



# OpenDaylight, OpenStack, and Kubernetes Integration for High Performance Applications

OpenStack Summit Boston | May 2017

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# Agenda

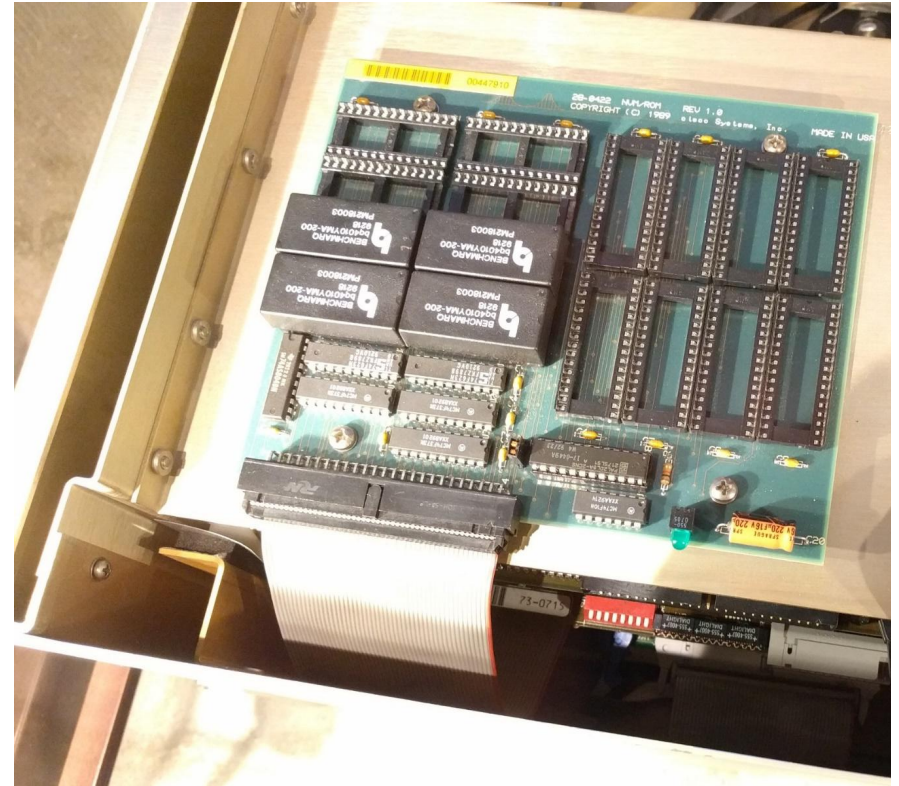
- Why SDN?
  - Network Virtualization capabilities and use cases
  - Hybrid Container and Bare Metal evolution
- The OpenDaylight Project
  - OpenDaylight NetVirt
- Ericsson and Red Hat joint NFVi offering
- Further reading

Slides:

