

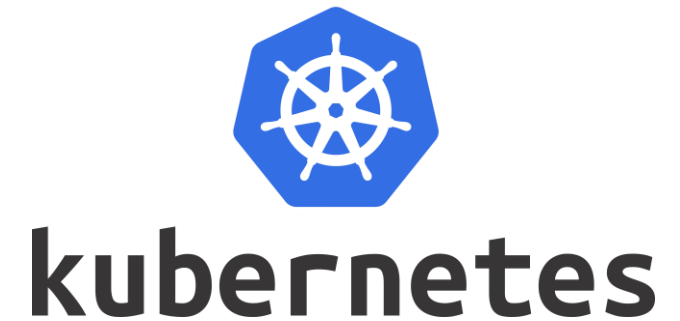
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## OSM-MR#10 Hackfest – Day 2 Session 3. K8s support in OSM

Gerardo García (Telefónica)

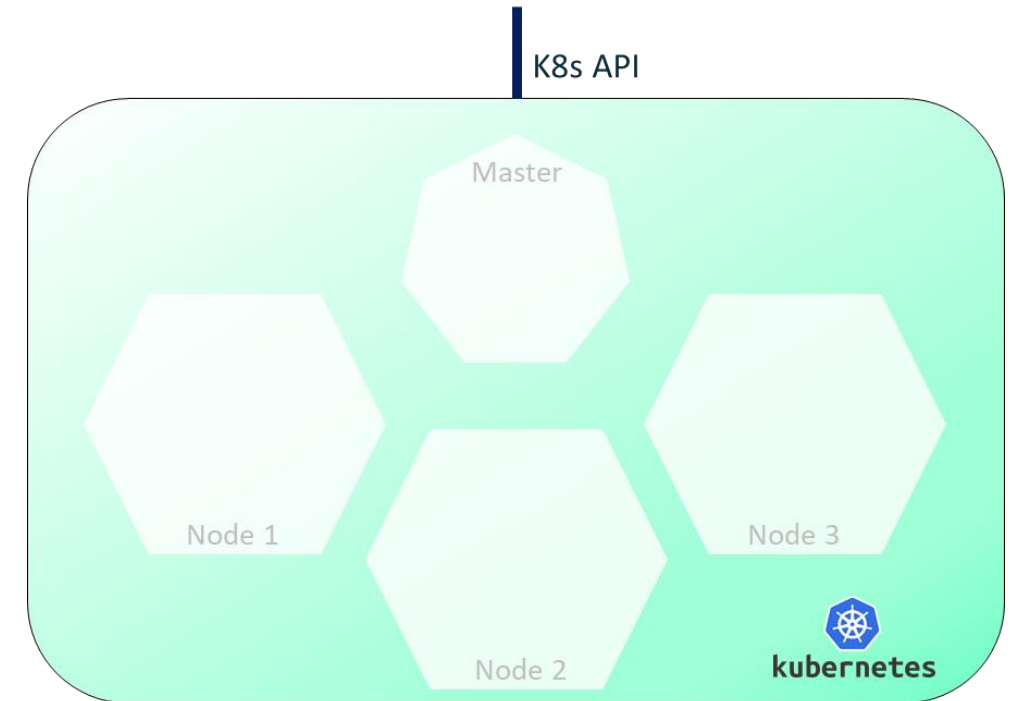
# Why K8s in OSM?

- Applications based in micro-services
  - OSM is, in fact, already running in K8s, both [distros](#) and [community installer](#)
- NFV use cases: 5G Core, uCPE/SD-WAN...
- K8s apps and clusters are essential ingredients for many Edge use cases



