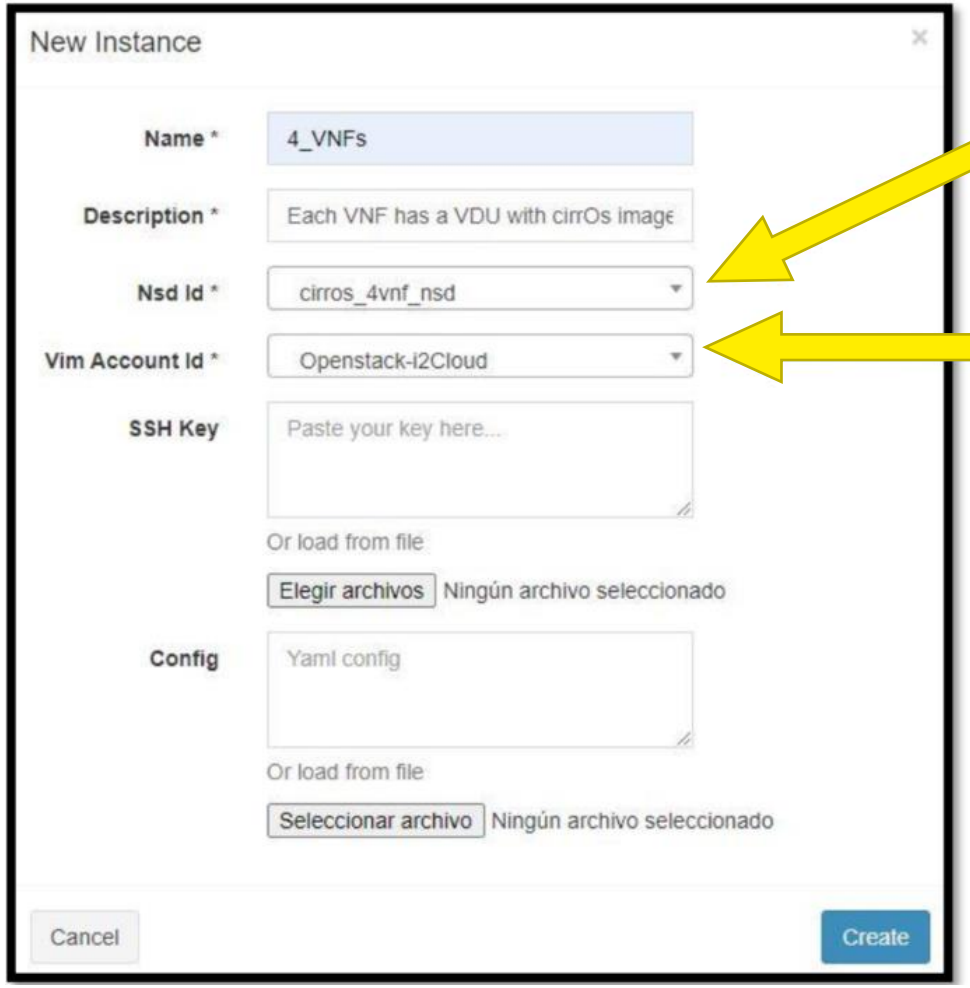
Example: NS Deployment (II)

Deploying a NS with 4 VNFs each running in 1 VM only.



Example: NS Deployment (IV)

