



Seamless Transition to CNFs with Tungsten Fabric

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24 September 2019

Who we are

- CodiLime has been providing networking engineering services since 2011
- We have been contributing to Tungsten Fabric since 2013
- Today we are presenting a working example of seamless transition to CNFs with Tungsten Fabric



OpenStack
cluster



Kubernetes
cluster



Tungsten Fabric
SDN

Agenda

1. Intro to the VNF/CNF landscape
2. Combining VNFs and CNFs in a single system
3. Realizing the scenario with Tungsten Fabric, OpenStack and Kubernetes
4. Topology examples
5. What's on the horizon

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The current state of the VNF world

- physical appliances moved to VMs 1:1
- tight coupling between layers and different products
- non-automated software release process
- limited testing capabilities

The current state of the VNF world

What we would like to have:

- clouds running many kinds of services at once
- continuous on-boarding and decommissioning of applications

What we wouldn't like to have:

- virtualization cluster as a single-purpose "appliance"
- same black-box appliances as physical, but requiring lots of more work and engagement

The need to go forward

- The usual promises of cloud native software:
 - easily deployable
 - testable
 - scalable
 - and maintainable
- applied to NFV products

The CNF challenges



Software
architecture



Performance



Security



Integration with
existing systems

The CNF challenges



Software
architecture



Performance



Security



**Integration with
existing systems**

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Combining VNFs and CNFs in a single system

- Single networking plane for workloads running on different orchestration platforms
- This is just one approach, another one can be running VMs on top of k8s (kubevirt)

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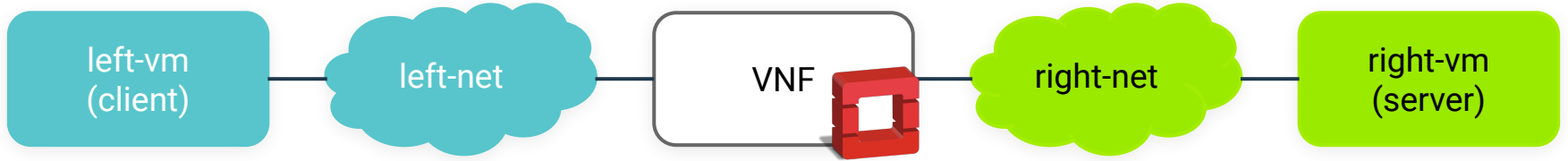
How can Tungsten Fabric help

- can act as the SDN plugin for OpenStack and Kubernetes (and other systems, not relevant here)
- most of the features are device agnostic (interface is the same pipe for packets on VMs and in containers)
- can be used in more interesting scenarios - VNF, CNF and PNF integration