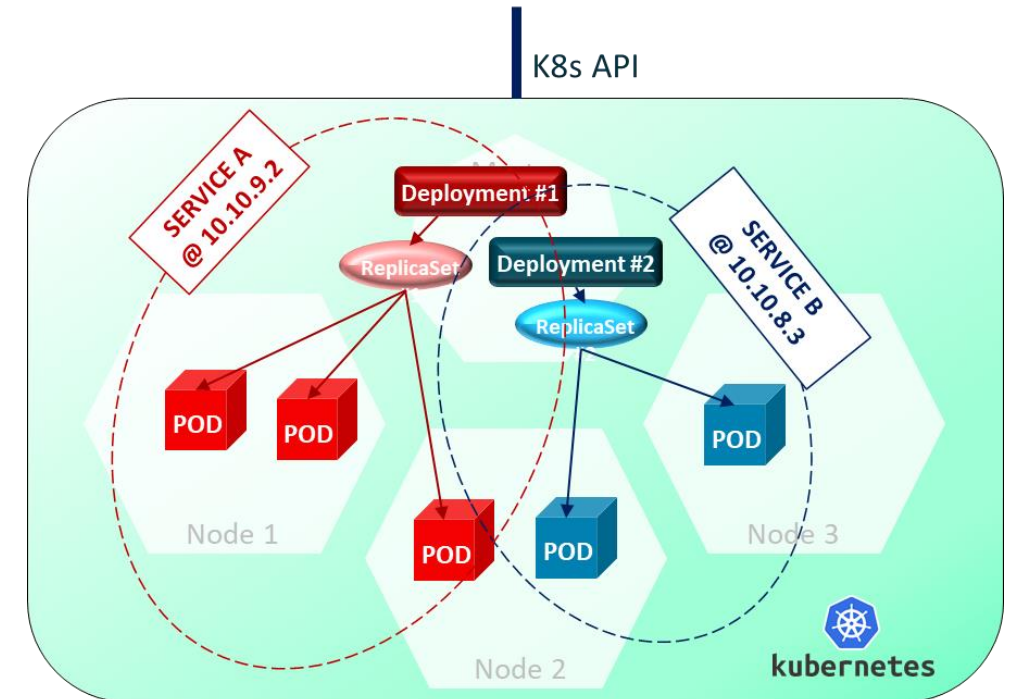
# How K8s-based apps are modelled today

- K8s provides a huge number of high-level service objects, which are the core of its functionality:
  - Pod sets: deployments (+replicasets), statefulsets
  - Services: clusterIP, NodePort, LoadBalancer
  - Storage: persistent volumes, persistent volume claims
- Those high-level objects are modelled with K8s manifest files in YAML format
- TWO packaged formats to deploy a K8s app:
  - **Helm charts**: indirect call to the K8s API via helm
  - **Juju charms and bundles**: indirect call to the K8s API via Juju



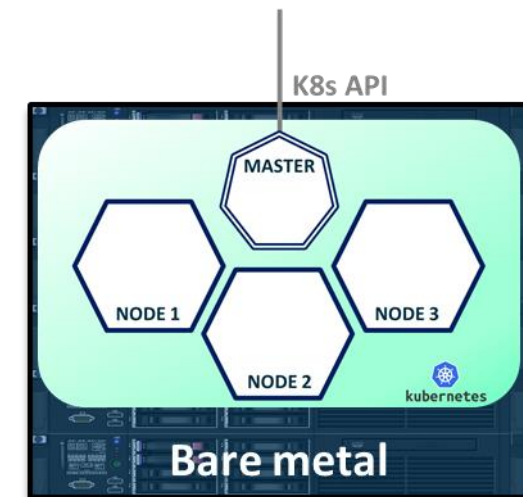
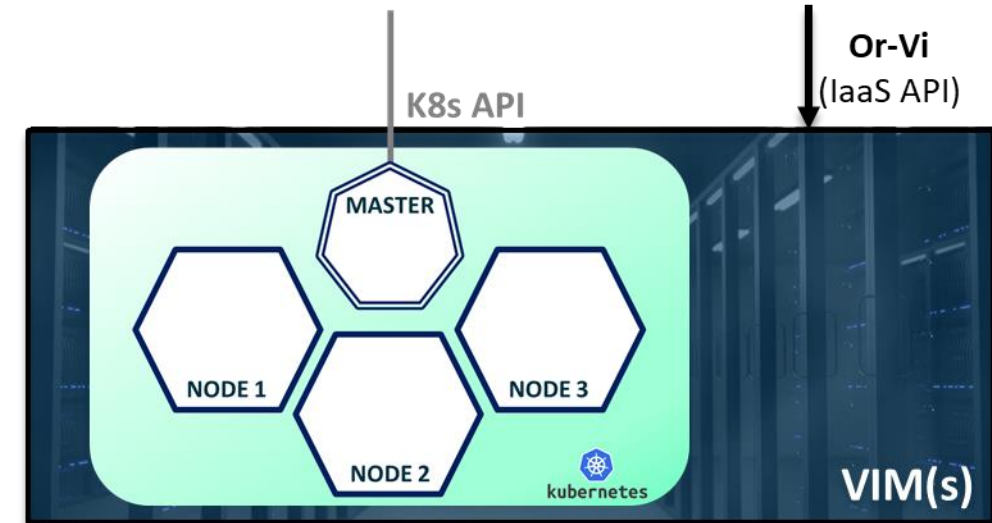
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# Requirements of K8s-based apps: a K8s cluster

