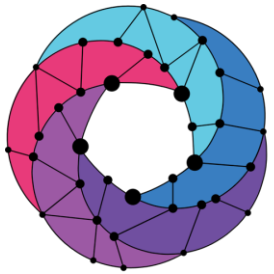


Open Source MANO by ETSI

Introduction to OSM

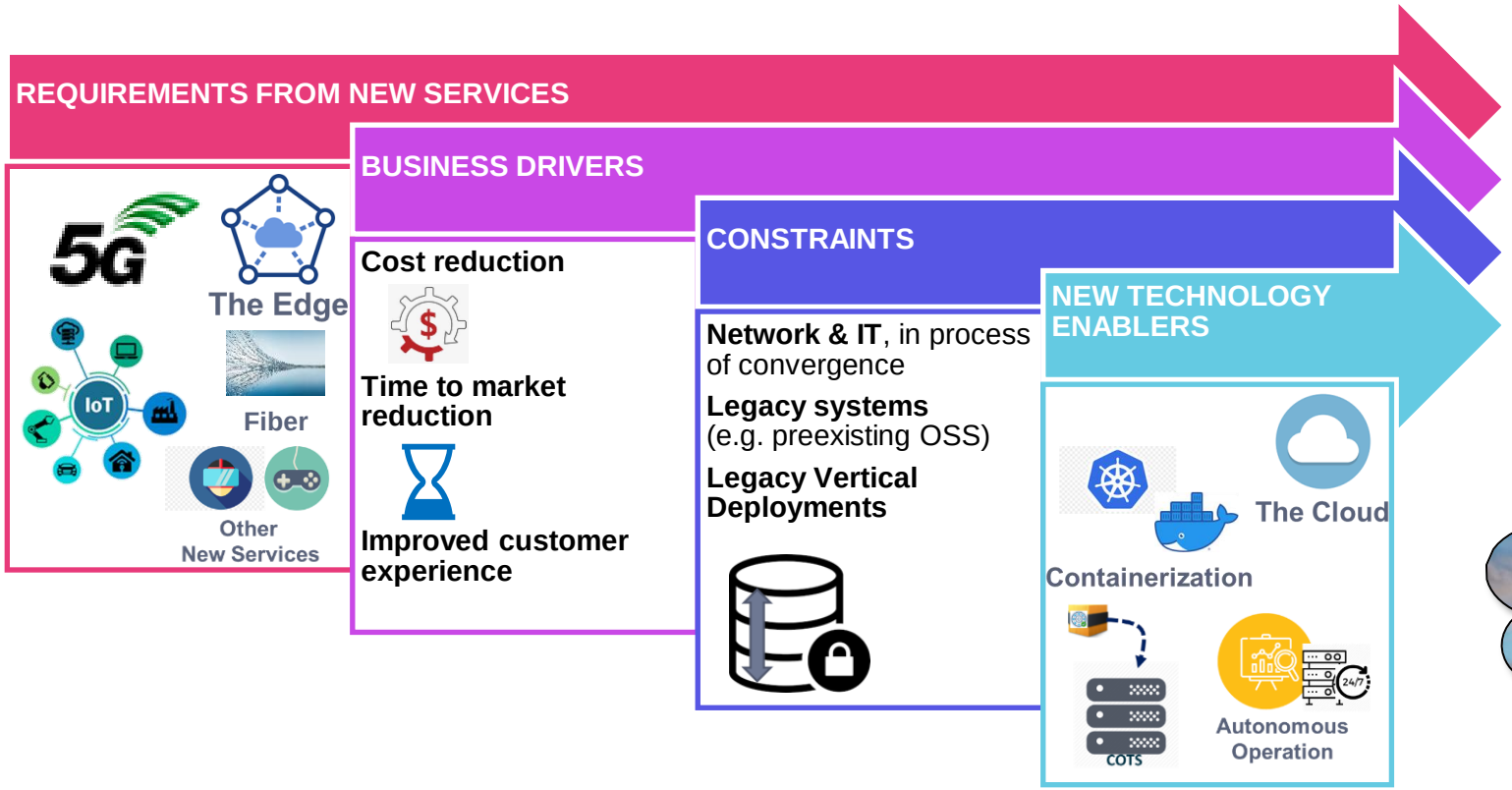
Gerardo García (Telefónica, OSM TSC Chair)

OSM Training Seminar - SLICES

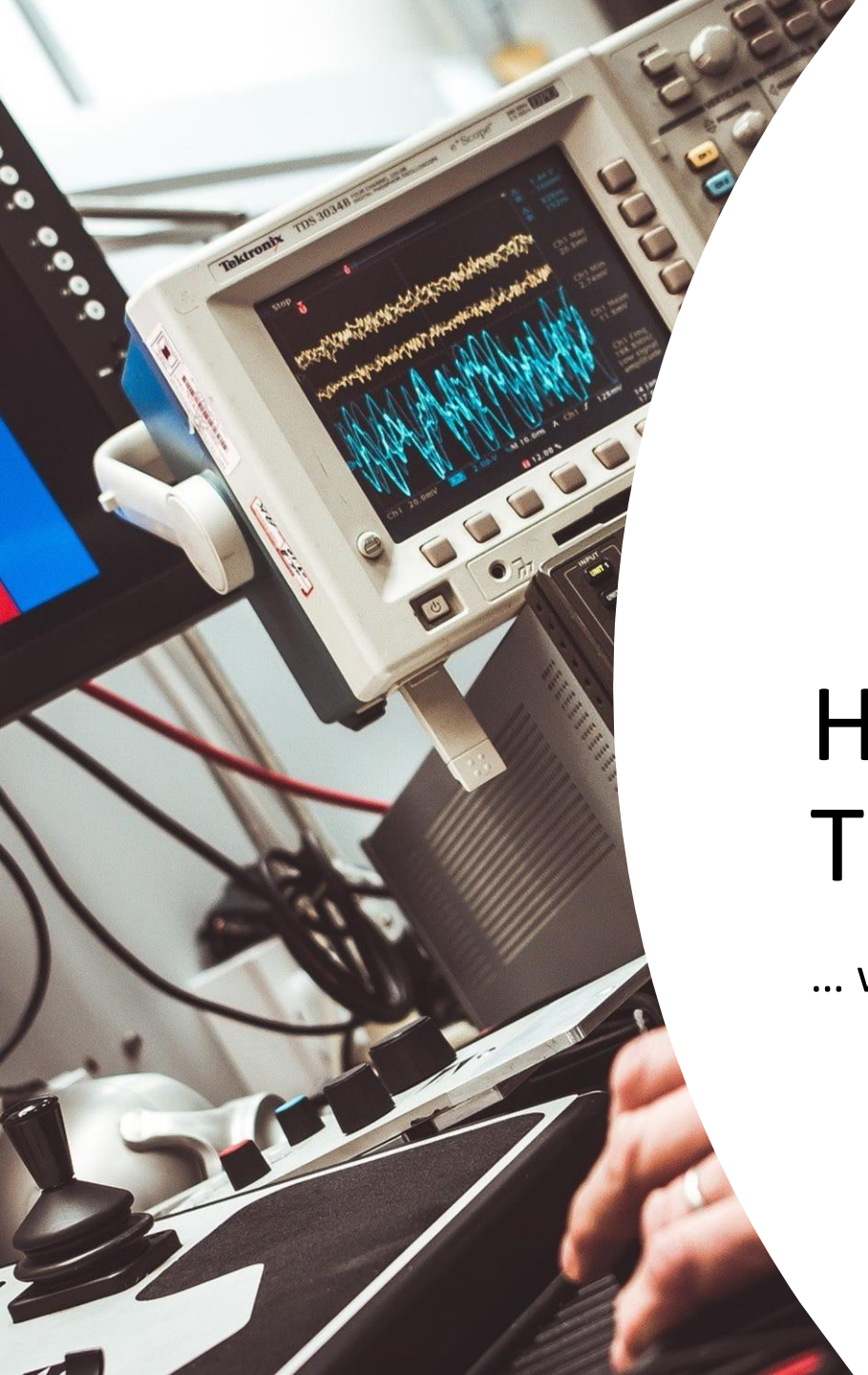
13/02/2024

Some requirements for the evolution of Telco Clouds…

Open Source MANO



NEXT-GEN TELCO CLOUD



Open Source MANO

How OSM Simplifies Telco Cloud Management…

… while keeping flexibility

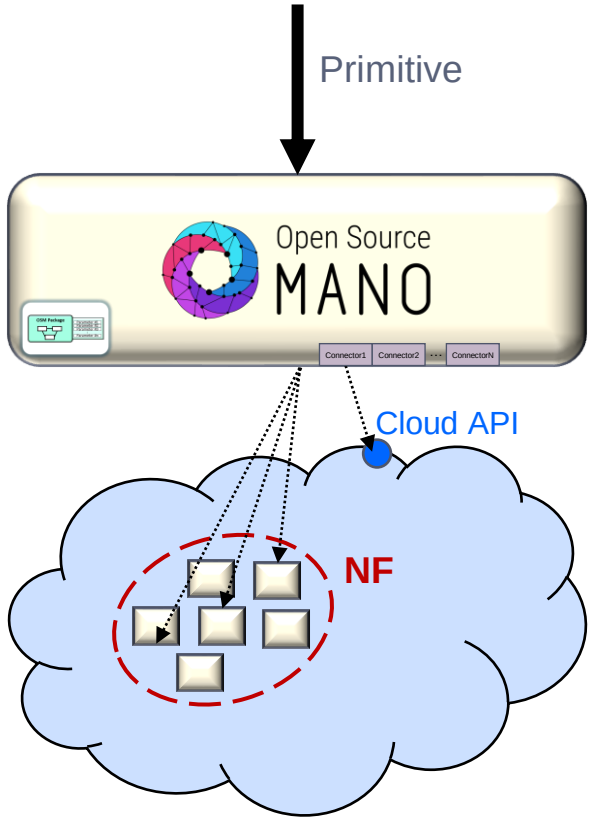
OSM provides a platform to create Networks as a Service and to manage them conveniently later…

OSM manages the low-level setup for Network Functions, so that they are ready for use.