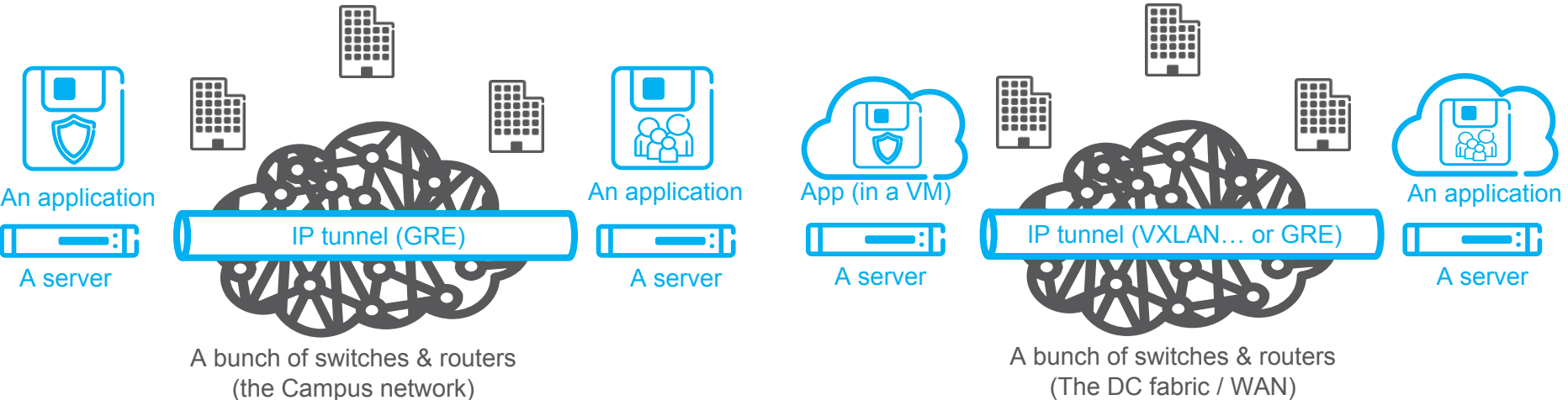
<https://goo.gl/GsKv3S>

# WHY SDN?

# Me & My First Router



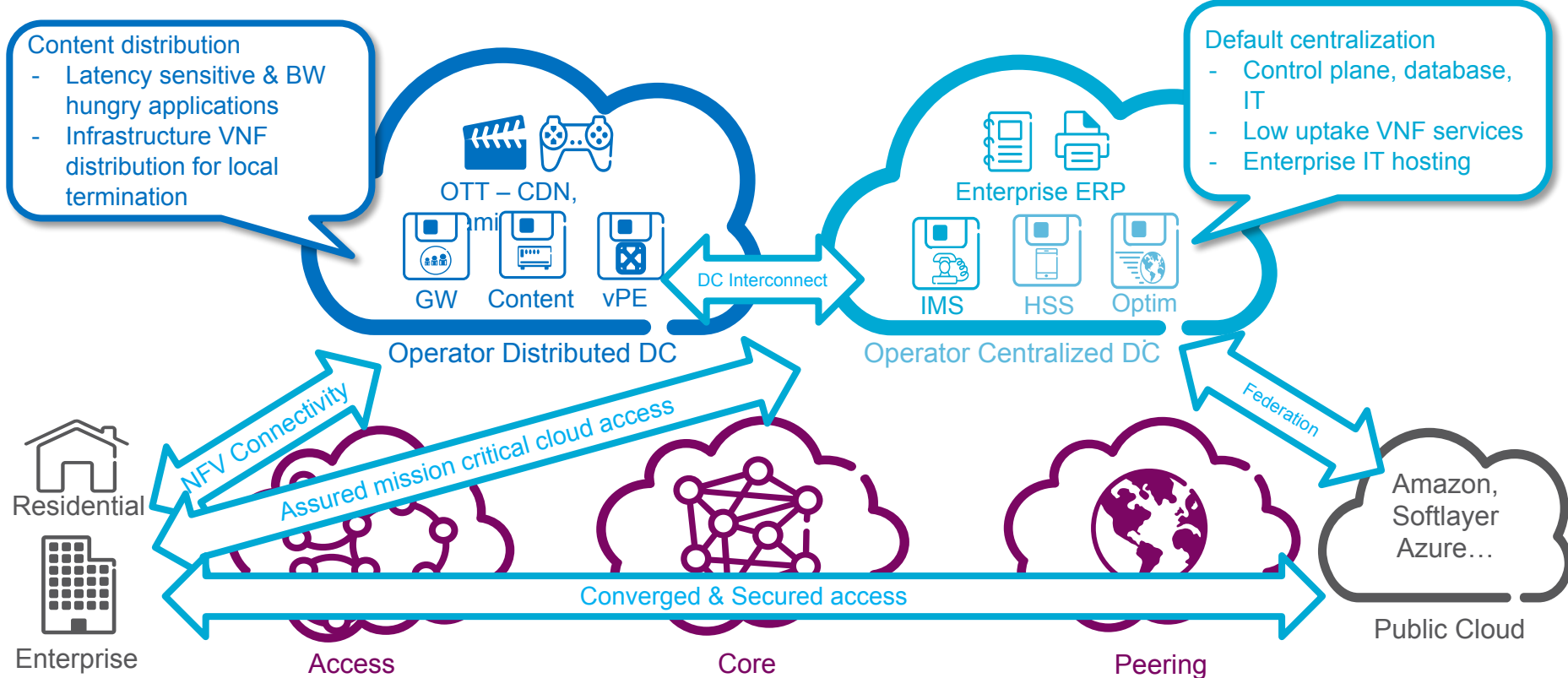
# 30 Years Later – Same Old?



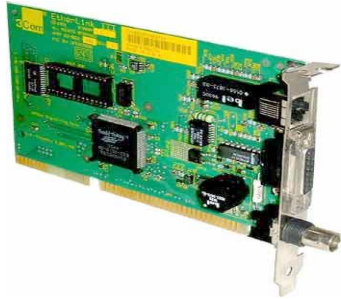
Then

Now

# 30 Years Later – Cloud & SDN



# Cloud Networking Evolution



## › 20 year old technologies

- Subnets
- Networks
- Routers/static routes
- VLAN's
- VRRP

## › Modern Platform

- › Open and hybrid datapath
- › Collaborative development
- › API/Model driven control plane and state distribution
- › Continuous Delivery

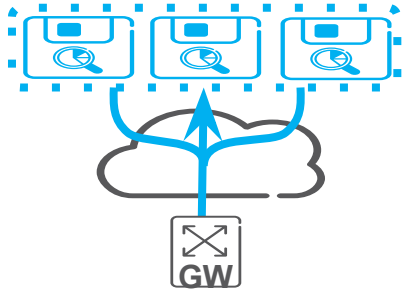
## › Modern IP Routing

- › Inter-Domain, Hierarchical
- › P2P, P2MP, MP2MP
- › Policy driven routing
- › Traffic engineering
- › Fast Reroute / Segment Routing