- The K8s cluster:
  - Can be created in different ways:
    - Standalone: Openshift, Charmed K8s, Ericsson CCD, etc.
    - As part of a VIM: VMware Cloud PKS, AWS, etc.
  - Can run on Bare Metal or on VMs running in a VIM
  - Once created, each cluster provides a K8s API, irrespective of the way it was created.
- Specific versions of K8s or CNI plugins might be required







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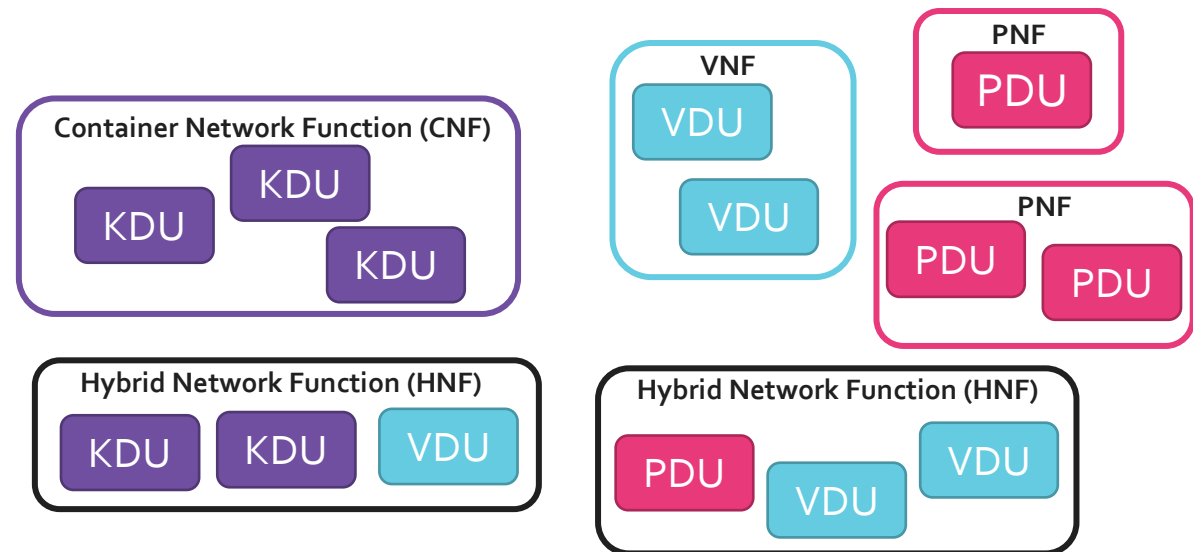
K8s support in  
OSM



# From K8s apps to xNF

## Model-driven (like everything in OSM)

- NF composition specified in the VNF descriptor
  - Deployment Units:
    - Virtual (VDU) = VM
    - Physical (PDU) = Physical Node
    - **Kubernetes (KDU) = K8s app**



# From K8s apps to xNF Model-driven (like everything in OSM)

- Modelling in the VNF descriptor:

- KDU based on helm charts or juju bundles

```
+++rw kdu:kdu* [name]
|   +-rw kdu:name          string
|   +-rw kdu:description?  string
|   +-rw (kdu:kdu-model)?
|   |   +--:(kdu:helm-chart)
|   |   |   +-rw kdu:helm-chart?  string
|   |   |   +-rw kdu:helm-version? enumeration
|   |   +--:(kdu:juju-bundle)
|   |       +-rw kdu:juju-bundle?  string
```

- K8s cluster requirements

```
+++rw kdu:k8s-cluster
|   +-rw kdu:version*  string
|   +-rw kdu:cni*      enumeration
|   +-rw kdu:nets* [id]
|       +-rw kdu:id    string
```