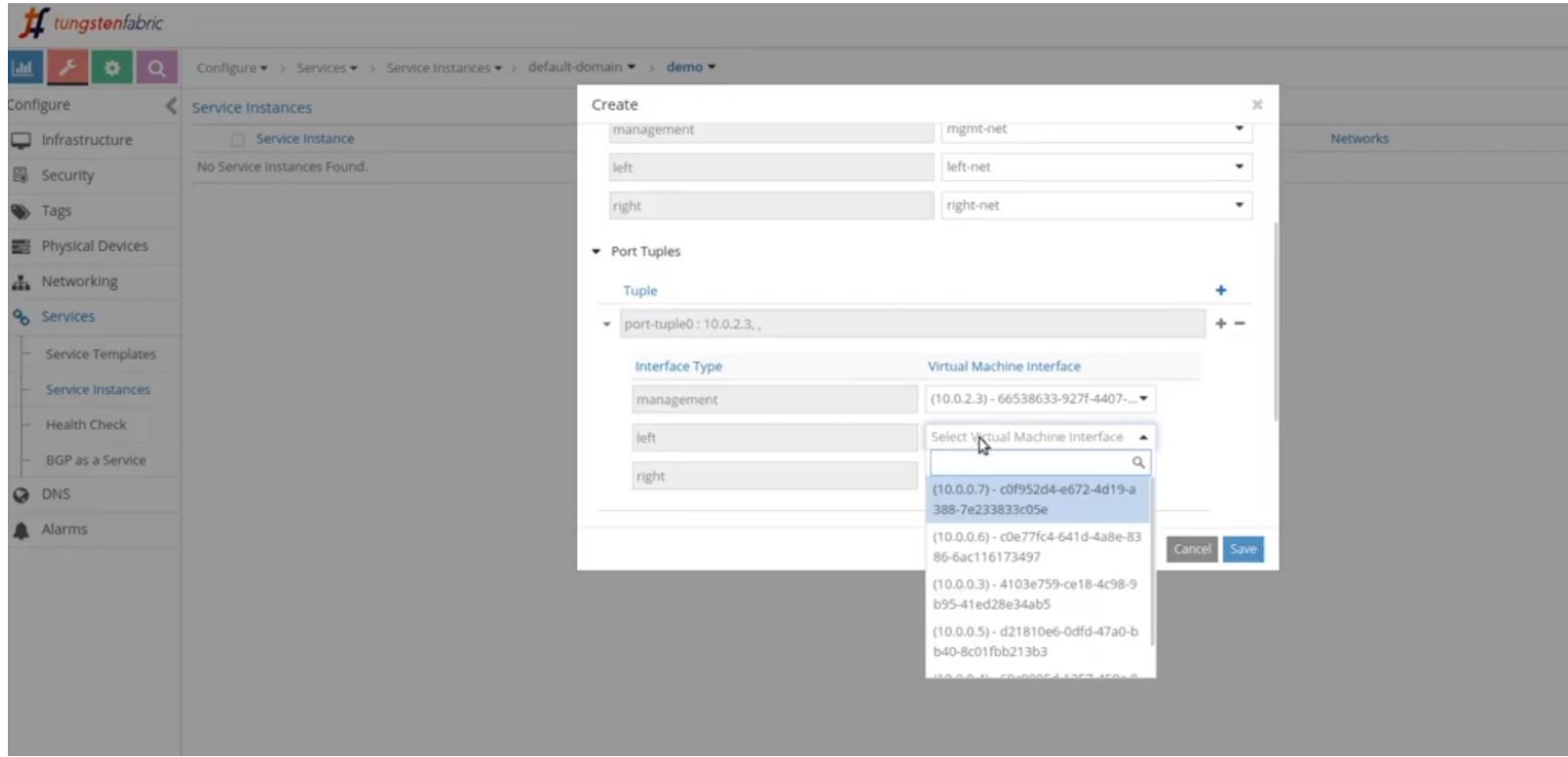
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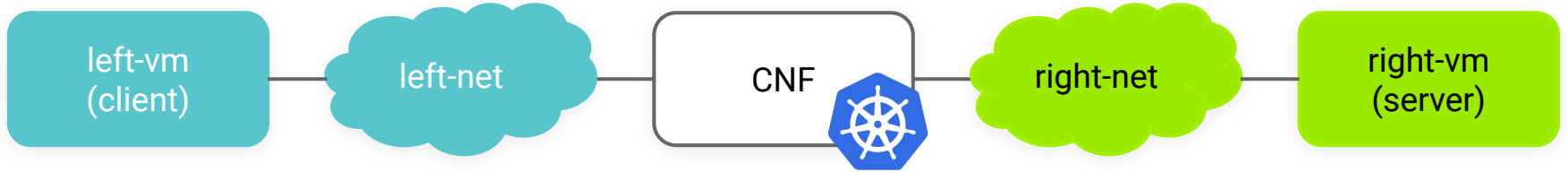
Topology 1: starting point



Topology 1: starting point



Topology 2: CNF swap



Topology 2: CNF swap

```
apiVersion: v1
kind: Pod
metadata:
  name: cnfPod
  annotations:
    k8s.v1.cni.cncf.io/networks: '[
      { "name": "right-net" },
      { "name": "left-net" },
      { "name": "mgmt-net" }
    ]'
...

```

Topology 2: CNF swap

The screenshot displays the Tungsten Fabric configuration interface. The left sidebar shows the navigation menu with categories like Infrastructure, Security, Tags, Physical Devices, Networking, and Services. The 'Services' section is expanded, showing 'Service Templates', 'Service Instances', 'Health Check', and 'BGP as a Service'. The main panel shows the 'Service Instances' configuration for 'default-domain' and 'demo'. An 'Edit' dialog box is open, showing the 'Port Tuples' section. The 'port-tuple1' is expanded, showing three interfaces: 'management', 'left', and 'right'. Each interface is mapped to a specific IP address and MAC address. The 'management' interface is mapped to (10.0.2.4) - d31ccb80-c9d7-11e9-... The 'left' interface is mapped to (10.0.0.8) - d2bd7306-c9d7-11e9-... The 'right' interface is mapped to (10.0.1.8) - d2f4f8c6-c9d7-11e9-... The dialog also shows 'Service Health Check' and 'Routing Policy' sections. The 'Save' button is highlighted.