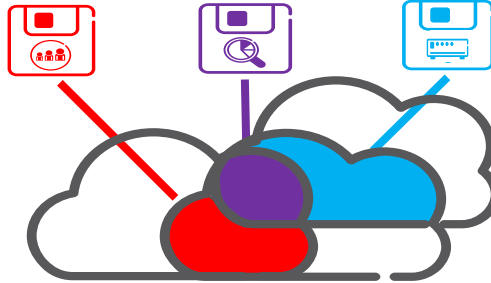


# Routing Capabilities Highlights

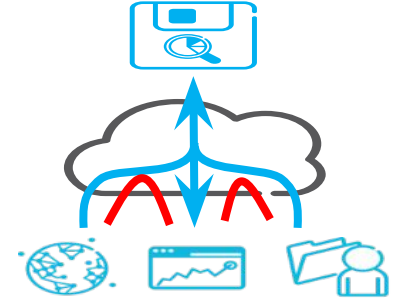
Native Fabric IP ECMP



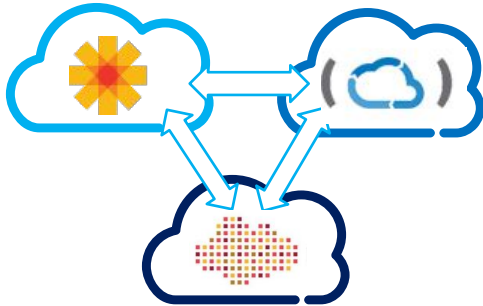
Intranet & Extranets



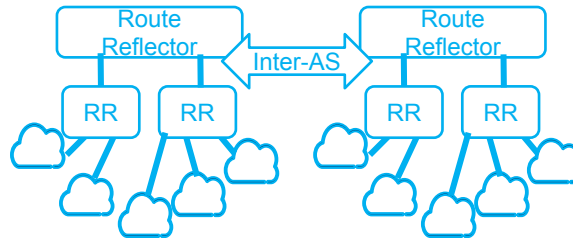
Hub & Spoke / Segmentation



Intra-DC



Open Interconnect clouds



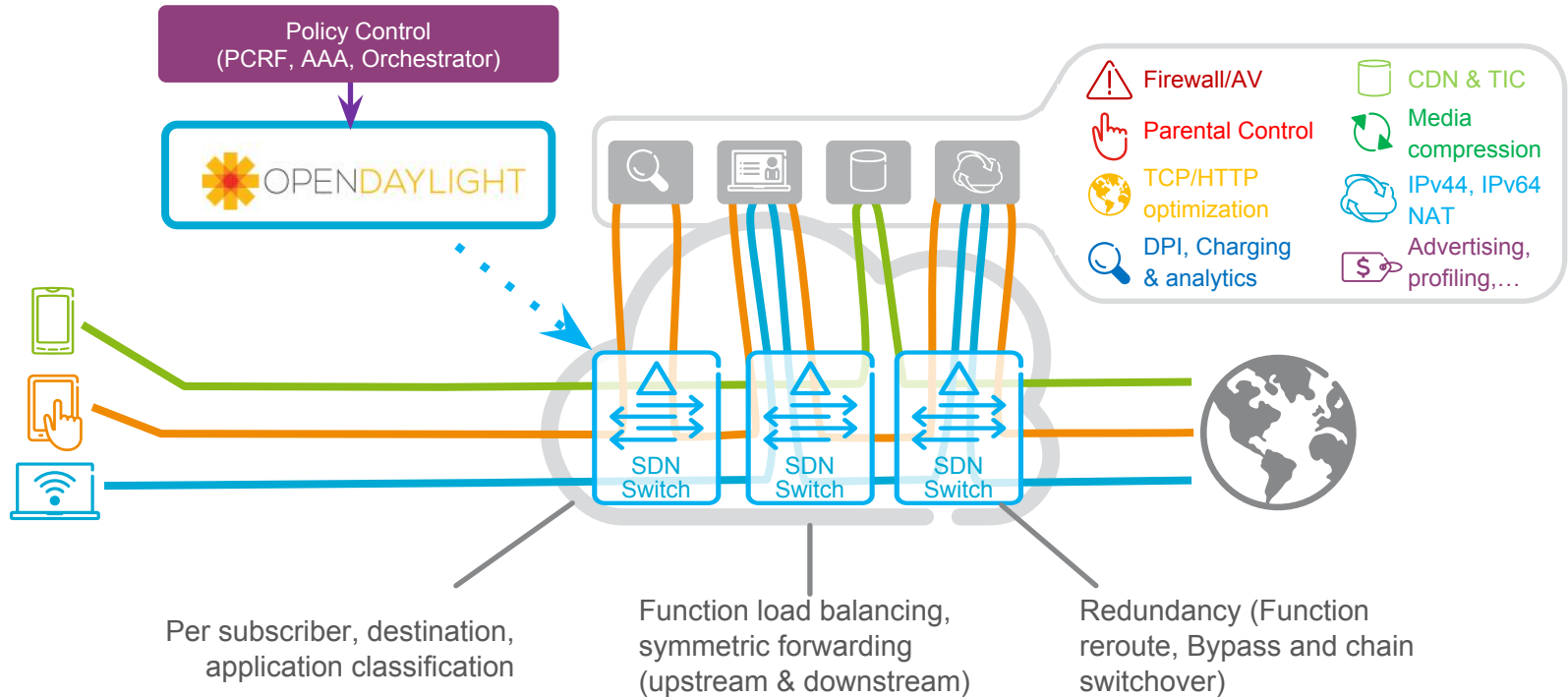
Dot it at Scale (of the internet)



And seamlessly (zero touch)