- Linking cluster networks to external connection points

```
+++rw ext-cpd* [id]
|   +-rw (cp-connection)?
|   |   +--:(kdu:k8s-cluster-net)
|   |       +-rw kdu:k8s-cluster-net?  -> /vnfd:vnfd/kdu:k8s-cluster/nets/id
```



# Two steps are considered in OSM

## STEP #1. CREATION OF THE K8S CLUSTER

### OPTIONS:

1. **By an external platform, static**
  - Cluster is then registered into OSM administratively
2. **By using an external platform API either in public cloud (Azure, Google, AWS) or in the private cloud**
3. **Created by OSM as a regular NS**

Not part of OSM

## STEP #2. USE OF THE K8S CLUSTER

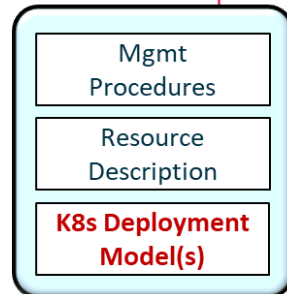
- **The full catalog of K8s objects is entirely incorporated** in a future-proof manner:

- **Helm charts:** +20,000 stable applications are already available for production
- **Juju bundles:** fairly powerful for inter-object configurations

- OSM also supports **hybrid cases**, which are required for real VNFs (e.g. 5G Core)

Ready since Release SEVEN!

NF Packages  
(VNF, PNF, HNF)



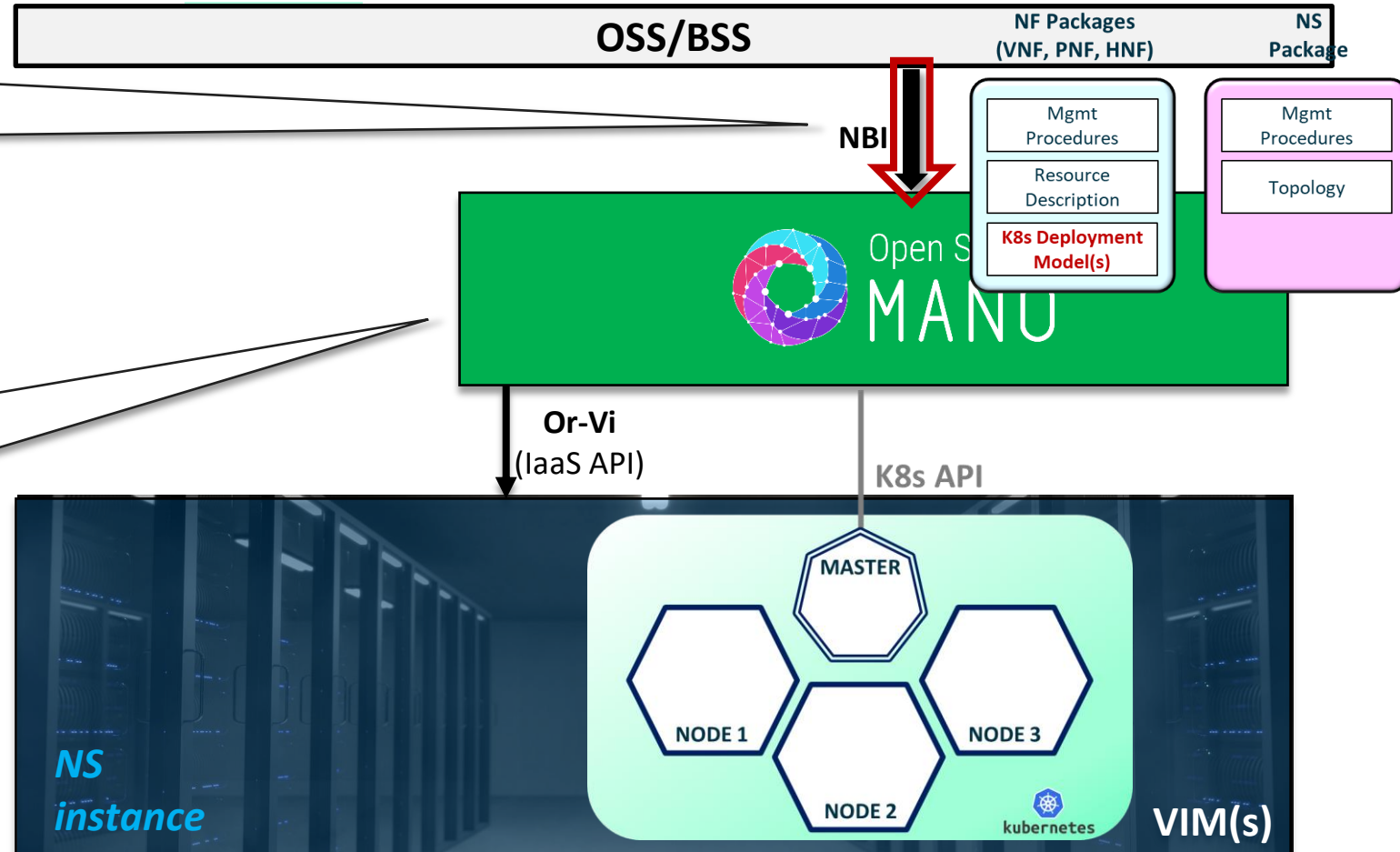
# OSM NBI abstracts the operations required to manage the life cycle of KDU in the context of a NS