- It covers in 100% the role of a kind of **specialized PaaS for Network Functions**, with 2 key features:
  1. **Complex connectivity** setup, including EPA and underlay scenarios.
  2. Solve **inter-NF relations**.

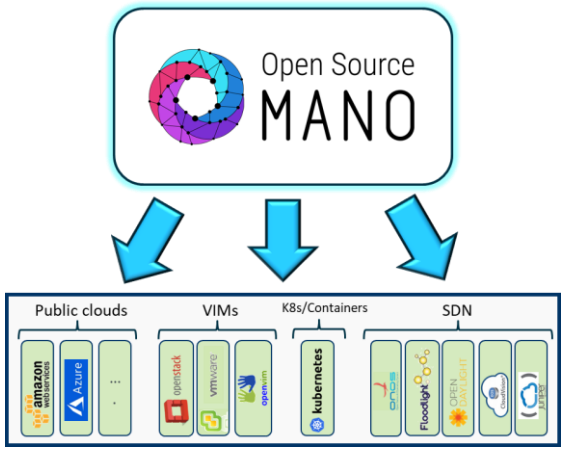
- Returns: **NS/NF ready for its use and properly connected**:
  - Exposes **the "function" and its lifecycle, not its components**.
  - Presented as a whole (i.e., abstracts from low-level details of the NF).
  - Easy (standardized) access to NF's lifecycle operations, via ***primitives***.

- This follows well-known paradigms in **IT** and **public clouds**.

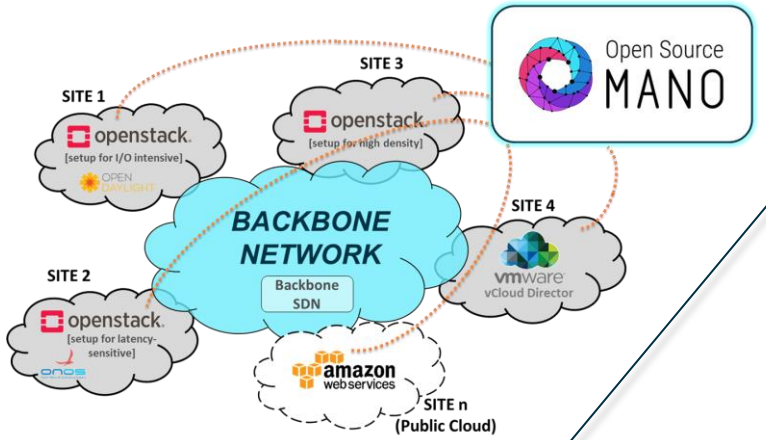


… on different types of infrastructure and across different locations…

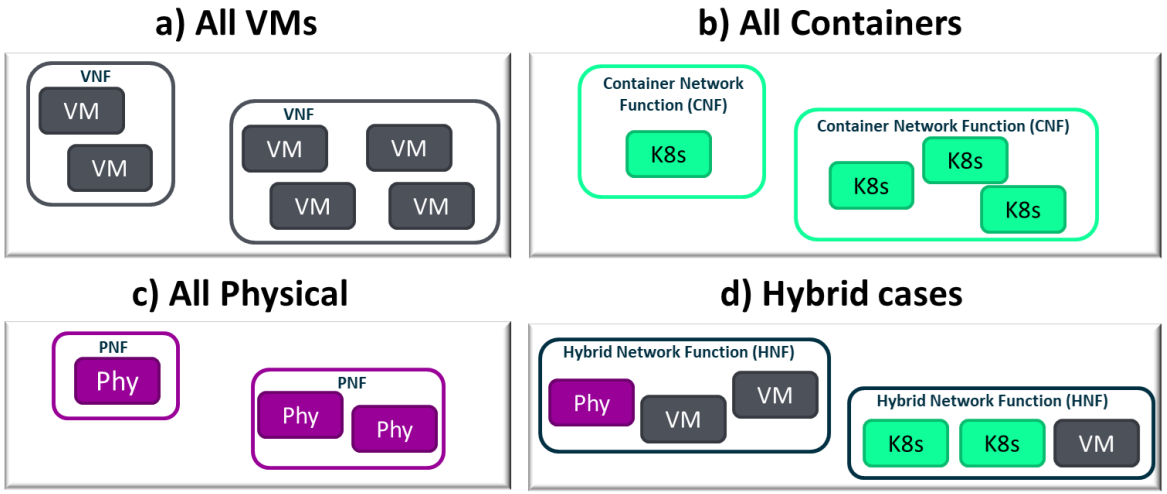
MULTI-VIM & MULTI-SDN



MULTI-SITE



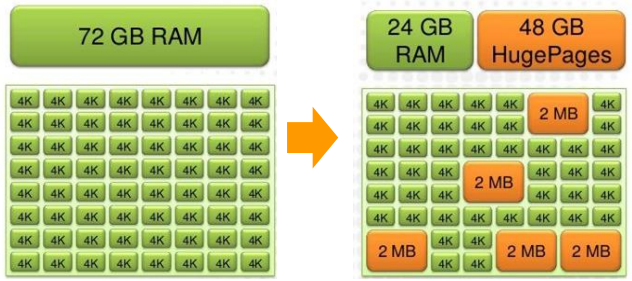
… with NFs composed of **VMs, containers** and/or **physical elements**…



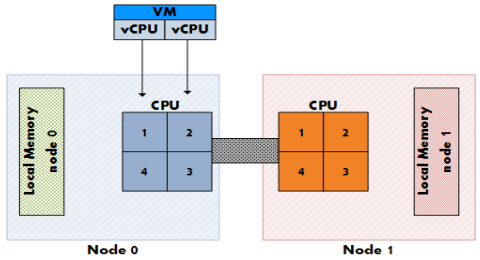
… and ready for network-specific workloads whenever needed