NS instantiation through the **OSM dashboard**

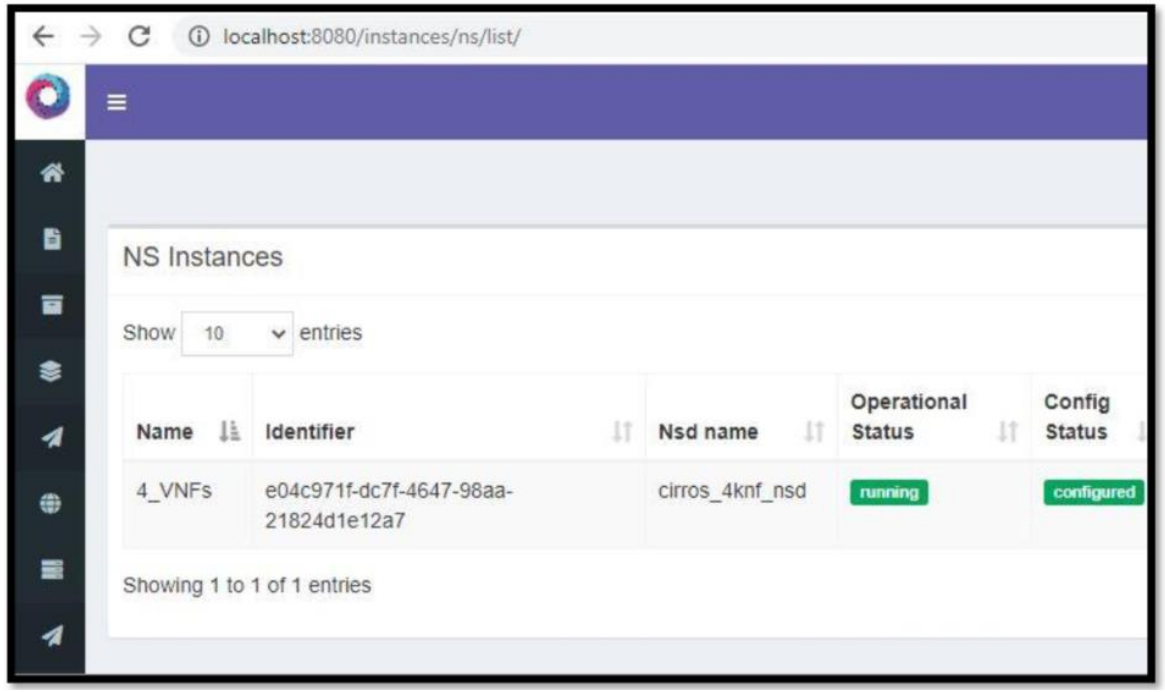


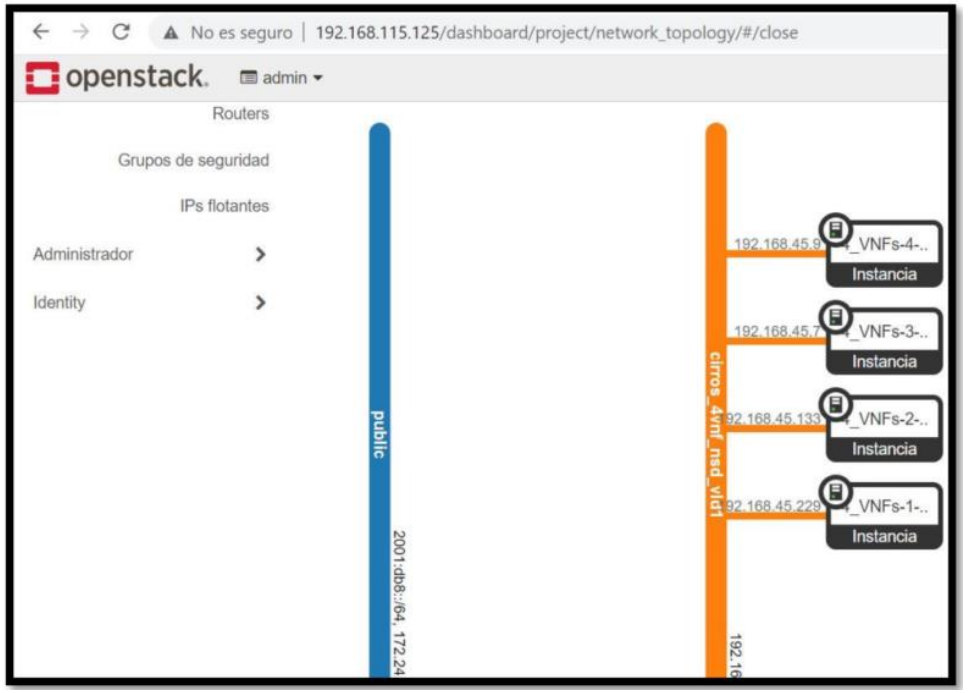
Which NS?

