



**SAMSUNG**

# ONAP Network Service on interconnected Openstack and Kubernetes based cloud regions

ONAP DDF at Stockholm Kista

12.06.2019

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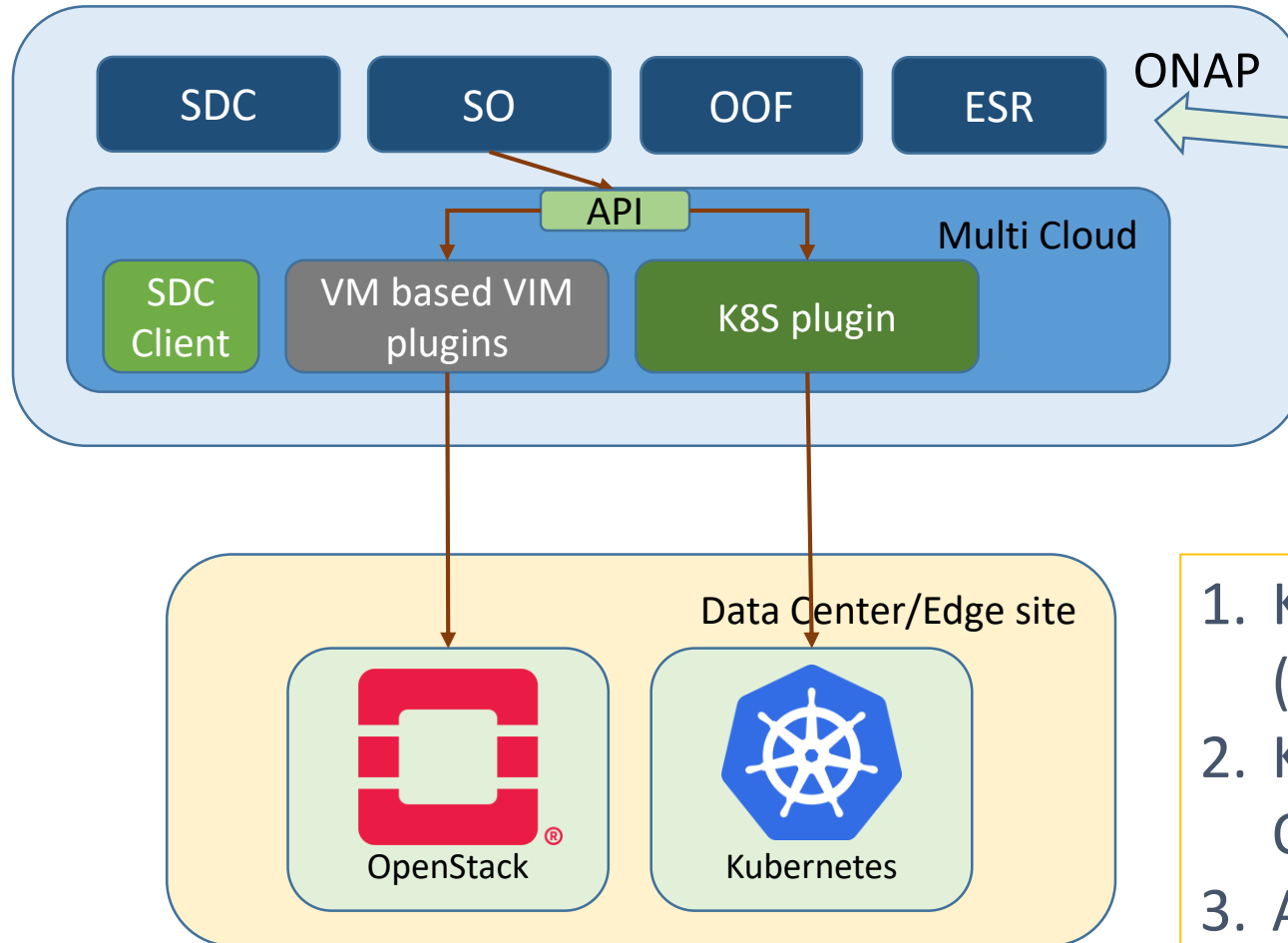
# Agenda

- How hybrid VIM is visible to ONAP?
- How heterogeneous services should be modeled?
- Proposed solution for VM and POD networking
- Proposed demo use case for ONAP
- Next steps
- Q&A

ONAP projects context (in this presentation)