Open Source MANO

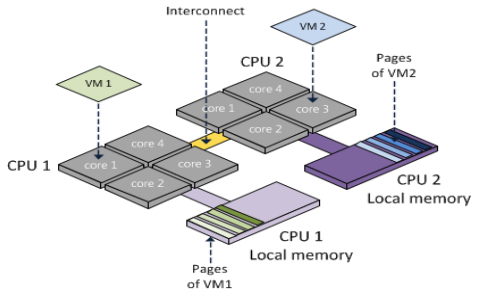
Huge Pages



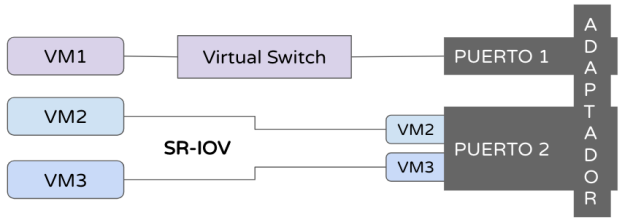
NUMA Topology Awareness

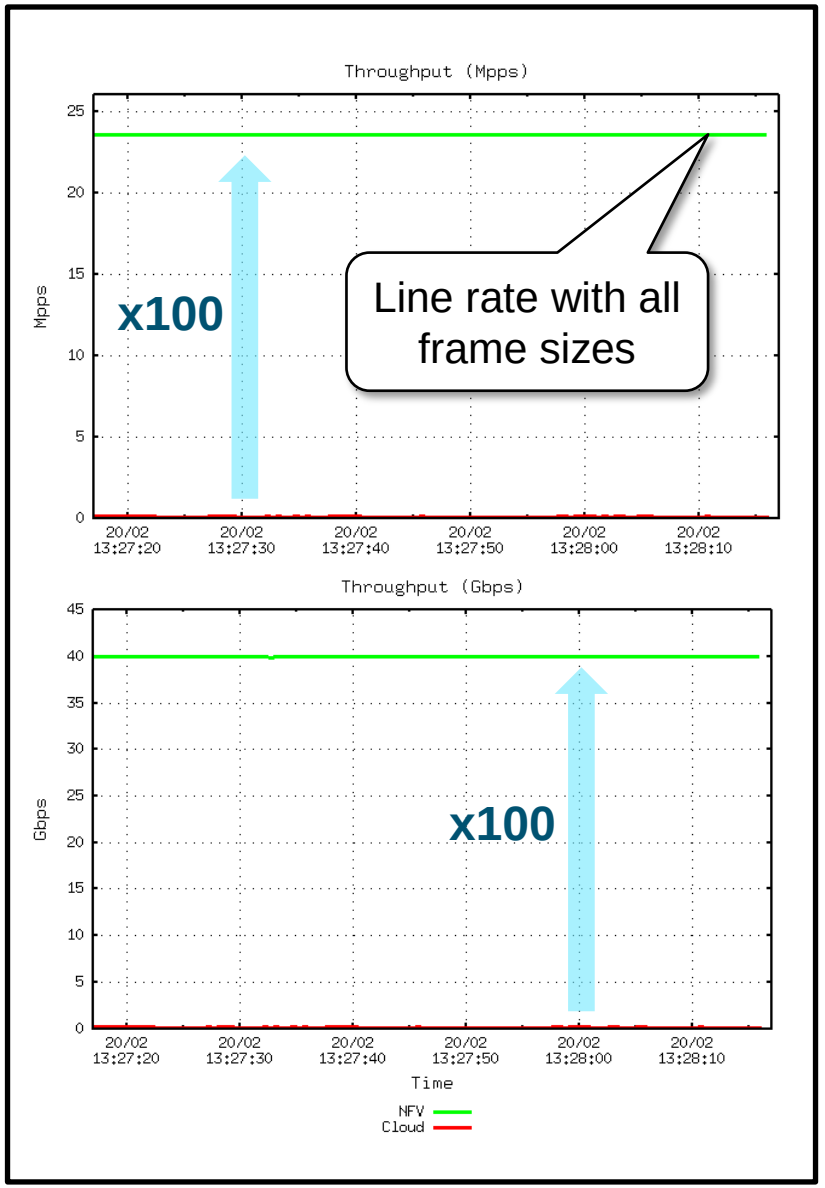


CPU Pinning



Data Plane assignment





OSM functionality is based on ETSI NFV reference framework

Open Source MANO

NF and NS as a Service

NFV MANO

- **NFVO**
- **VNFM**

- NF catalogue
- Multi-tenancy
- RBAC

aws · Azure · vmware · Red Hat · openstack

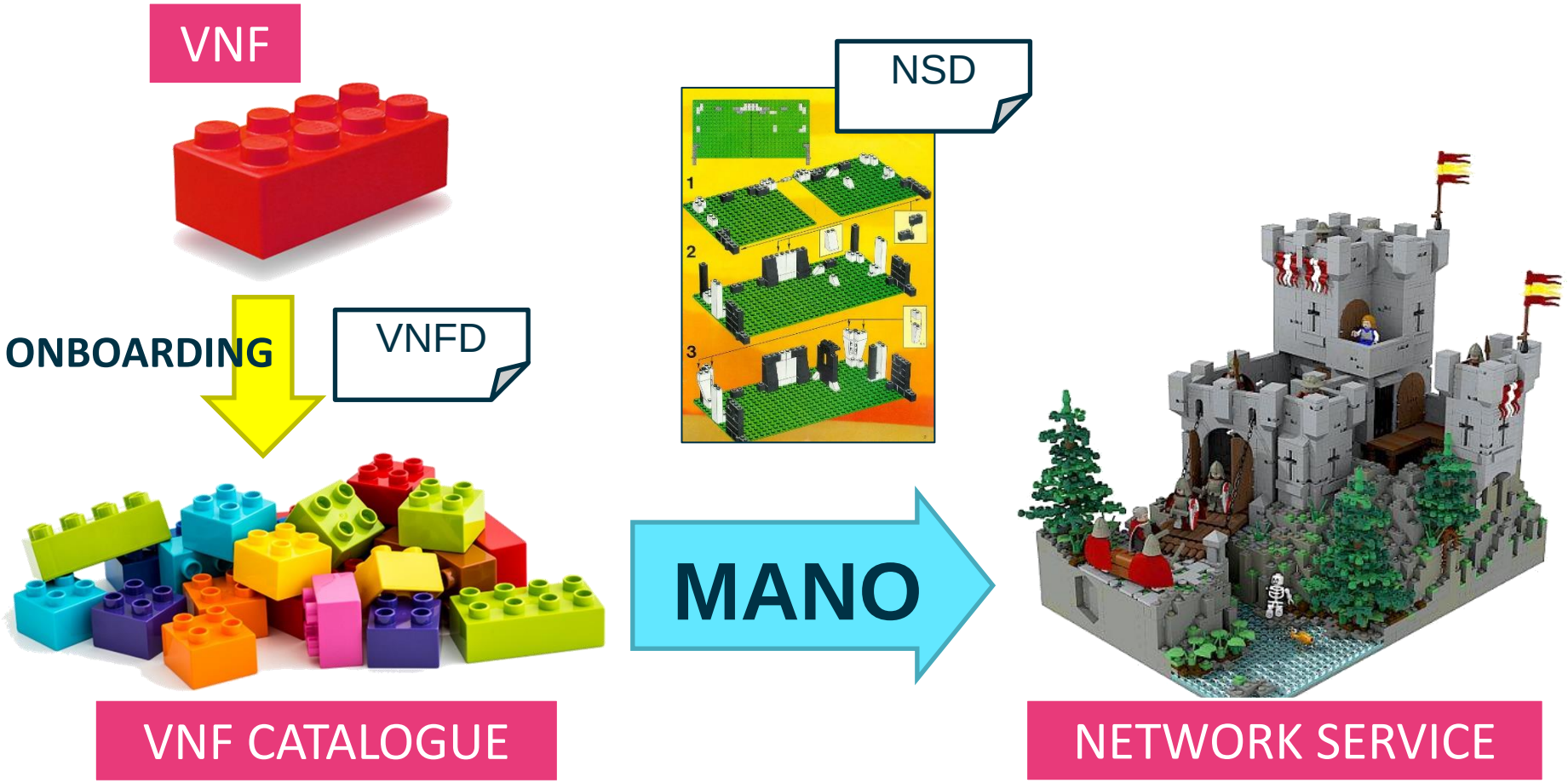
NB interface (REST API) based on SOL005 (+SOL003)

Common model for NS and NF packages (SOL004, SOL007) and descriptors (SOL001, SOL006)

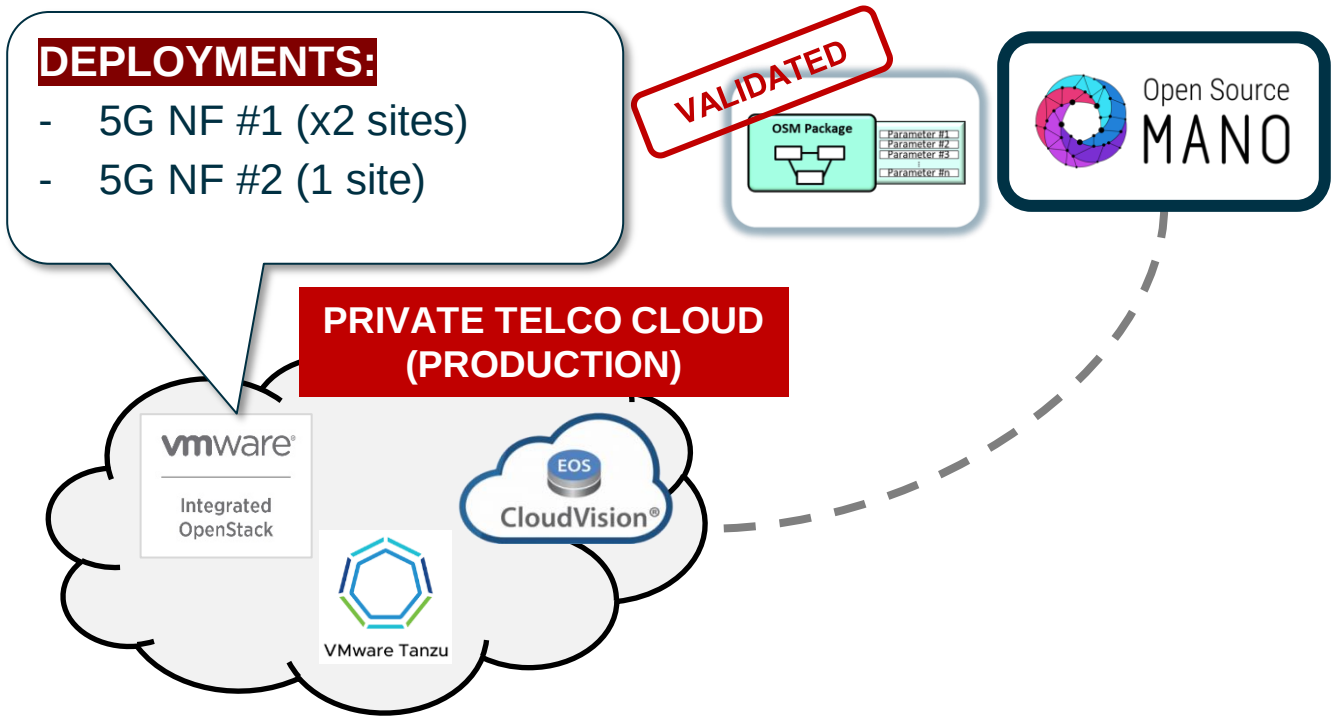
Multi-site and multi-cloud southbound interaction