Interface Type

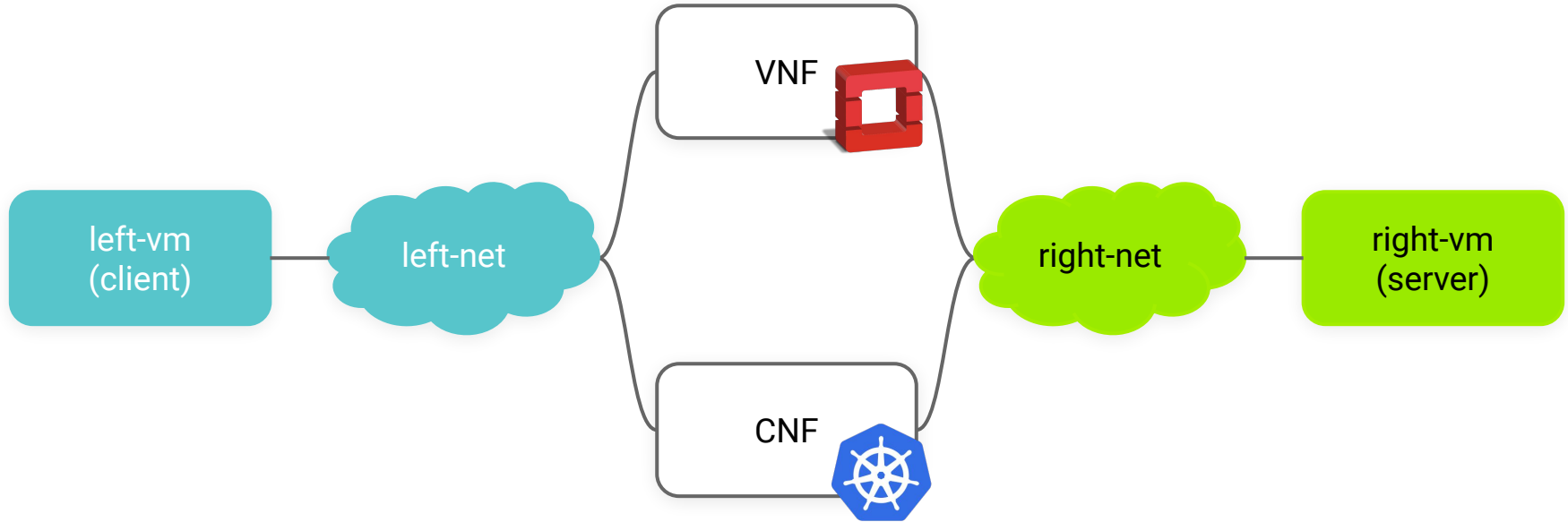
Interface Type	Virtual Machine Interface
management	(10.0.2.4) - d31ccb80-c9d7-11e9-...
left	(10.0.0.8) - d2bd7306-c9d7-11e9-...
right	(10.0.1.8) - d2f4f8c6-c9d7-11e9-...