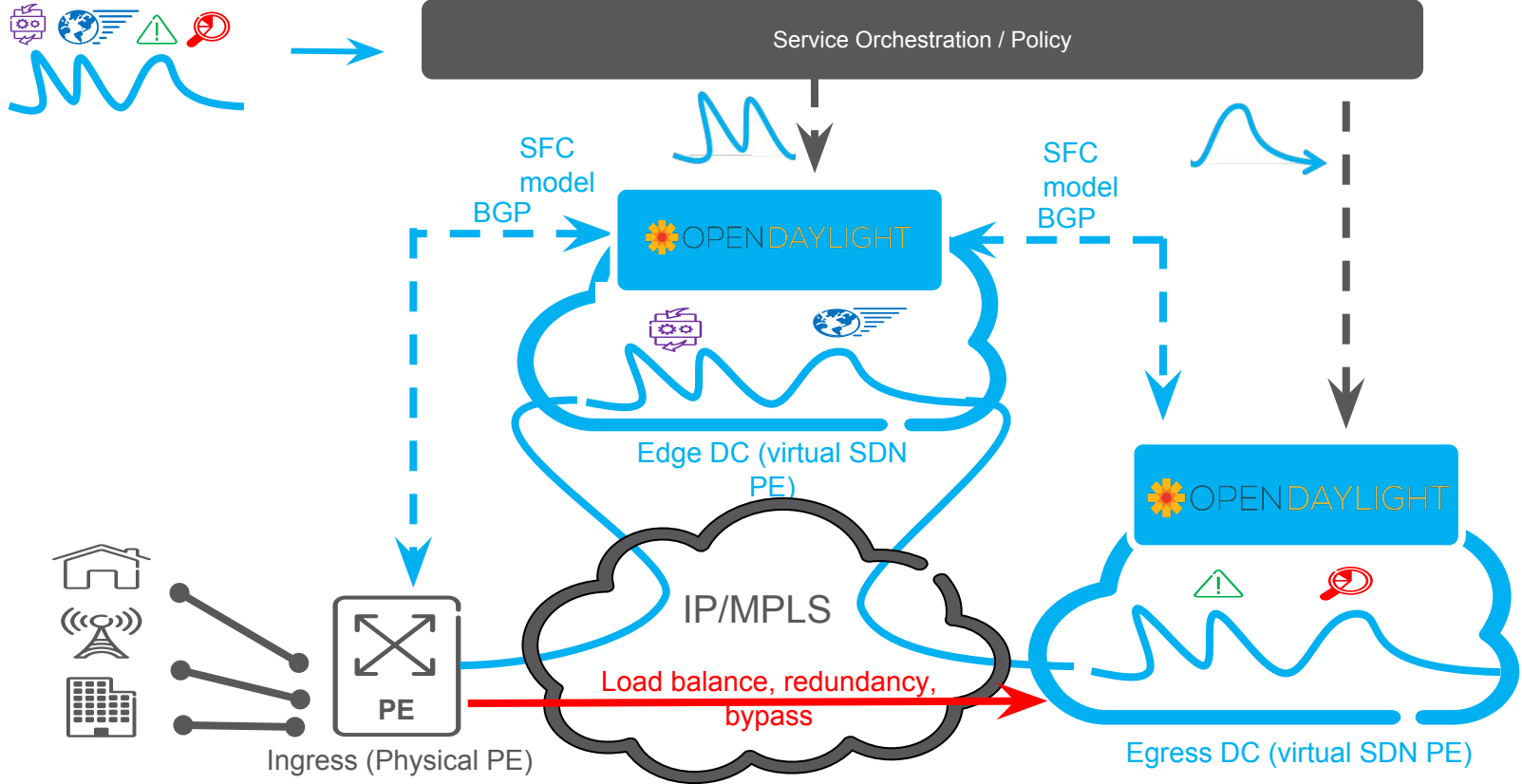
Inter-DC

# Policy-driven, Subscriber Aware Service Composition

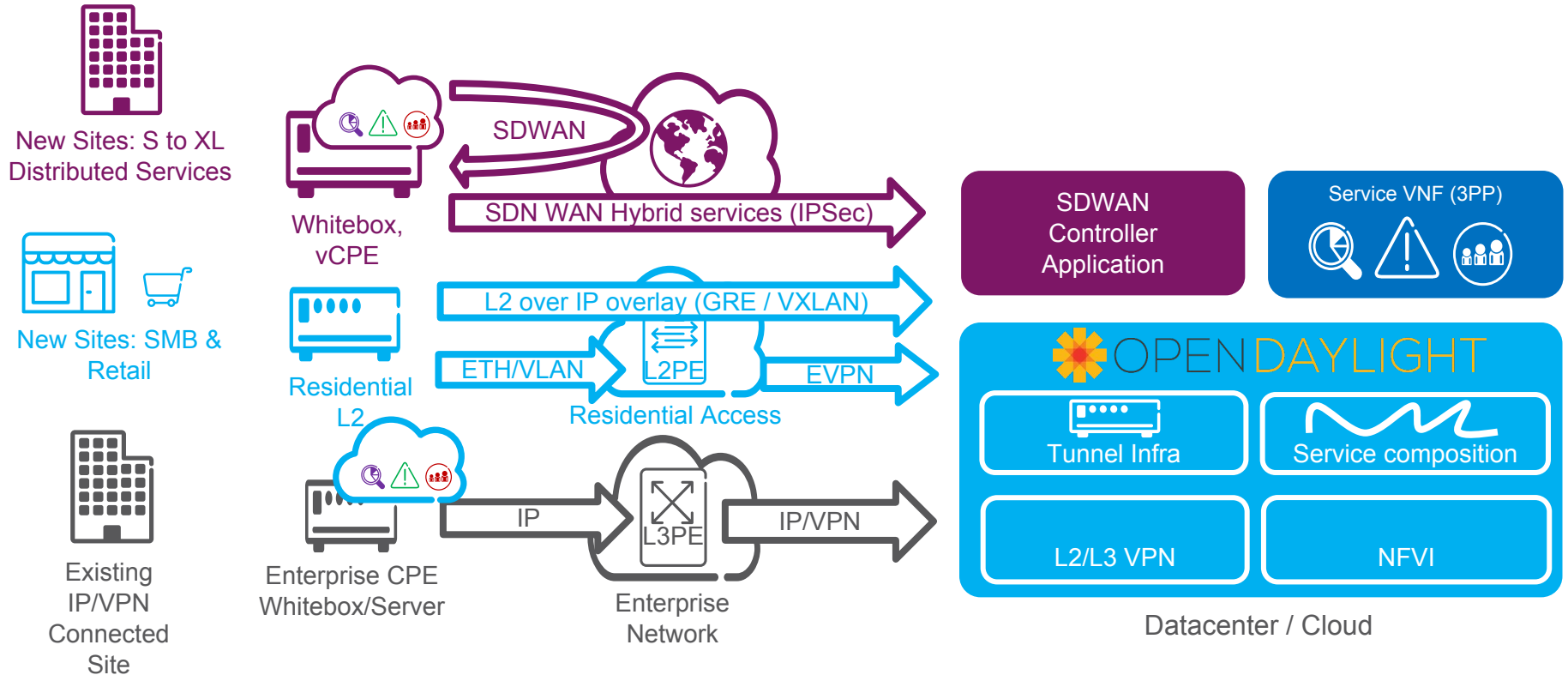


# SFC & Routing Integration

## Distribution & Redundancy

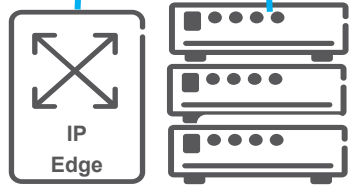
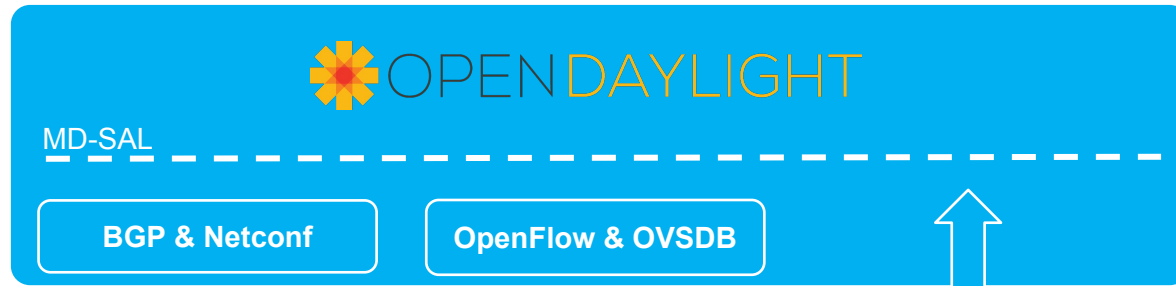