Key concept: replicability and predictability

Network designs can leverage on replaceable components that can be safely and automatically assembled



Using the exact same packages, the same service can be deployed in multiple types of clouds and sites



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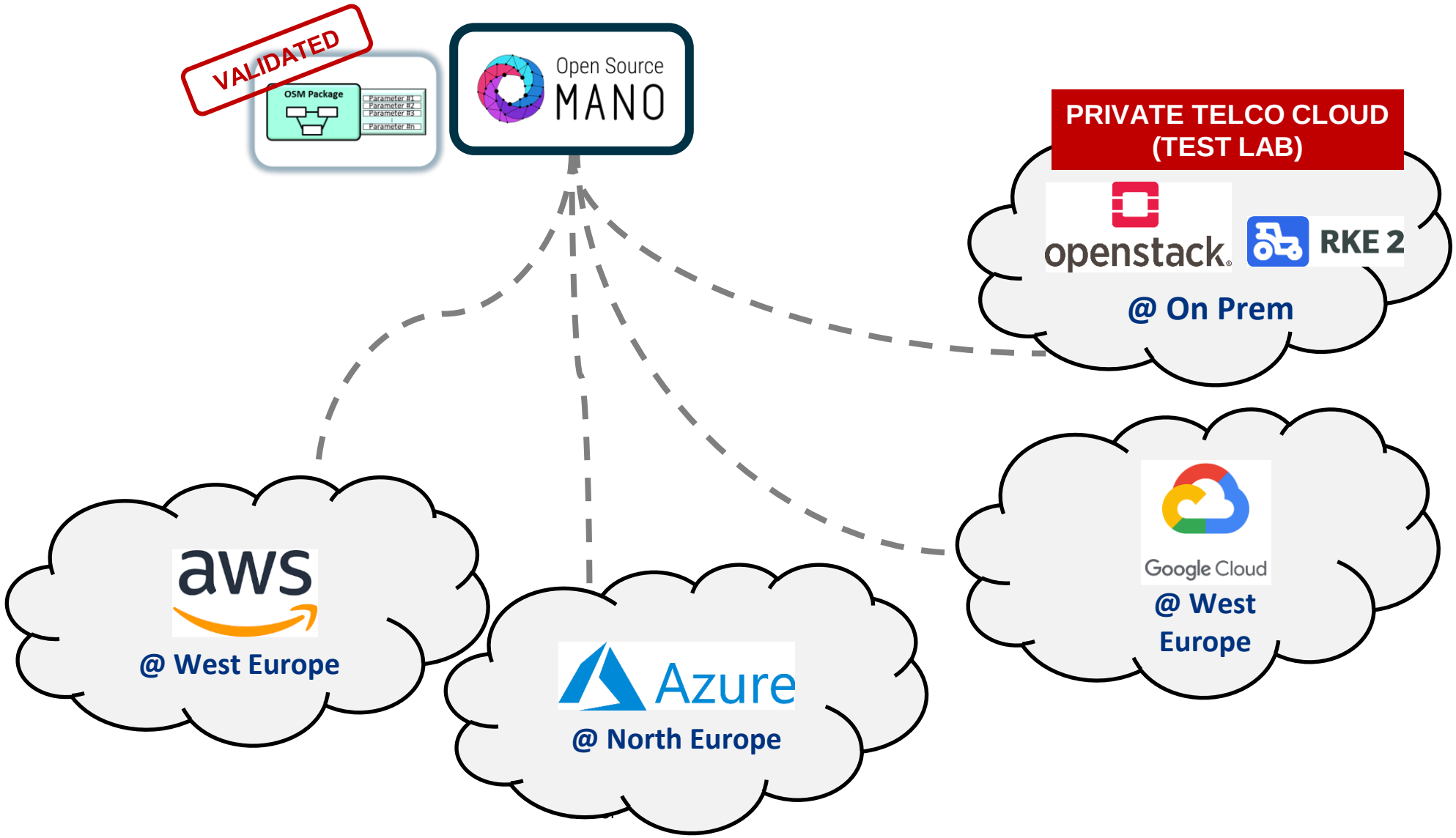


As a result, OSM brings big operational benefits for the challenges of a modern Telco Cloud

Open Source MANO

Reduction of complexity
- Via abstraction & layering

Reliable deployment in multiple locations

Independent of the type of cloud

Vendor-agnostic

Reliable and unambiguous testing
- Ideal for CI/CD

Error minimization

Minimal **Time to Market** for second deployments

Easier **capacity growth among clouds**

Ability to **move workloads** between clouds

Allows for advanced **redundancy schemas**

Reduction of efforts

A Vibrant and Thriving Community

OSM Community is really **LARGE AND DIVERSE**, with **153** members today, but always **OPEN** to new participants

Open Source MANO

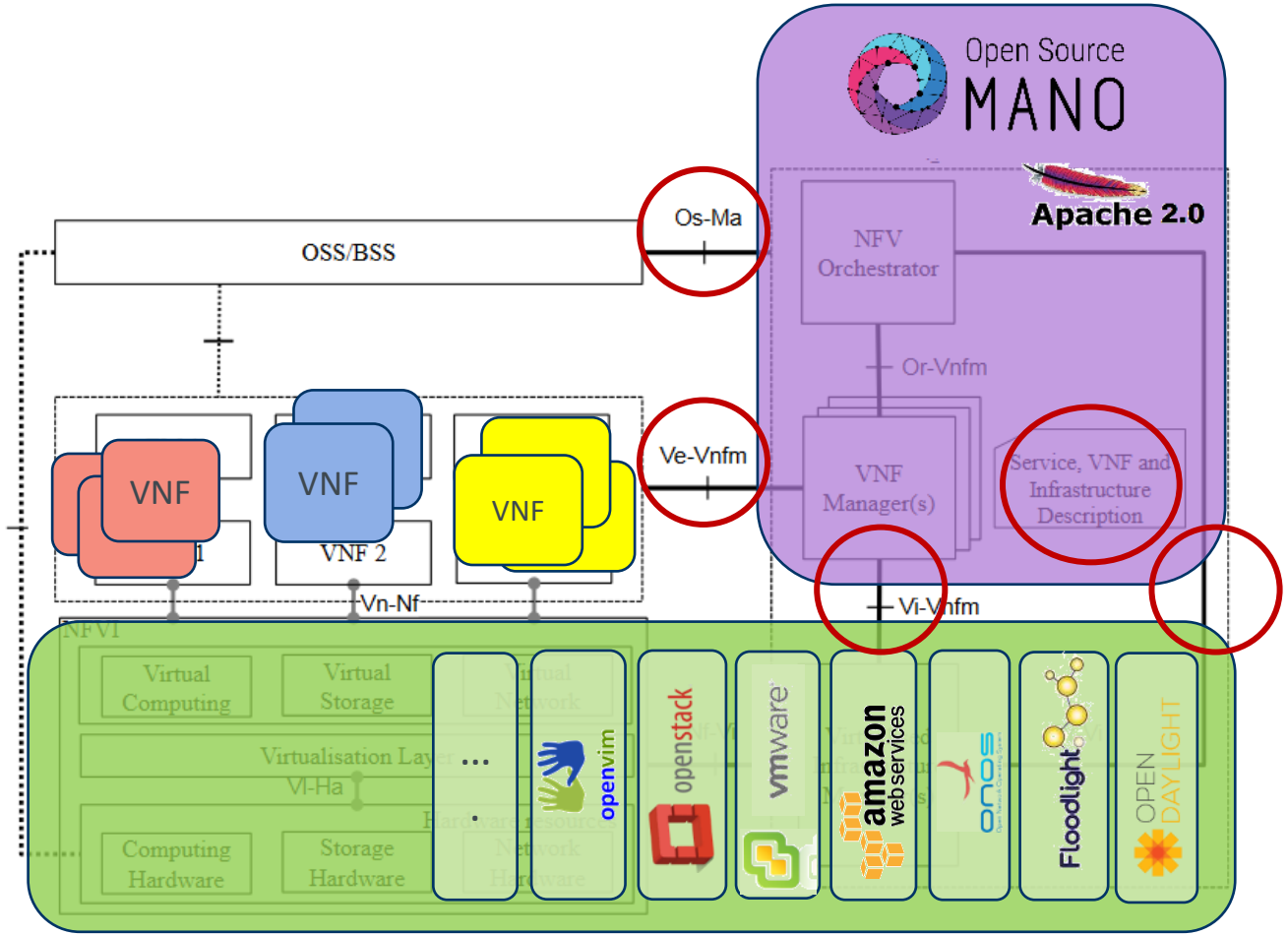
- **15 Global Service Providers**
- **Leading IT/Cloud players**
- **VNF providers**