- SDC
- Multicloud/k8s

# Use case: Site with 2 cloud regions



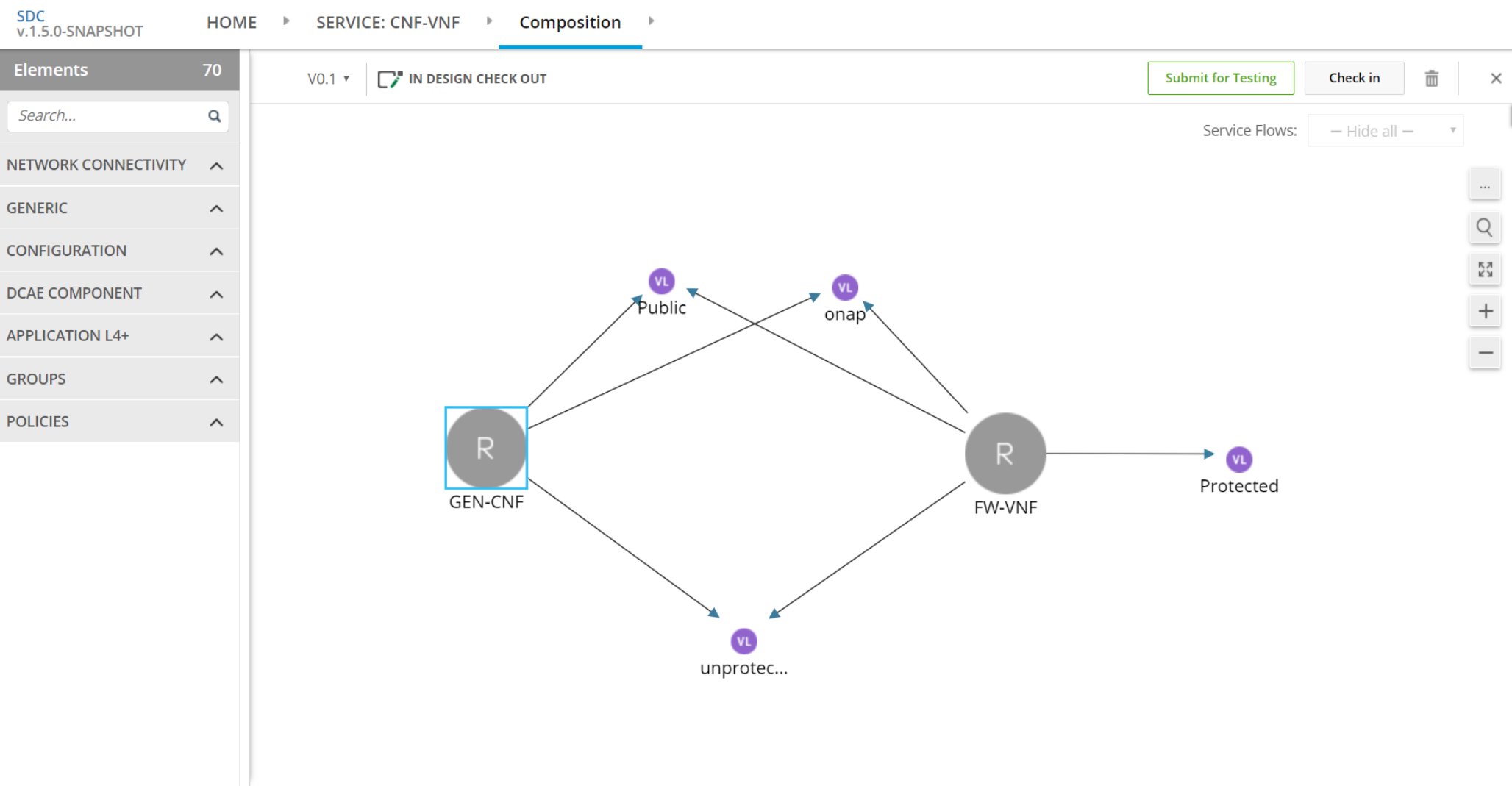
AAI (ESR) registered with 2 cloud regions.  
- Openstack  
- Kubernetes

1. Kubernetes running on top of Openstack (E.g. Magnum, Murano or Heat K8s cloud provider)
2. Kubernetes running on bare metal beside Openstack
3. A combination of the two