Which VIM?

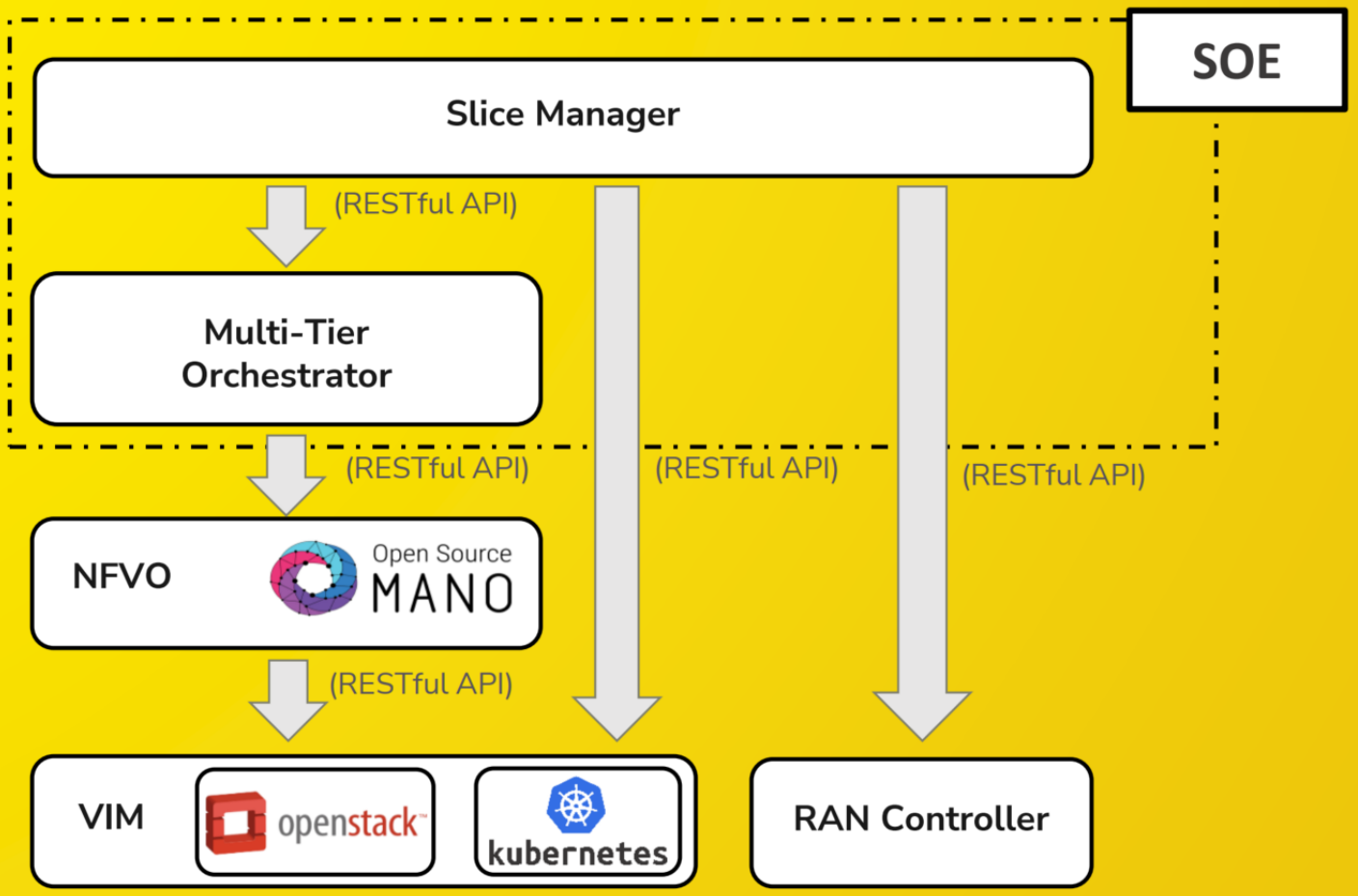
Example: NS Deployment (V)