Service Health Check

Routing Policy

Cancel Save

Topology 3: VNF/CNF multipath



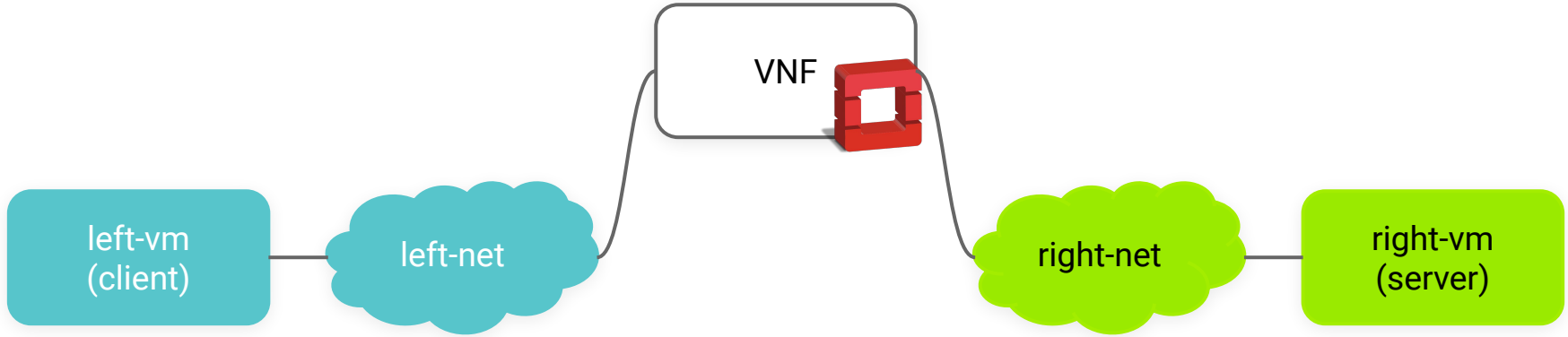
Topology 3: VNF/CNF multipath

The screenshot displays the Tungsten Fabric management interface. The left sidebar shows the navigation menu with categories like Infrastructure, Security, Tags, Physical Devices, Networking, and Services. The main panel shows the 'Service Instances' configuration for a 'demo' instance. An 'Edit' dialog is open, showing the configuration for a 'right-net' instance. The dialog includes a 'Port Tuples' section with two tuples: 'port-tuple1' (10.0.2.4, 10.0.0.8, 10.0.1.8) and 'port-tuple0' (10.0.2.3, 10.0.0.7). Below this, there is a table mapping 'Interface Type' to 'Virtual Machine Interface'.

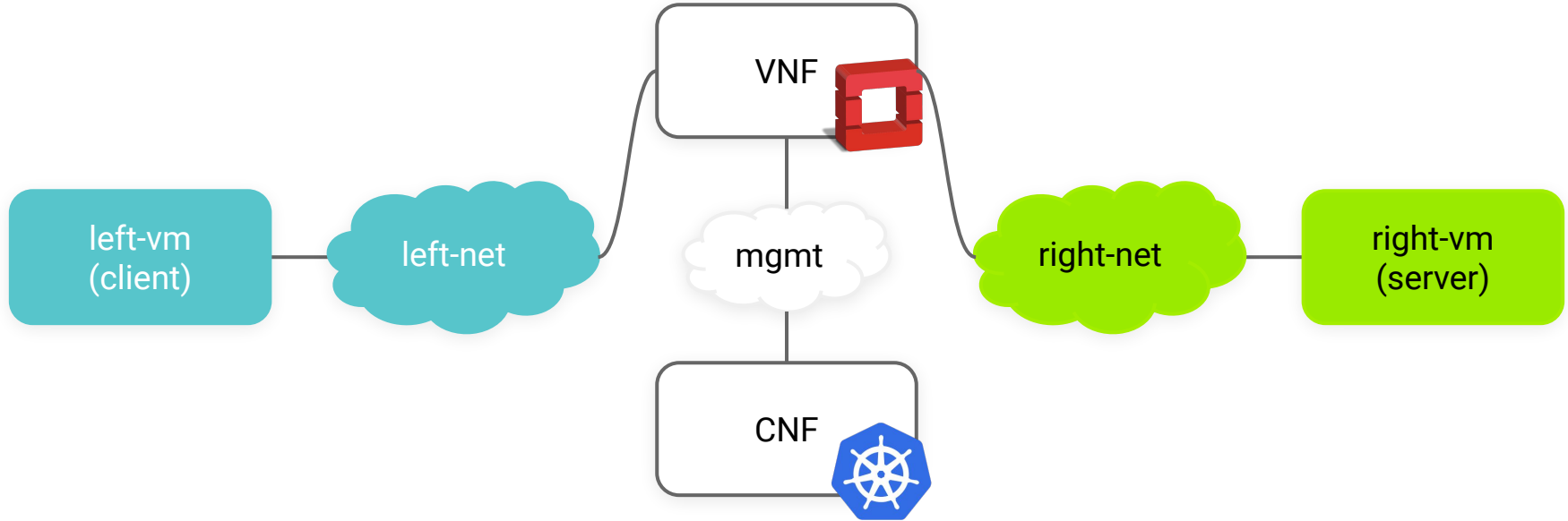
Interface Type	Virtual Machine Interface
management	(10.0.2.3) - 66538633-927f-4407-...
left	(10.0.0.7) - c0f952d4-e672-4d19-...
right	Select Virtual Machine Interface

The dialog also includes a 'Service Health Check' section and 'Cancel' and 'Save' buttons.