# Target: ONAP Network Service over VM and Container based cloud regions

- Model ONAP service seamlessly having both VM and Container based NFs
  - Onboard xNF packages with VNF/CNF artifacts
  - Common (TOSCA?) model for both virtualization types
  - SDC's "Service composition" can visualize xNFs including interconnections
- Instantiate service NFs
  - Configure service networks (by SDNC?) through multicloud to Openstack
  - Start VMs through multicloud to Openstack cloud region
  - Deploy container manifest (Helm) through multicloud/k8s-plugin to Kubernetes cloud region
- Configure and run CLs on service NFs
  - Regardless of virtualization type
    - Configure NFs same way
    - Application specific CL triggers (e.g. VES events) same way

# SDC service modeling view



- Interconnections for xNFs visible regardless of virtualization type (VM or Container)
- Example from vFW use case where Package generator is CNF while Sink and FW is a VNF.

# Modeling NFs in a service

Application specific modeling should be exactly the same for PNF, VNF and CNF

- FCAPS

- E.g. Application configuration through APPC with NetConf
- E.g. Monitoring through VES or some other protocol

- Close loop

- E.g. Modeling micro service and operational policies
- E.g. Configuring APPC NB/SB interfaces with Controller Design Studio (CDS)

# How to network VM and POD?

## Target

- Enable running of VMs and PODs on **same** data center on **same** networks
- Enable VMs and PODs to interconnect in multiple networks with adequate performance and without complicated network configuration

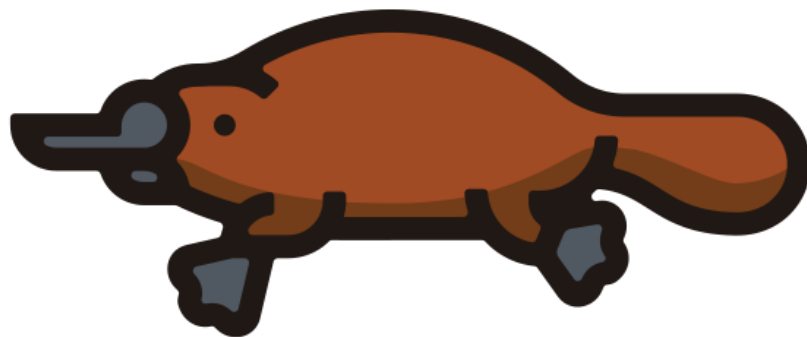
## Problems in terms of networking setup

- If using a networking solution that has native support for both OpenStack and Kubernetes it's possible to enable L3 connectivity between OpenStack and Kubernetes networks, but it would require manual configuration which could become quite complicated if also needing to adhere to rules of the OpenStack security group and Kubernetes Network Policy
- Kubernetes expects to use NodePort, LoadBalancer or ExternalName type services to access Pods from OpenStack VMs (i.e. outside of the Kubernetes cluster). In most cases, that would lead to reduced VM-to-Pod data-plane performance compared to Pod-to-Pod or VM-to-VM cases.
- Double-tunneling will have negative impact on data-plane performance (e.g. Kubernetes 'flannel' tunnel encapsulated in OpenStack 'vxlan' tunnel when running Kubernetes on top of OpenStack).

# Interconnectivity between Kubernetes Pods and Services and OpenStack VMs

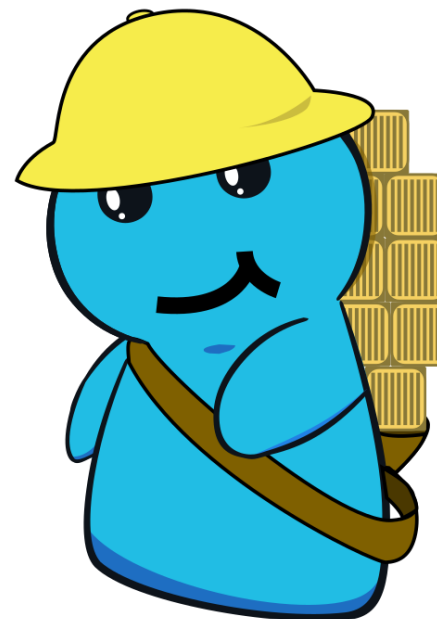
## Solution → [Kuryr-kubernetes](#)

The OpenStack Kuryr project solves these problems by enabling native Neutron-based networking in Kubernetes. With Kuryr-Kubernetes it's possible to choose to run both OpenStack VMs and Kubernetes Pods on the same Neutron network if your workloads require it or to use different segments and, for example, route between them.