(*) Names & brands may be claimed as the property of others

ETSI OSM & ETSI NFV

- **ETSI NFV:** Industry Specification Group on Network Functions Virtualisation

- **ETSI OSM:** ETSI hosted Open Source project developing a Management and Orchestration (MANO) stack aligned with ETSI NFV Architectural Framework and IM



OSM activities create continuous feedback loops with other ETSI initiatives…

Open Source MANO

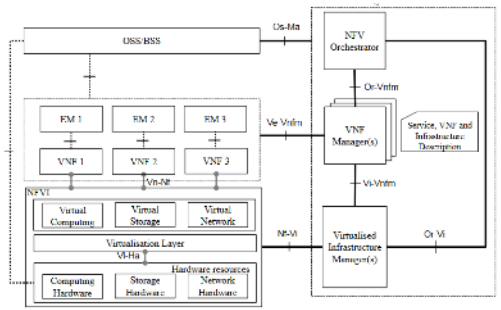
service provider

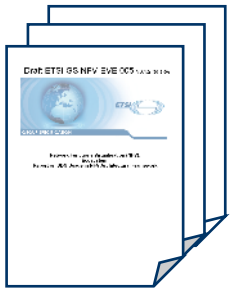
system development

standards

- Architectural Framework
- Information/Data Model (IM/DM)
- API definitions
- Test Specs

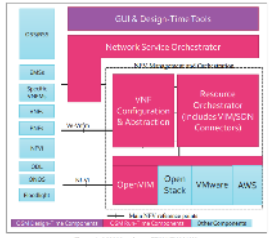
ETSI NFV

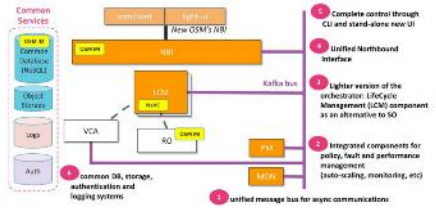




Testing

Open Source MANO





- Release White Papers
- IM improvements (100+ points raised), bugs in APIs
- Lessons learnt EUAG White Paper

… while providing a highly effective bridge between **Standards** and **Research Projects**

Open Source MANO

ETSI NFV

Open Source MANO

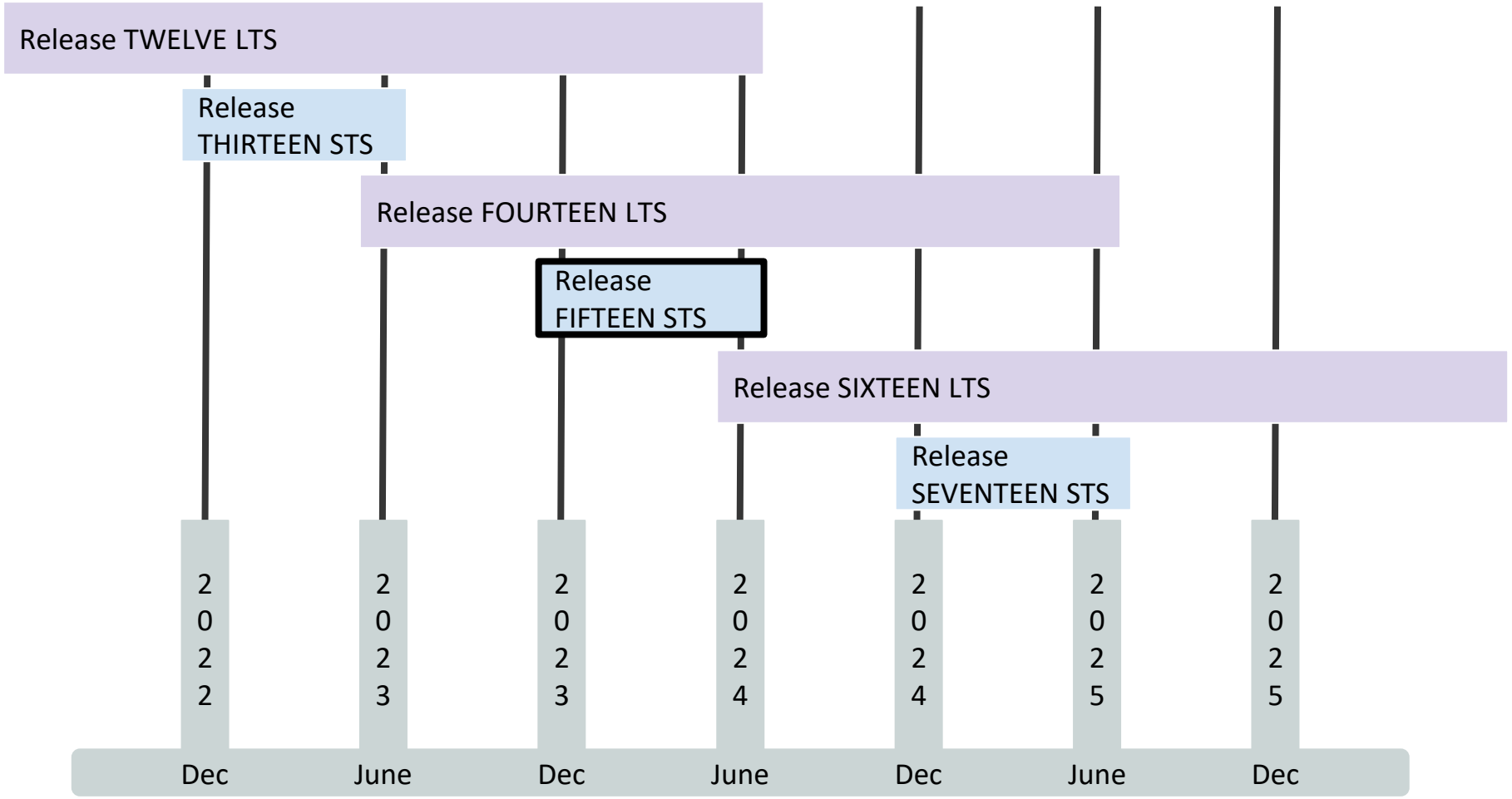
```
<!DOCTYPE html>
<html id="home-layout">
  <head>
    <meta http-equiv="content-type" conte
    <title>Source Code Pro</title>
      <!-- made with <3 and AFDKO -->
    <meta name="keywords" content="sans,
      monospace, open source, coding, for
    <link rel="stylesheet" type="text/css
  </head>
  <body>
    <div id="main">
```

https://osm.etsi.org/wikipub/index.php/Research

Open Source MANO

OSM in production: two releases per year

OSM Release cadence



LTS Releases (Long Term Support)	STS Releases (Short Term Support)
24 months community support	6 months community support
Oriented to production	Oriented to innovation & development
Focus on stability	Focus on innovation & agility
Community grants upgrade between LTS's	Upgrade on a best effort basis

Release FIFTEEN brings a whole set of new functionalities …

NS instantiation and lifecycle mgmt

- Cancel operation task.
- Service Function Chaining.
- AZ for Cinder.
- Dual-Stack IP Support for VNFs in SOL003 VNFM interface.

Kubernetes support

- Support of OCI registries for Helm-based KDU
- Deprecation of Helm v2.

Closed-loop life cycle in public clouds

- Resource consumption metrics from GCP.