# Virtual CPE: Site to Site Connectivity

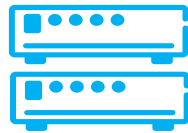




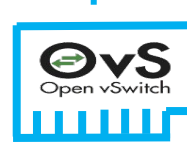
# Open Data Plane Integration



Routers & Blackbox SW



DC virtual switch, white boxes and smartNICs

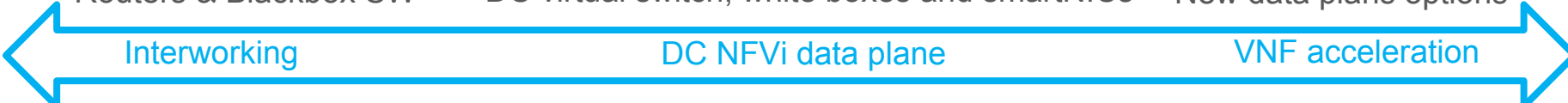


New data plans options

Interworking

DC NFVi data plane

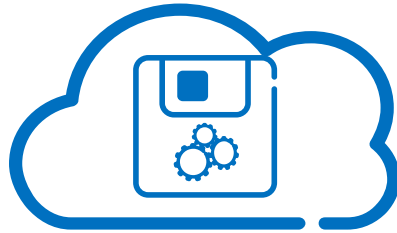
VNF acceleration



# Complementary Technologies – Coexistence Required



- › Legacy Appliances
- › SRIOV VNF
- › Extreme performance
  - HW assisted
  - Specific HW/interfaces (e.g access equipment GPON/Radio)



- › Ease for legacy software (full stack bundling)
- › Good performances
  - Multi-tenant VM optimized vs fragmented
  - DPDK enabled



- › Scalable multi-tenancy model for non multi-tenant software
- › Best fit for cloud native software / PaaS optimized code