# KURYR

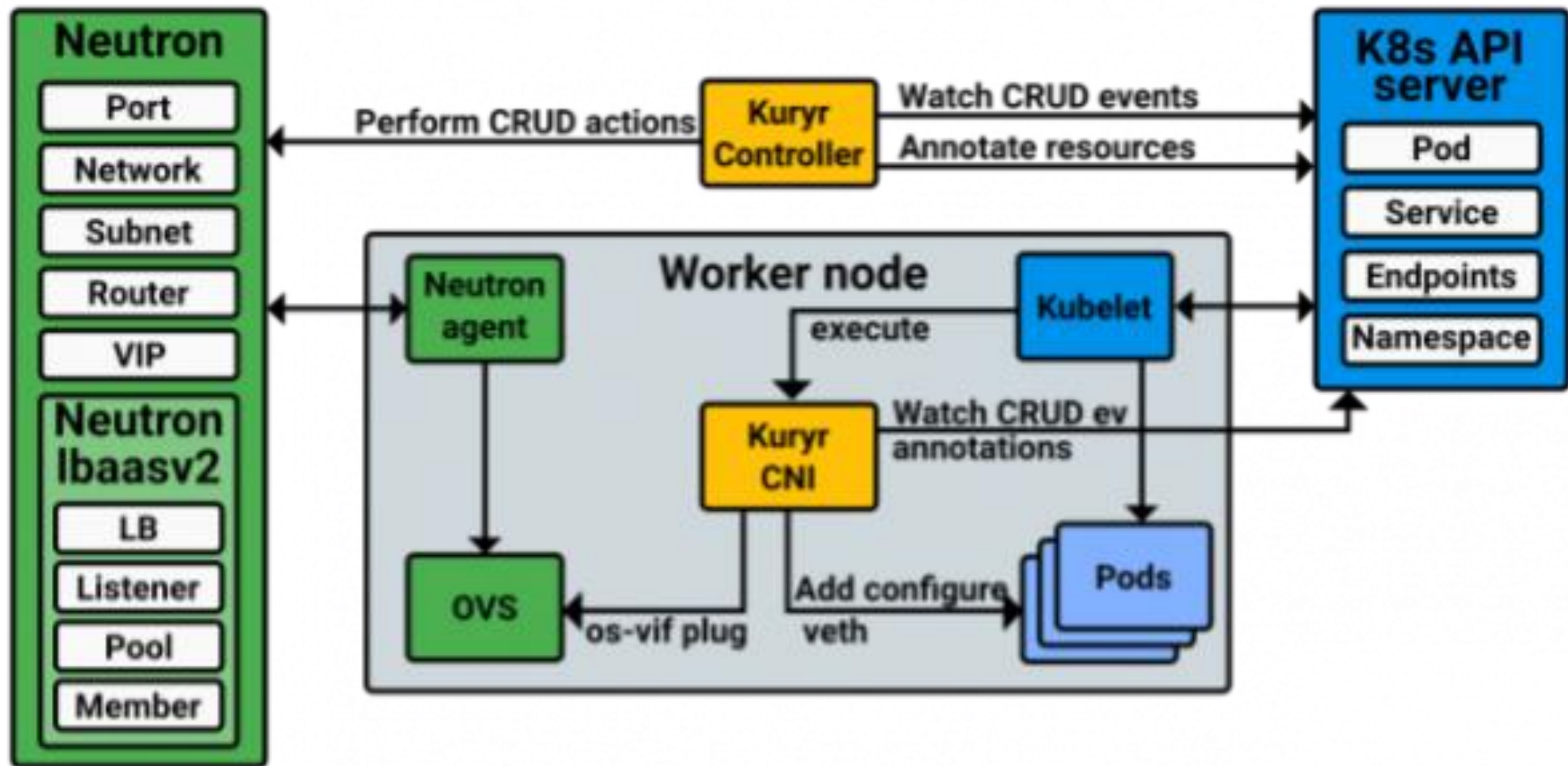
*an OpenStack Community Project*





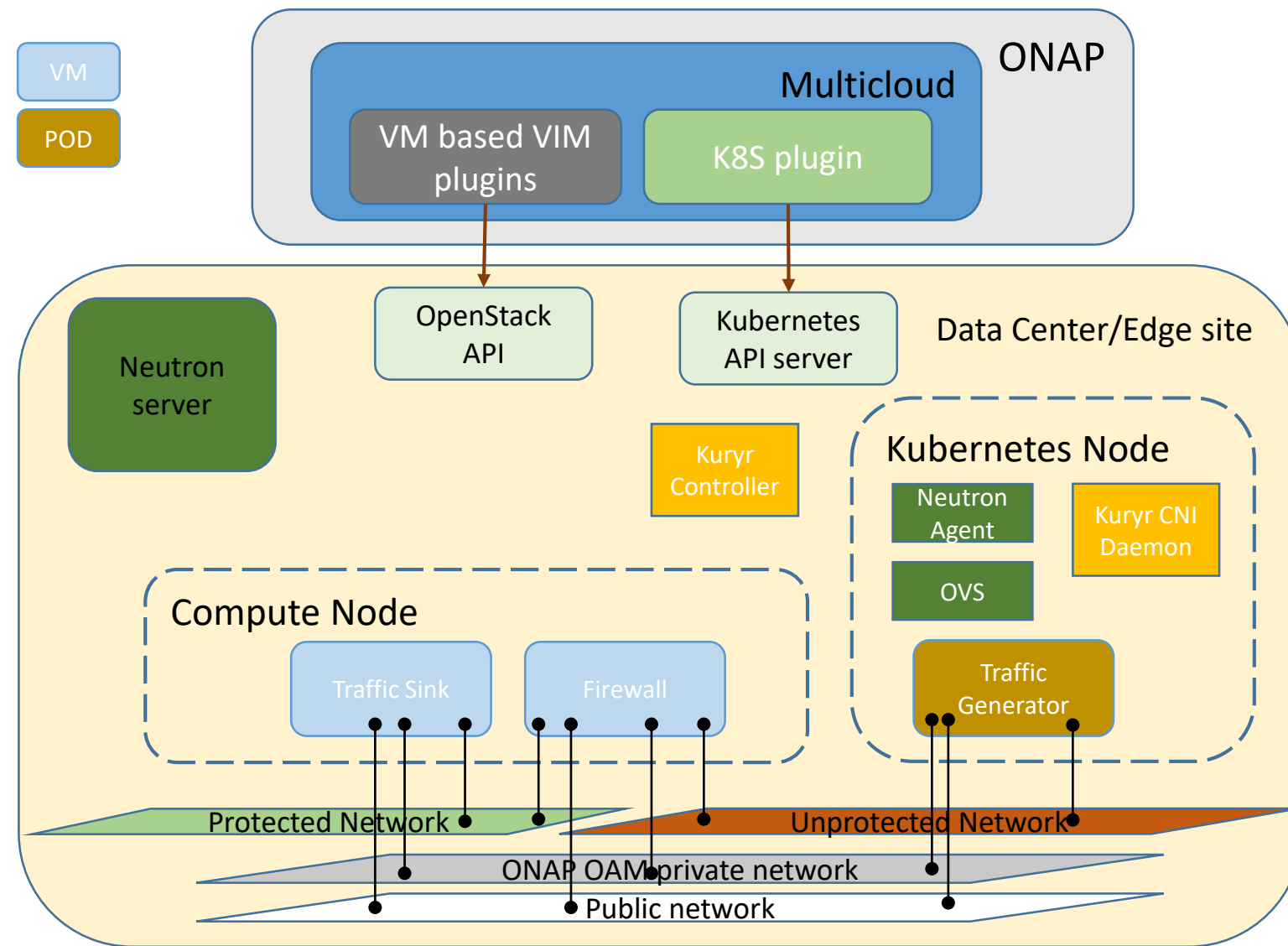
# Kuryr-kubernetes

[https://docs.openstack.org/kuryr-kubernetes/latest/devref/kuryr\\_kubernetes\\_design.html](https://docs.openstack.org/kuryr-kubernetes/latest/devref/kuryr_kubernetes_design.html)



The two Kuryr-Kubernetes components depicted with all the main components they interact with.