## OSM operations:

- NS instantiate
- NS primitive
- NS termination

## Full K8s app lifecycle operations:

- install
- upgrade
- rollback
- delete





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## Step 1. How to create a K8s cluster

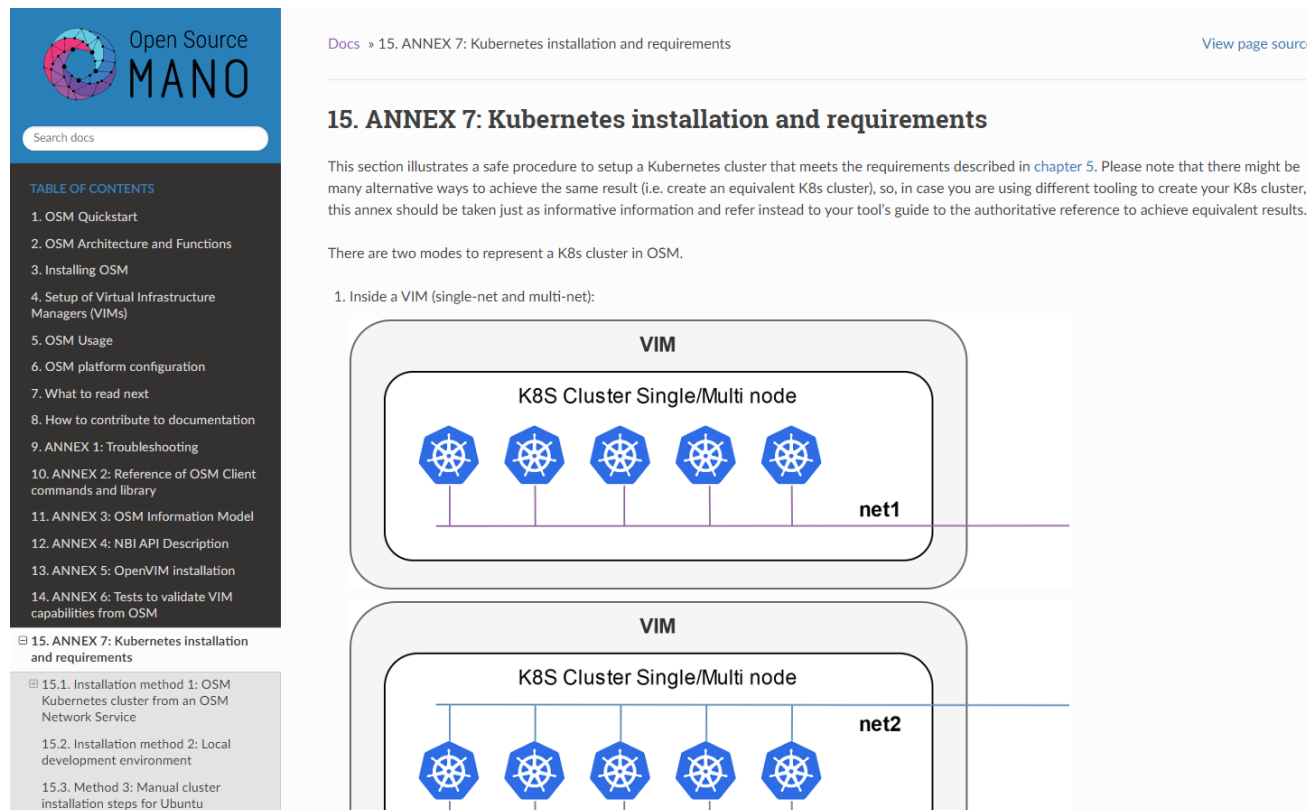
Cluster creation using OSM packages



# How to install a K8s cluster

You can follow this guide:

<https://osm.etsi.org/docs/user-guide/15-k8s-installation.html>



The screenshot shows the Open Source MANO documentation interface. On the left is a sidebar with a search bar and a table of contents. The main content area displays the title '15. ANNEX 7: Kubernetes installation and requirements' and a brief introduction. Below the text is a diagram illustrating two deployment modes for a K8s cluster within a VIM. The top diagram, labeled 'net1', shows a VIM container holding a 'K8S Cluster Single/Multi node' which consists of five Kubernetes node icons connected to a single network line. The bottom diagram, labeled 'net2', shows a similar VIM container with a 'K8S Cluster Single/Multi node' where the five node icons are each connected to their own individual network lines.

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Search docs

TABLE OF CONTENTS

- 1. OSM Quickstart
- 2. OSM Architecture and Functions
- 3. Installing OSM