# Duplication of Networking Layers


  
kubernetes  
CoE / PaaS


   
Infra NAT/FW IP/GTP/LB




  
openstack

  
Policy Based Service chaining


     
VPN/Routing Infra NAT/FW IP/GTP/LB SmartNIC


  
Fabric NMS


  
DC Gateway

    
Spine Spine Spine

One Application

  
K8S Pods

  
VM's / VNF

  
Appliance



User



Performance overhead  
Cost impact



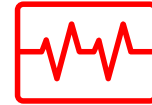
Heterogenous  
Catalogue  
dashboard



Loose  
service  
integration



Admin



No correlation  
Troubleshooting

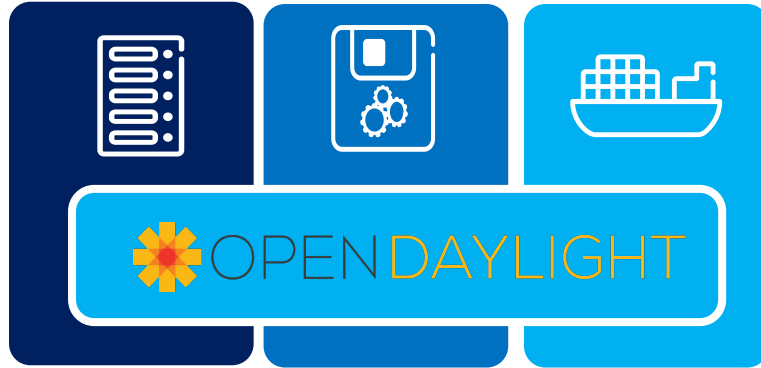


Interworking  
Connectivity  
burden

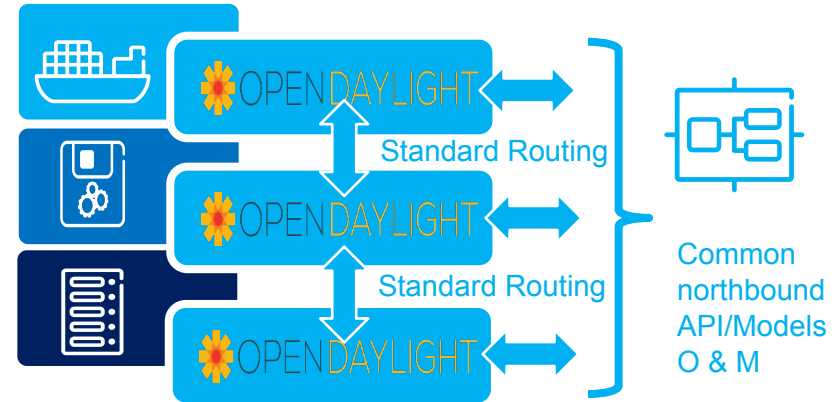


Duplicate  
Knowhow  
Validation

# Two Approaches

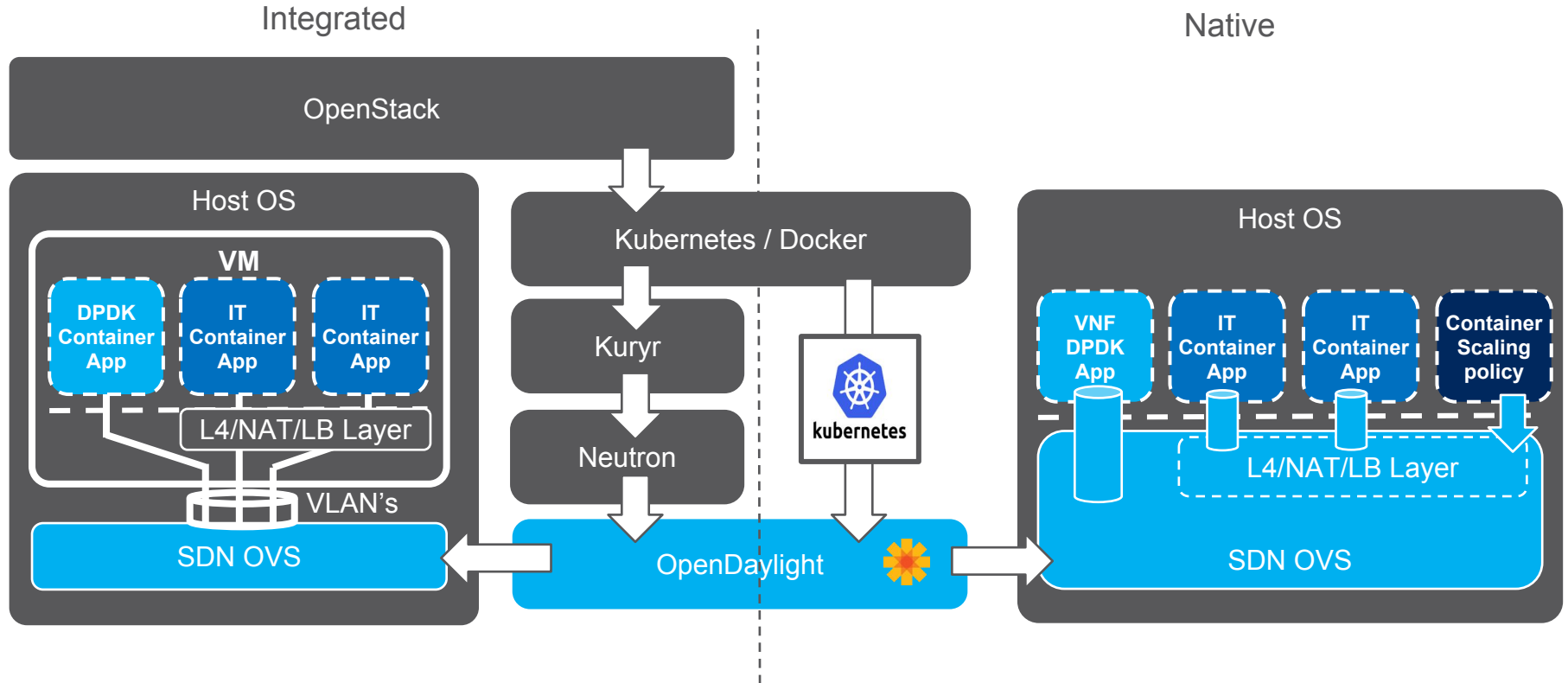


- › Single controller instance that operates on all three layers
- › Simpler approach to unify operations and provide uniform capabilities
- › Harder validation / lifecycle management across multiple instances / version at each layers

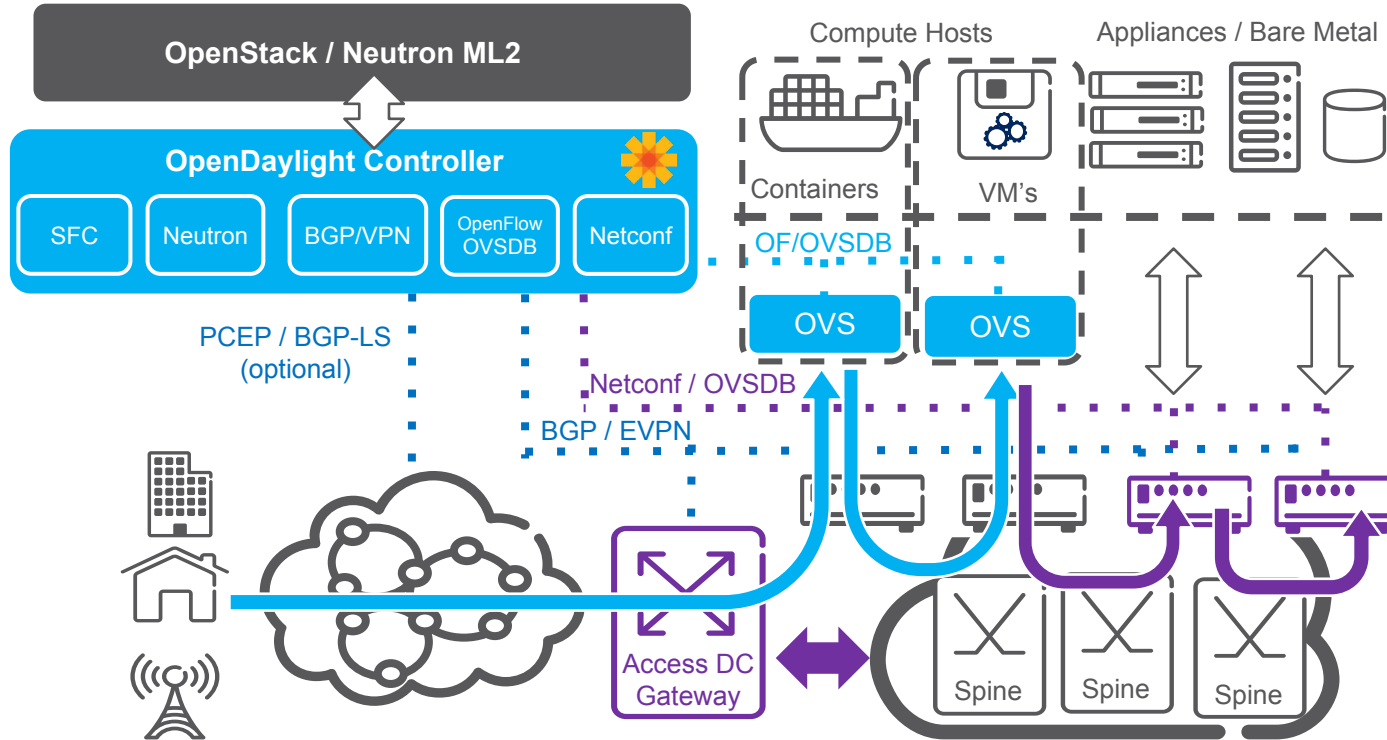


- › Decorrelated lifecycles & vendor / technology independence at each layer
- › Needs to align northbound API and ensure east/west interworking of advanced capabilities
- › Even when decoupled leveraging OpenDaylight at each layer simplifies this east/west and northbound integration