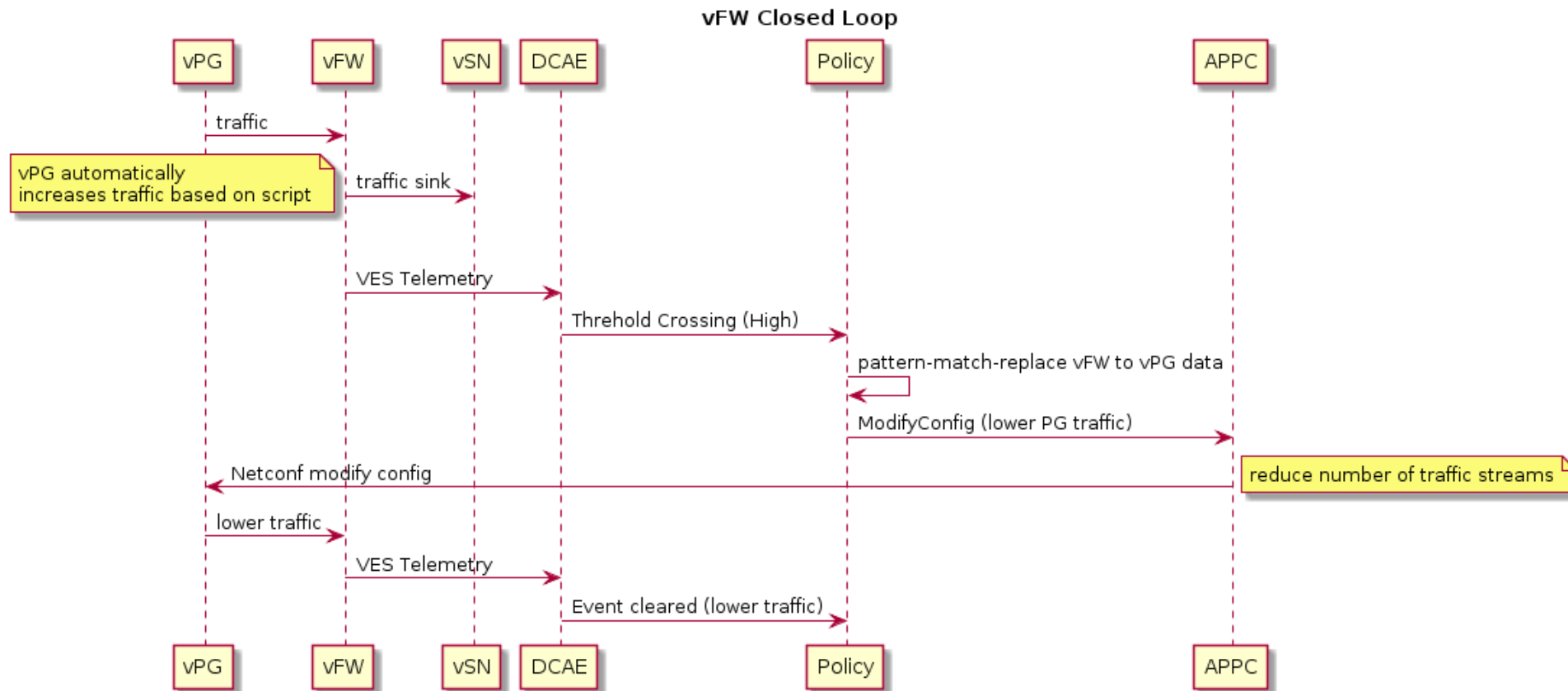
# ONAP vFW demo on OpenStack and Kubernetes



Proposal is to extend ONAP vFW demo over Openstack and Kubernetes cloud regions.

- KUD used as a Kubernetes deployment
- DevStack or RDO used as OpenStack deployment
- Kuryr components installed into KUD deployment
- Networks and ports created by OpenStack Neutron

# ONAP vFW demo on OpenStack and Kubernetes CL



vFW close loop part works exactly same way as before and there should be no changes on functionality

# Next steps

- Longer term targets in ONAP SDC
  - Support and drive ONAP network service seamless modeling over multiple heterogeneous cloud regions
- Longer term targets in ONAP multcloud/k8s
  - Support and drive cloud native orchestration in ONAP
- Short term targets/proposals
  - Further discuss with Multicloud and Multicloud/k8s teams about Openstack/kubernetes hybrid site use case
  - Design and develop a PoC for ONAP multcloud to demonstrate the use case
    - Extend vFW use case with Kuryr plugin
    - Demo in scope of multcloud/k8s project's KUD deployment?
  - Contribute to CNF modeling (SDC)

Questions?



# ONAP

OPEN NETWORK AUTOMATION PLATFORM