OSM installation

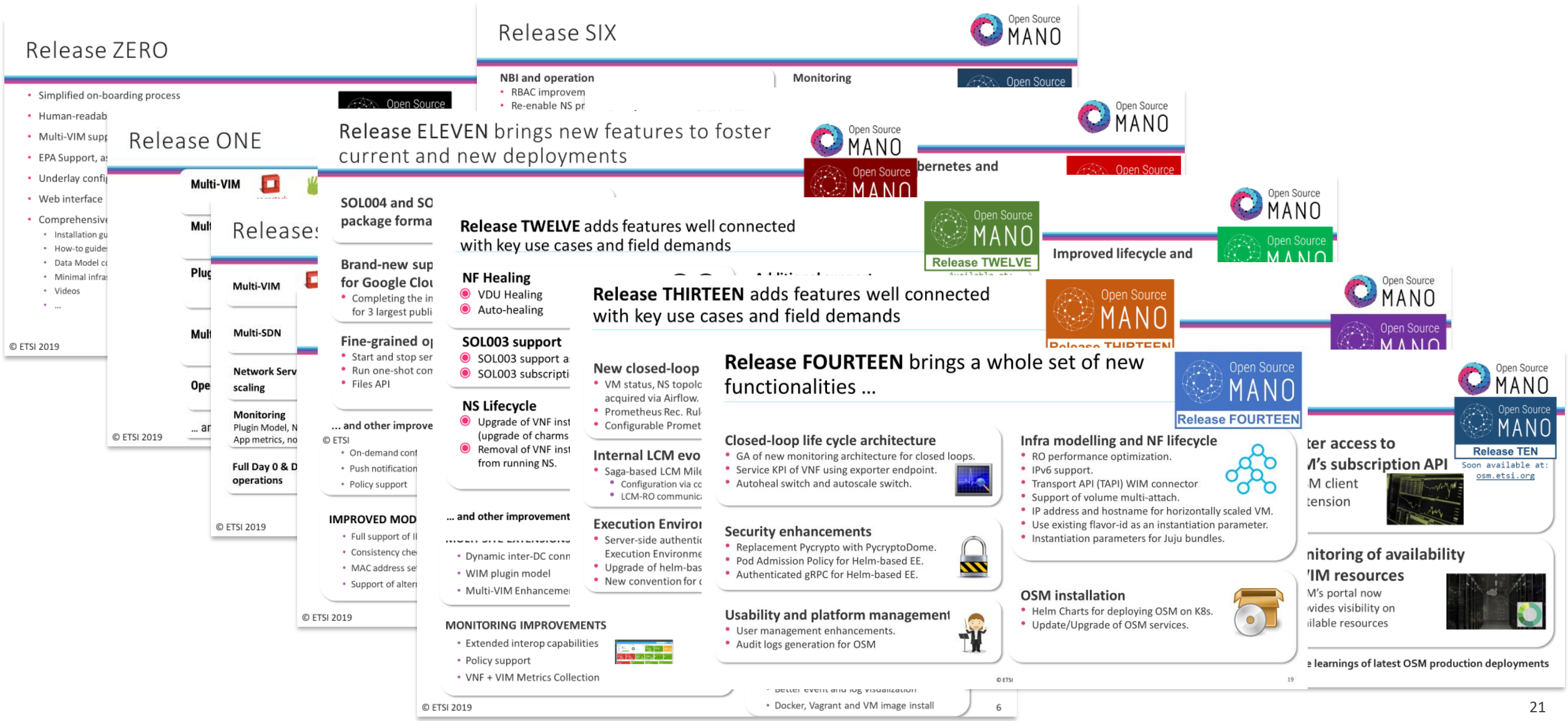
- Use of upstream MongoDB Helm chart in community installer.
- Make juju installation optional in community installer.
- Update of OSM Helm installer to latest versions.

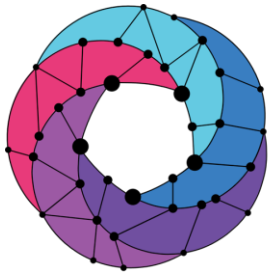
E2E Testing

- Public Cloud Robot tests in OSM pipeline.
- Robot framework linting for E2E tests.

… which are added on top of an already long set of features.

Open Source MANO





Open Source
MANO
by ETSI

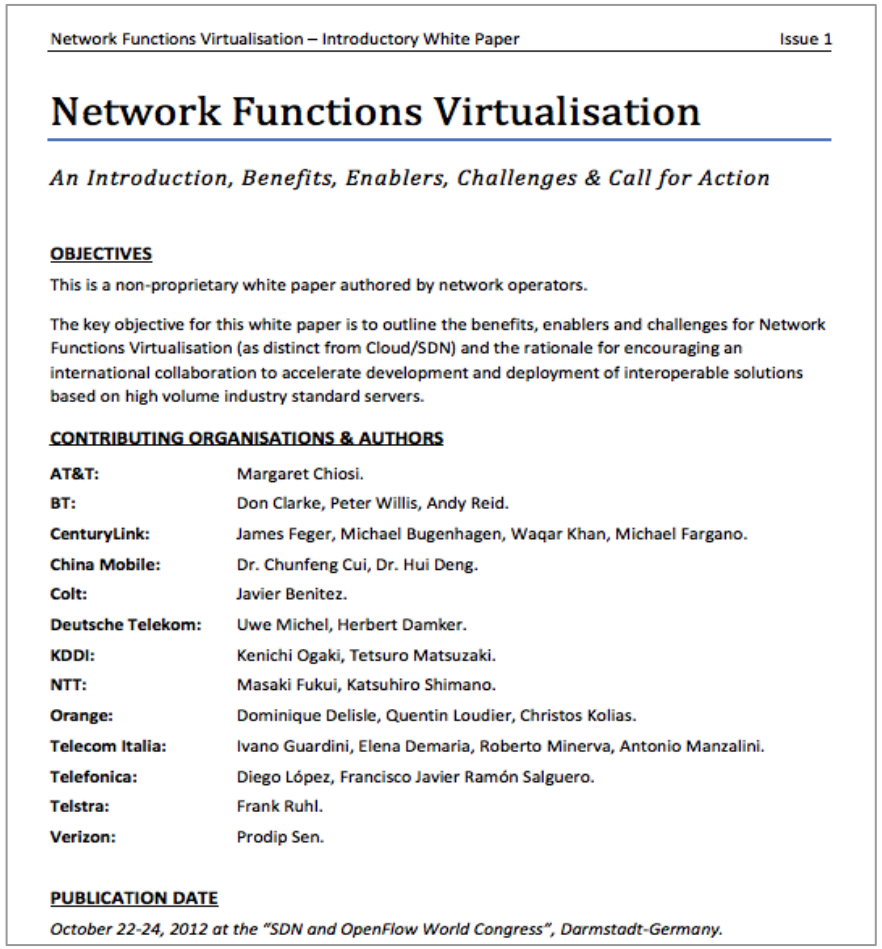
Thank You!

osm.etsi.org
osm.etsi.org/docs/user-guide
osm.etsi.org/wikipub

Evolution of NFV orchestration

In 2012, a white paper was written by the world's leading telecom network operators, leading to the foundation of Network Function Virtualization

Open Source MANO



Network Functions Virtualisation – Introductory White Paper Issue 1

Network Functions Virtualisation

An Introduction, Benefits, Enablers, Challenges & Call for Action

OBJECTIVES

This is a non-proprietary white paper authored by network operators.

The key objective for this white paper is to outline the benefits, enablers and challenges for Network Functions Virtualisation (as distinct from Cloud/SDN) and the rationale for encouraging an international collaboration to accelerate development and deployment of interoperable solutions based on high volume industry standard servers.

CONTRIBUTING ORGANISATIONS & AUTHORS

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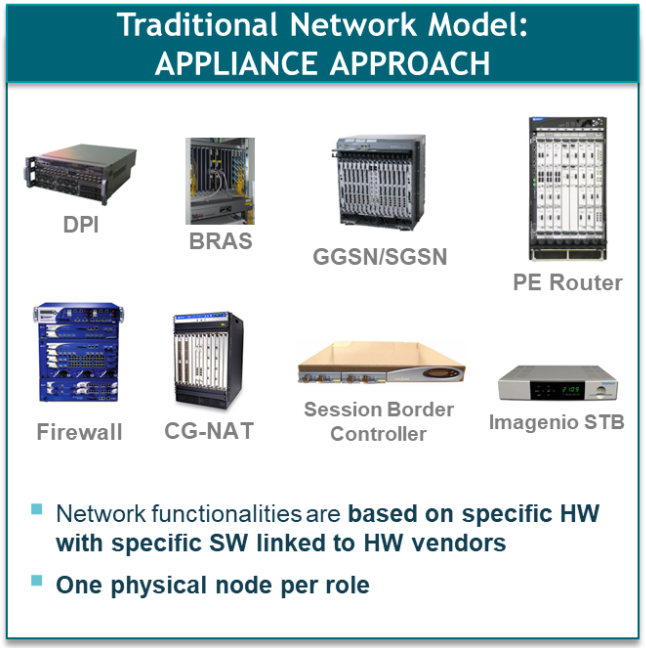
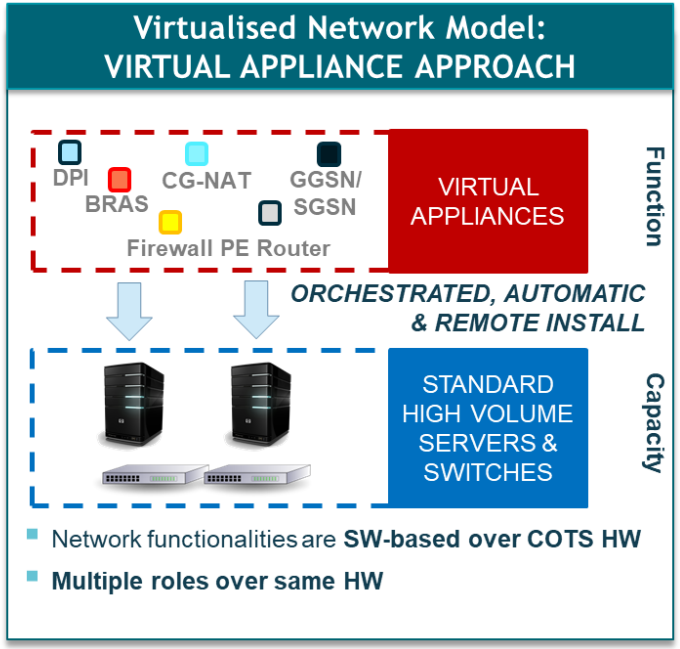
Deutsche Telekom:	Uwe Michel, Herbert Damker.
KDDI:	Kenichi Ogaki, Tetsuro Matsuzaki.
NTT:	Masaki Fukui, Katsuhiro Shimano.
Orange:	Dominique Delisle, Quentin Loudier, Christos Kolias.
Telecom Italia:	Ivano Guardini, Elena Demaria, Roberto Minerva, Antonio Manzalini.
Telefonica:	Diego López, Francisco Javier Ramón Salguero.
Telstra:	Frank Ruhl.
Verizon:	Prodip Sen.