# SDN for Container/PaaS Infra



# Hybrid Bare Metal



# THE OPENDAYLIGHT PROJECT

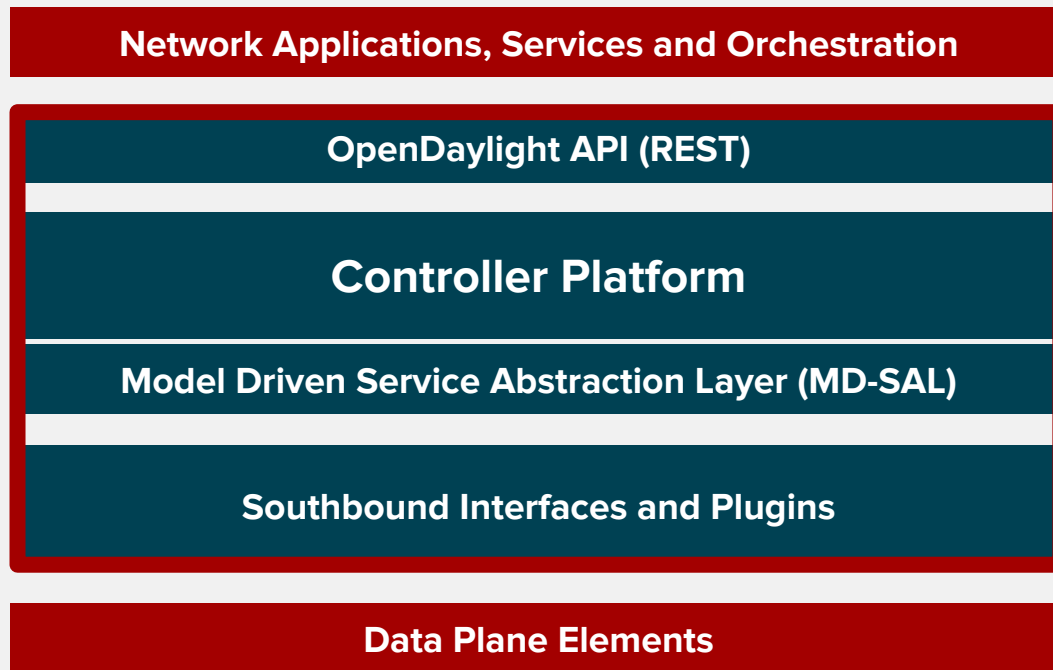
# What is OpenDaylight?

## Overview

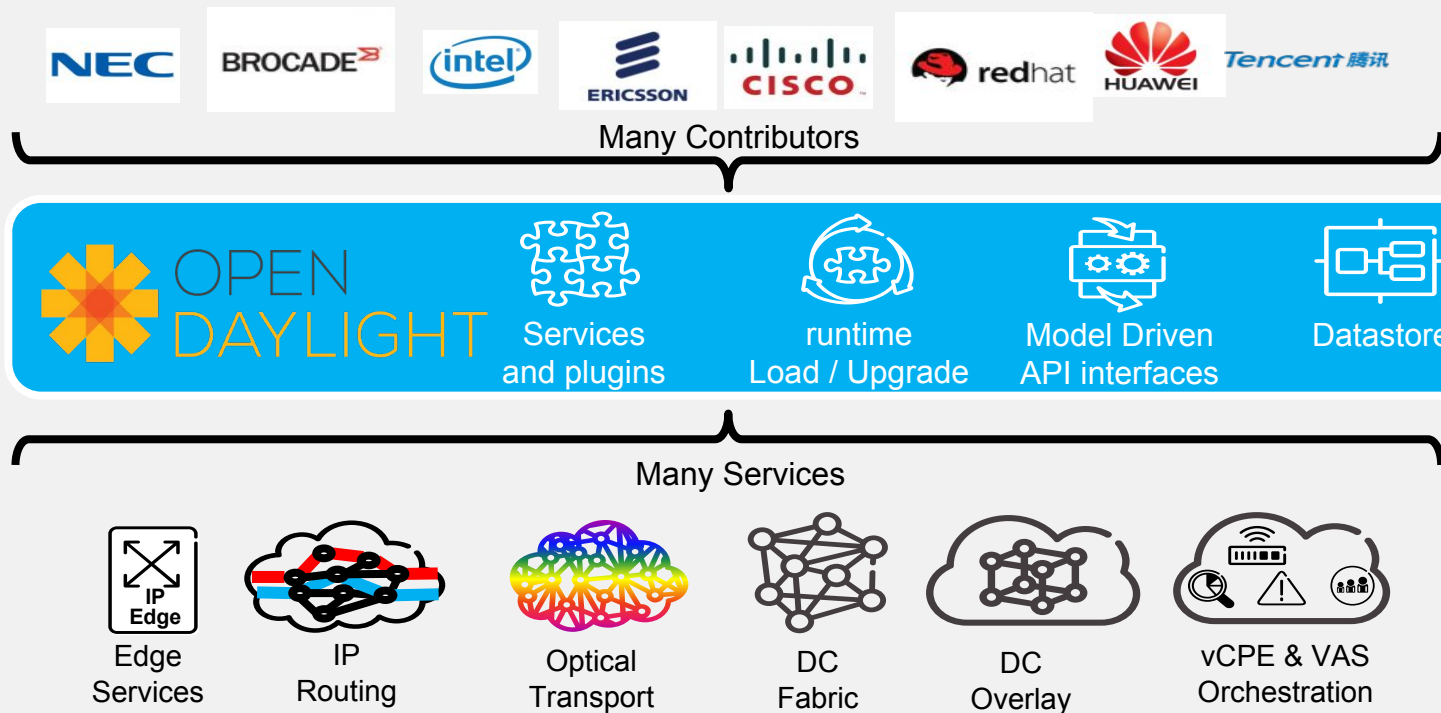
- OpenDaylight is a modular, extensible, and multi-protocol controller infrastructure built for SDN deployments on modern multi-vendor networks
- Provides a model-driven service abstraction platform that allows users to write applications that easily work across a wide variety of hardware and southbound protocols
- Composed of a number of different projects that can be combined as needed to meet the requirements of a given scenario