- 4. Setup of Virtual Infrastructure Managers (VIMs)
- 5. OSM Usage
- 6. OSM platform configuration
- 7. What to read next
- 8. How to contribute to documentation
- 9. ANNEX 1: Troubleshooting
- 10. ANNEX 2: Reference of OSM Client commands and library
- 11. ANNEX 3: OSM Information Model
- 12. ANNEX 4: NBI API Description
- 13. ANNEX 5: OpenVIM installation
- 14. ANNEX 6: Tests to validate VIM capabilities from OSM
- 15. ANNEX 7: Kubernetes installation and requirements
  - 15.1. Installation method 1: OSM Kubernetes cluster from an OSM Network Service
  - 15.2. Installation method 2: Local development environment
  - 15.3. Method 3: Manual cluster installation steps for Ubuntu

Docs » 15. ANNEX 7: Kubernetes installation and requirements

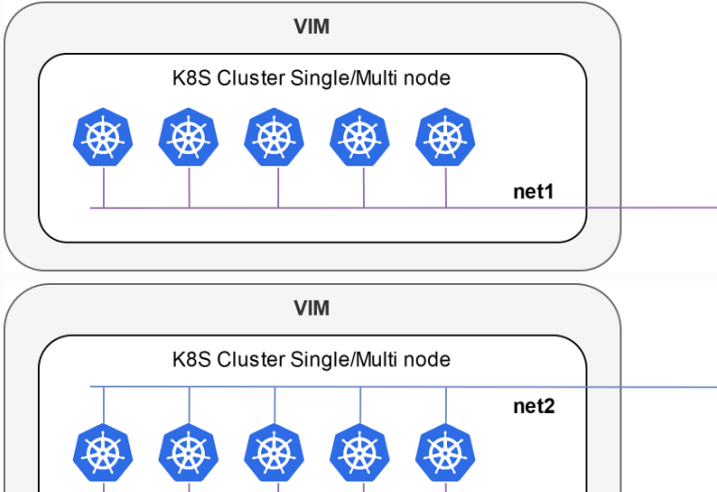
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## 15. ANNEX 7: Kubernetes installation and requirements

This section illustrates a safe procedure to setup a Kubernetes cluster that meets the requirements described in chapter 5. Please note that there might be many alternative ways to achieve the same result (i.e. create an equivalent K8s cluster), so, in case you are using different tooling to create your K8s cluster, this annex should be taken just as informative information and refer instead to your tool's guide to the authoritative reference to achieve equivalent results.