PUBLICATION DATE

October 22-24, 2012 at the "SDN and OpenFlow World Congress", Darmstadt-Germany.

https://portal.etsi.org/nfv/nfv_white_paper.pdf



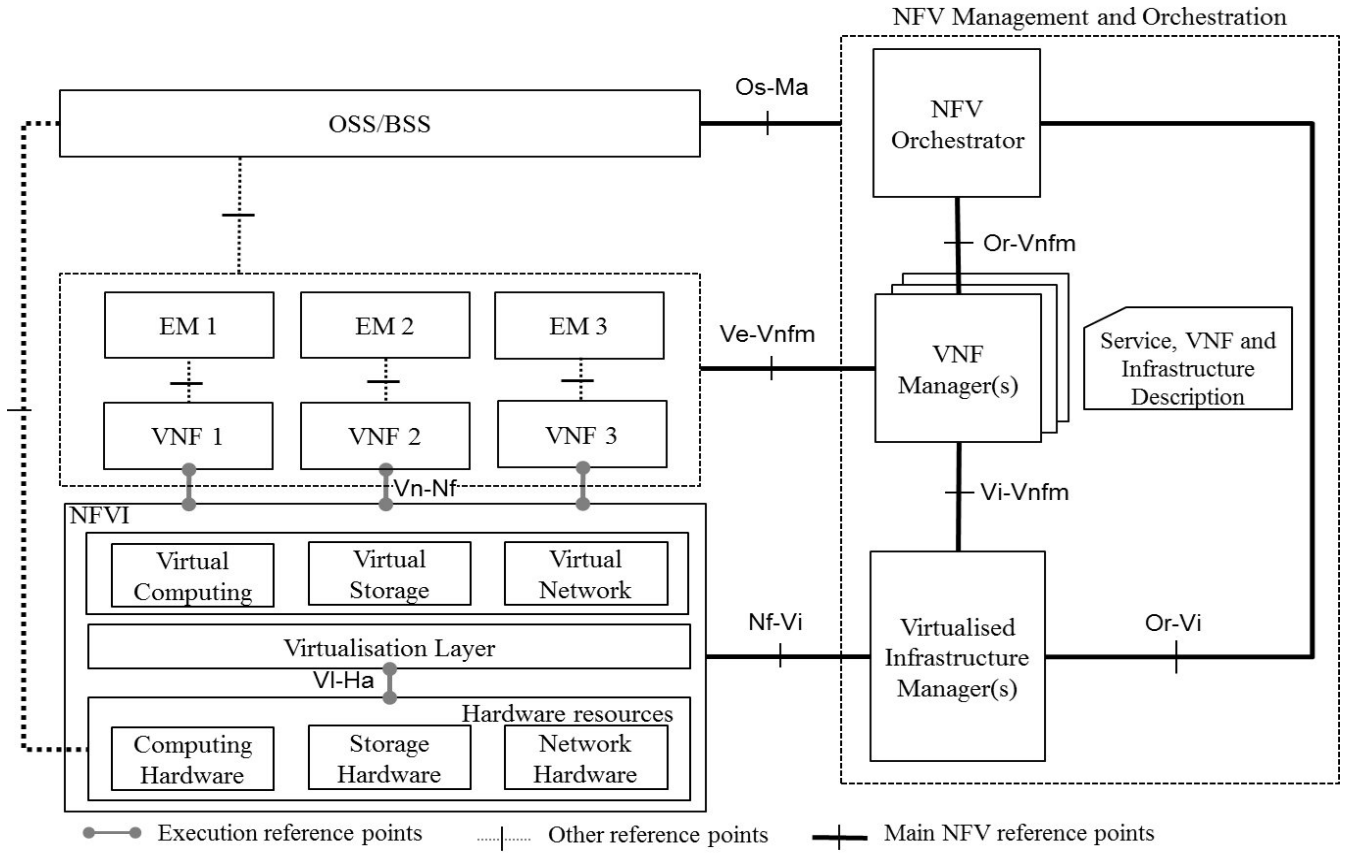


Promises:

- CAPEX reduction through commodity HW
- OPEX reduction thanks to the automation of a SW-based network