NS instantiation result in OSM & OpenStack dashboards



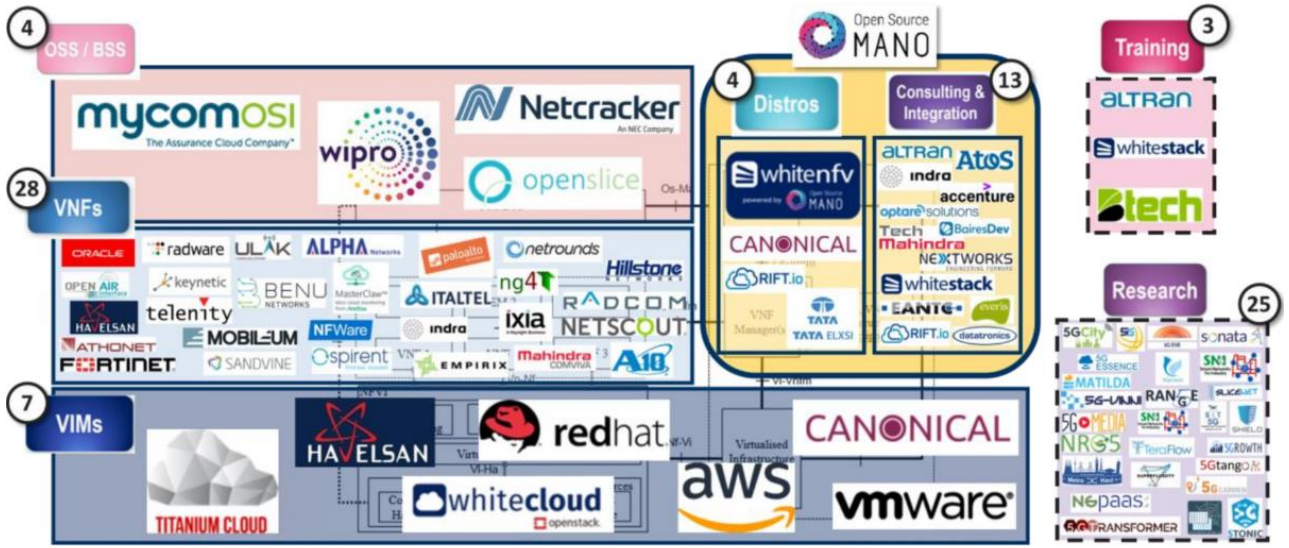


OSM Role in IoT-NGIN – i2CAT's Slice Manager



ETSI OSM Community

Significant number of commercial offers related to OSM (OSM Ecosystem)



Large and diverse community with 150 members

References

[1] https://www.etsi.org/deliver/etsi_gs/nfv/001_099/002/01.02.01_60/gs_nfv002v010201p.pdf

[2] https://www.etsi.org/deliver/etsi_gs/nfv/001_099/006/02.01.01_60/gs_nfv006v020101p.pdf

[3] http://osm-download.etsi.org/ftp/osm-11.0-eleven/OSM12-hackfest/presentations/OSM%2312%20Hackfest%20-%20What%20is%20OSM.pdf

i2CAT.net

THE INTERNET
RESEARCH CENTER

Never stop
designing the
digital future

Contact:
reza.mosahebfard@i2cat.net

Generalitat de Catalunya
Government of Catalonia

UNIVERSITAT POLITÈCNICA DE CATALUNYA BARCELONATECH

Ajuntament de Barcelona

UNIVERSITAT RAMON LLULL

upf. Universitat Pompeu Fabra Barcelona

tecnio catalonia | ACCIÓ Generalitat de Catalunya

orange

cellnex
driving telecom connectivity

JUNIPER NETWORKS

cisco

vodafone

FUJITSU

interoute
from the ground to the cloud

MEDIAPRO

Institució CERCA
Centres de Recerca de Catalunya