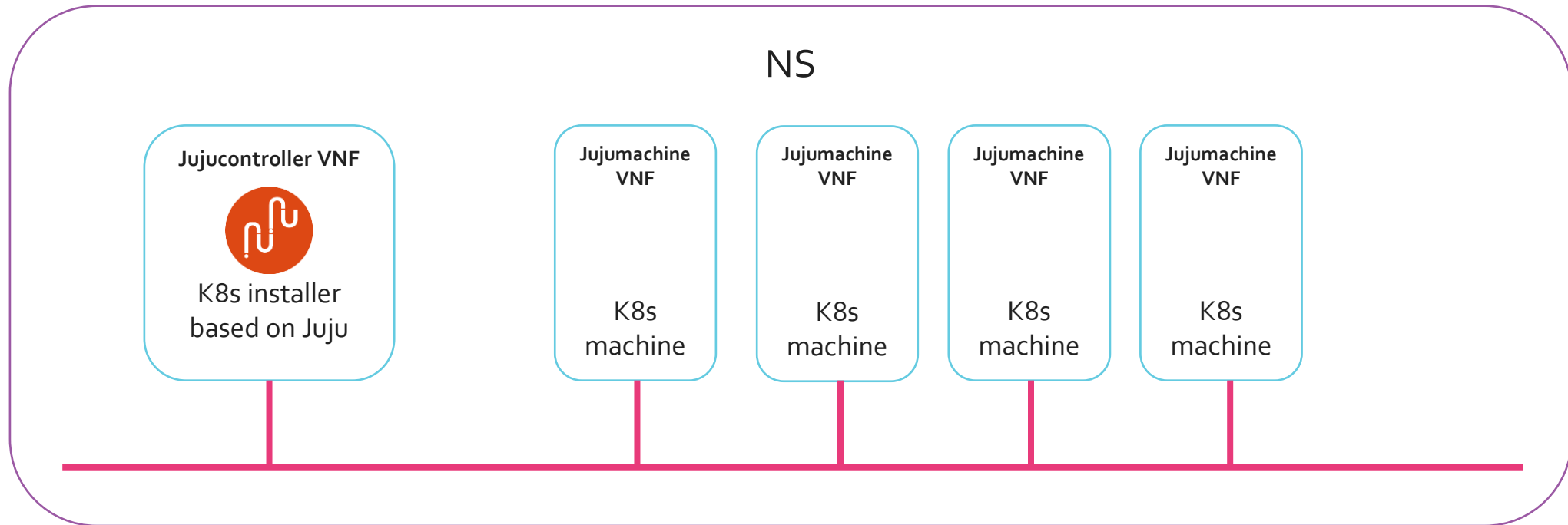
There are two modes to represent a K8s cluster in OSM.

1. Inside a VIM (single-net and multi-net):



The diagram illustrates two Virtual Infrastructure Managers (VIMs) stacked vertically. Each VIM contains a 'K8S Cluster Single/Multi node' represented by a rounded rectangle. Inside each cluster rectangle, there are five Kubernetes node icons (blue circles with a white ship's wheel) connected to a horizontal line. The top VIM is connected to a network labeled 'net1', and the bottom VIM is connected to a network labeled 'net2'.

# How to install a K8s cluster using OSM packages

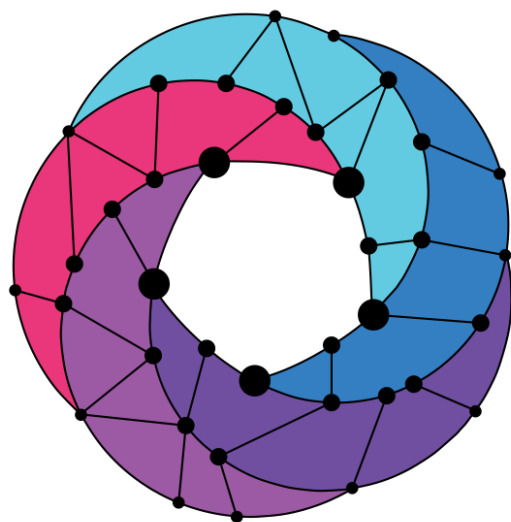




# Friendly reminder: not a hands-on session



**PLEASE DO NOT DEPLOY  
A KUBERNETES CLUSTER IN ETSI VIM!  
(WE ALREADY CREATED ONE FOR YOU)**



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