Under ETSI's umbrella, the industry elaborated a first NFV architecture

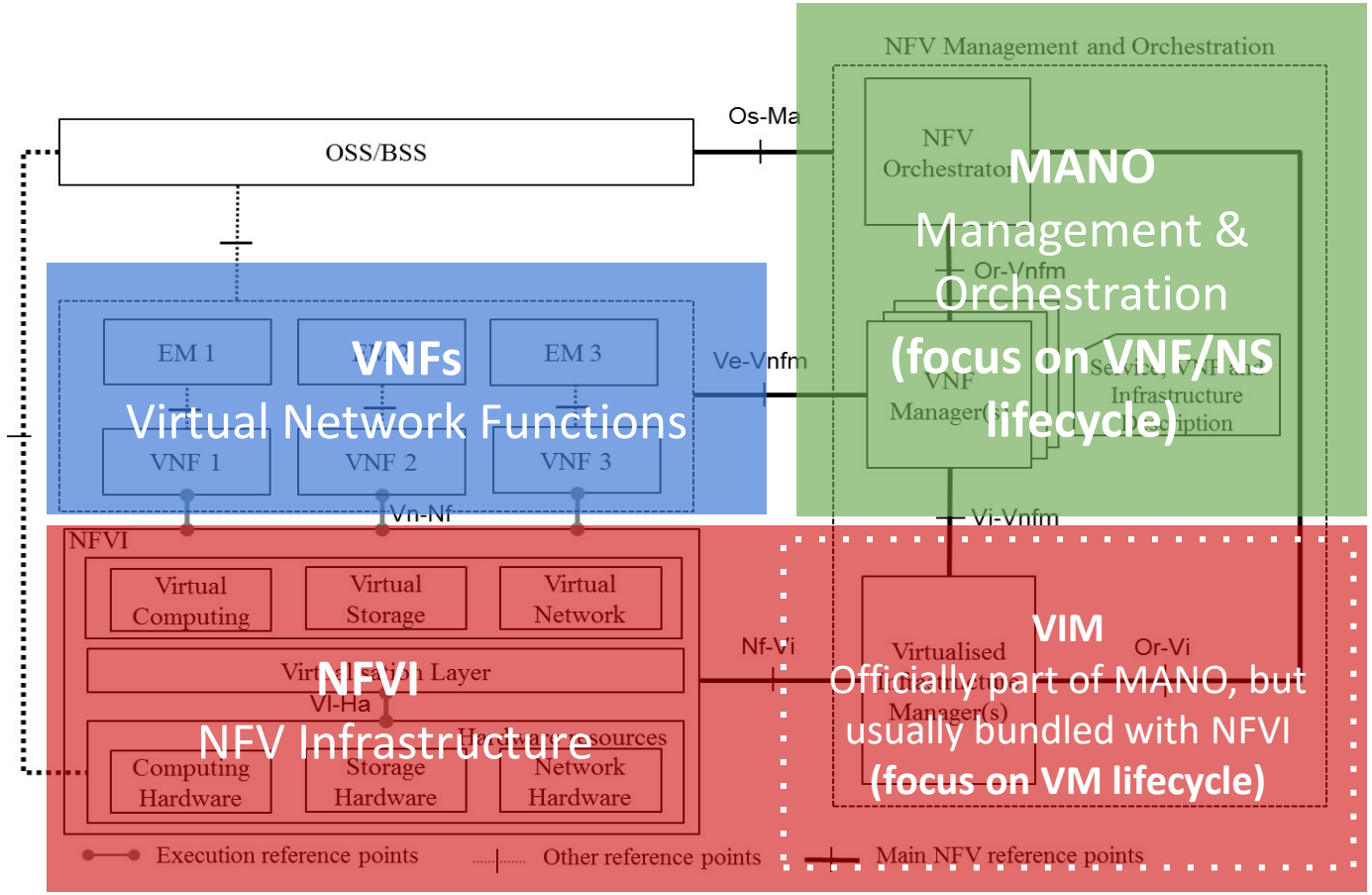
Open Source MANO



ETSI

Under ETSI's umbrella, the industry elaborated a first NFV architecture

Open Source MANO



ETSI

NFV architecture has evolved over time, incorporating new elements

Open Source MANO

2013: NFV Release 1
First NFV architecture

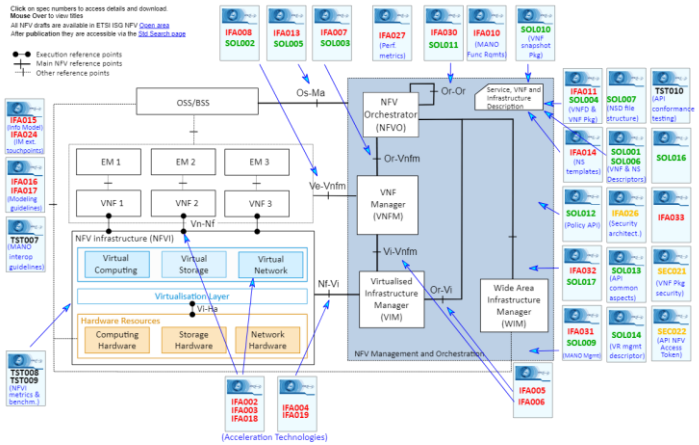
2015-2016: NFV Release 2
First interface specifications (SOL specs)

2017-2018: NFV Release 3
Multi-domain NS mgmt. via Or-Or
Multi-site connectivity services with WIM

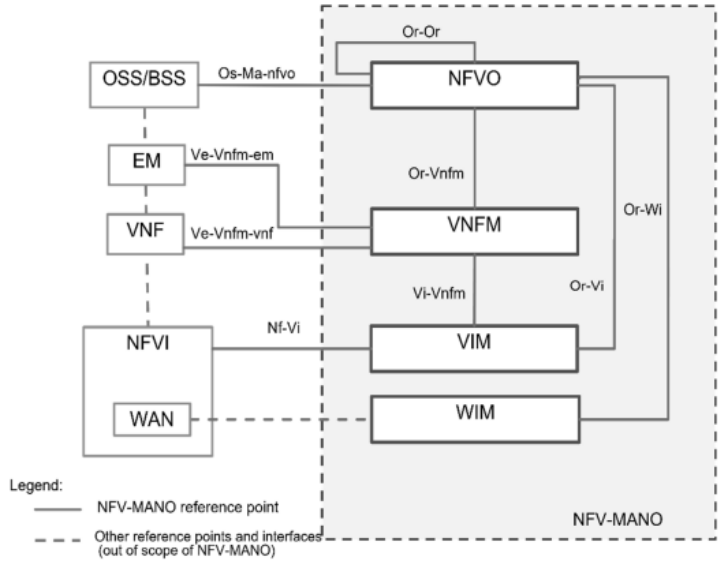
2019-2020: NFV Release 4
Container mgmt. and orchestration with CISM, CIR and CIS
CIS Cluster mgmt. with CCM

2012 — 2023

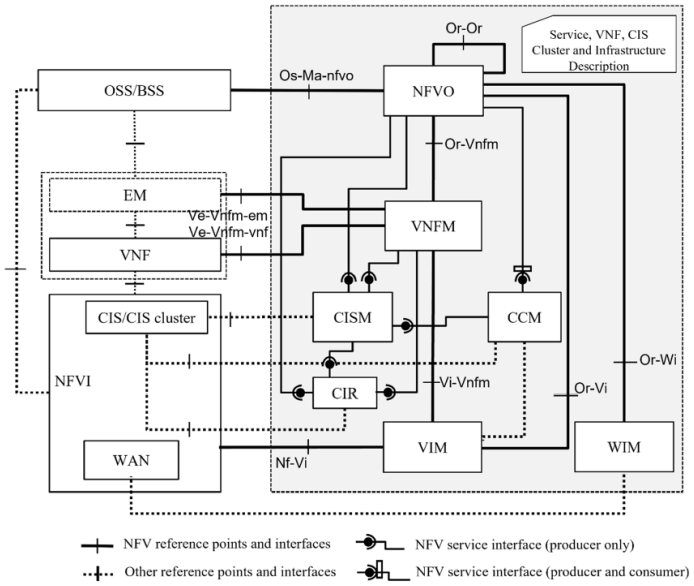
NFV architecture and interfaces specifications



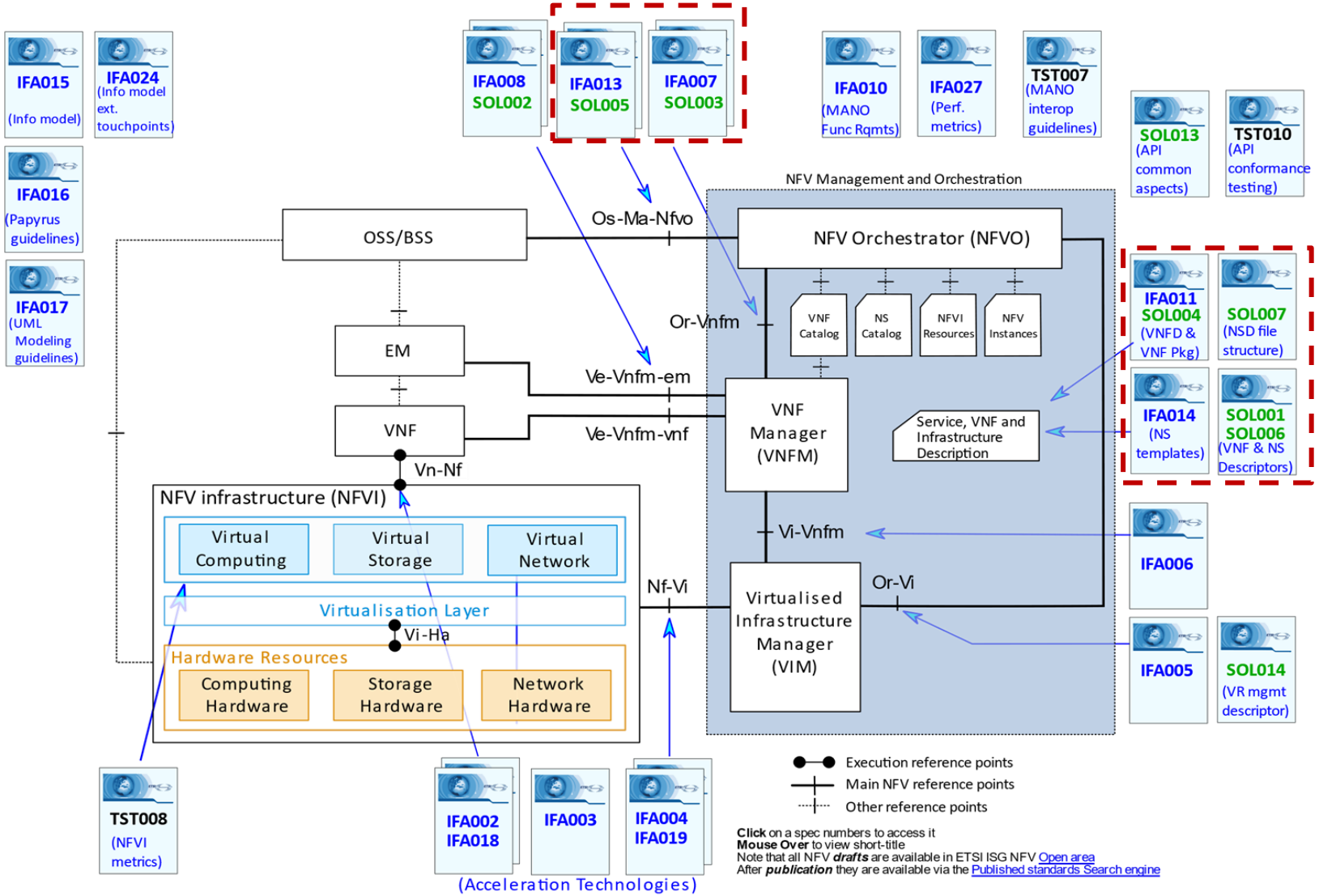
NFV architecture in Release 3



NFV architecture in Release 4



ETSI NFV Architecture



OSM in ETSI NFV Architecture