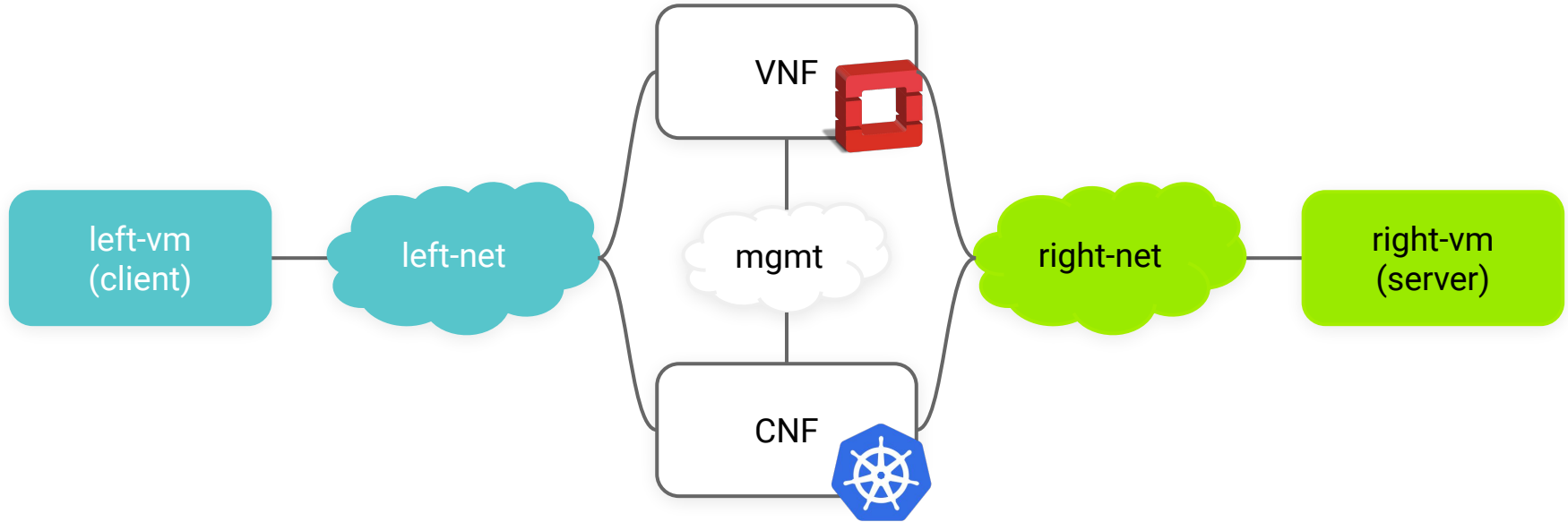
Topology 4: in-service CNF swap



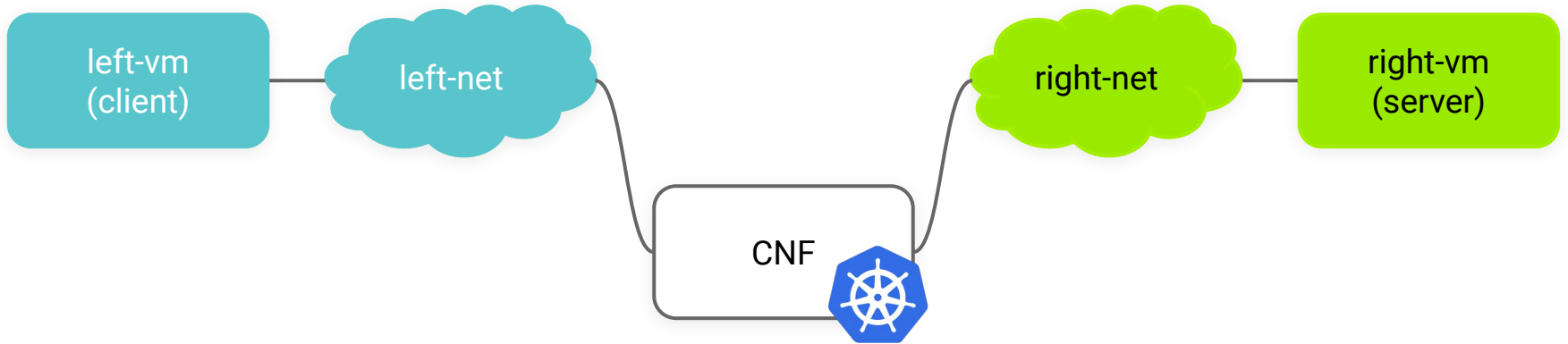
Topology 4: in-service CNF swap



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But that's just a start

- unified orchestration - MANO
- CNF performance features equal to the VM offering
- workload placement optimization
- higher-level k8s objects in the service chain
- native k8s API:
CNTT and CNCF TUG Common API Framework @ 15:20

Resources

- Our LFN demo booth at ground floor
- Service chaining demo online:
<https://youtu.be/-lZzcq9aZg4>
- Blog post about running VMs on k8s:
<https://codilime.com/vnfs-in-cnfs/>
- DPDK-based CNI Support Using Integrated Tungsten Fabric – VPP Solution (Tungsten Fabric, DPDK, FD.io, Kubernetes)
Presented by ATS @ LFN demo booth

Q&A