# Core Architecture



# A Modular Platform



# OpenDaylight with OpenStack

- OpenDaylight exposes a common OpenStack Service Northbound
  - API matches Neutron REST precisely
  - Multiple implementations of Neutron providers exist in OpenDaylight
    - We focus on NetVirt
- Key fundamental facts about our integration:
  - Neutron is where the OpenStack networking API is being defined
  - OpenDaylight consumes the Neutron API rather than replace or change it

# NetVirt and VPNService Integration

Upstream Boron release

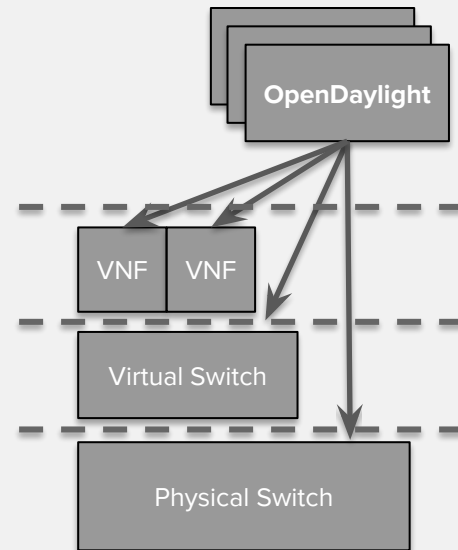
- It became apparent that the VPNService\* had it's own version of NetVirt
- During the Boron cycle the two projects joined efforts so that:
  - NetVirt became the main Network Virtualization engine of OpenDaylight
  - NetVirt is more feature rich
  - The two projects are now using the same common service pipeline defined in NetVirt
  - The two projects leverage code, test, and developer resources
- This shows strong upstream convergence around NetVirt

\*<https://wiki.opendaylight.org/view/VPNService:Main>

# OpenDaylight NetVirt

## Overview

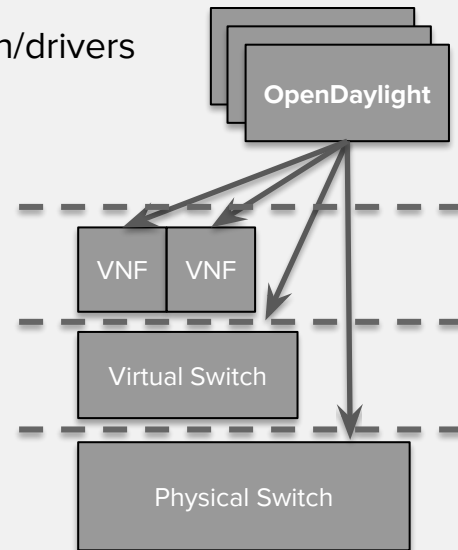
- Network Virtualization application developed on OpenDaylight consisting of modular sub-services such as L2, L3, ACL, NAT, DHCP, IPv6 control, and more
- Configure and manage the:
  - Overlay networks and virtual switches
  - ToR switches
  - OpenStack tenant networks
- Uses NETCONF and YANG to model the topology
- Modular and extensible, both southbound and northbound



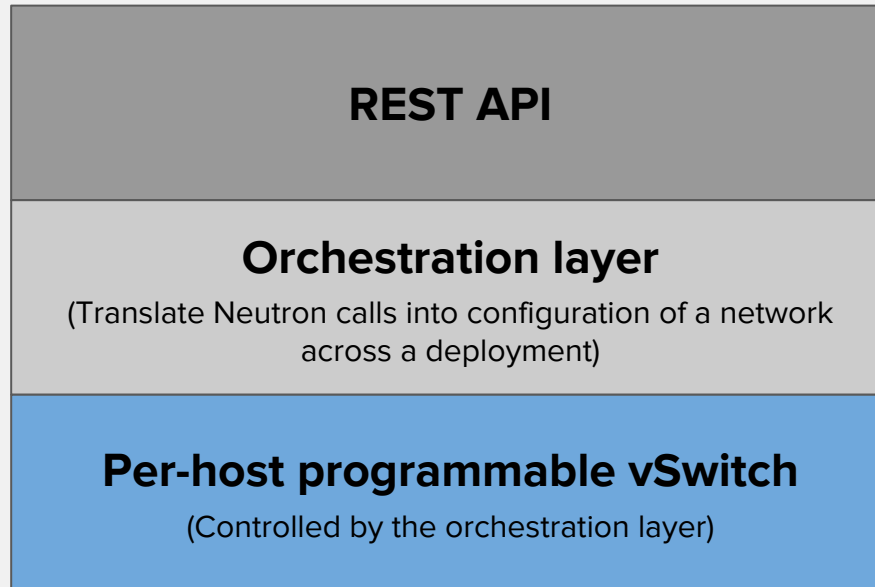
# OpenDaylight NetVirt

Overview (cont.)

- Supports the Neutron API via the networking-odl Neutron plugin/drivers
- Currently controls OVS virtual switches and Layer 2 gateways
- On-going work to enable support for:
  - VPP (fd.io) virtual switches
  - CNI plugin for Kubernetes

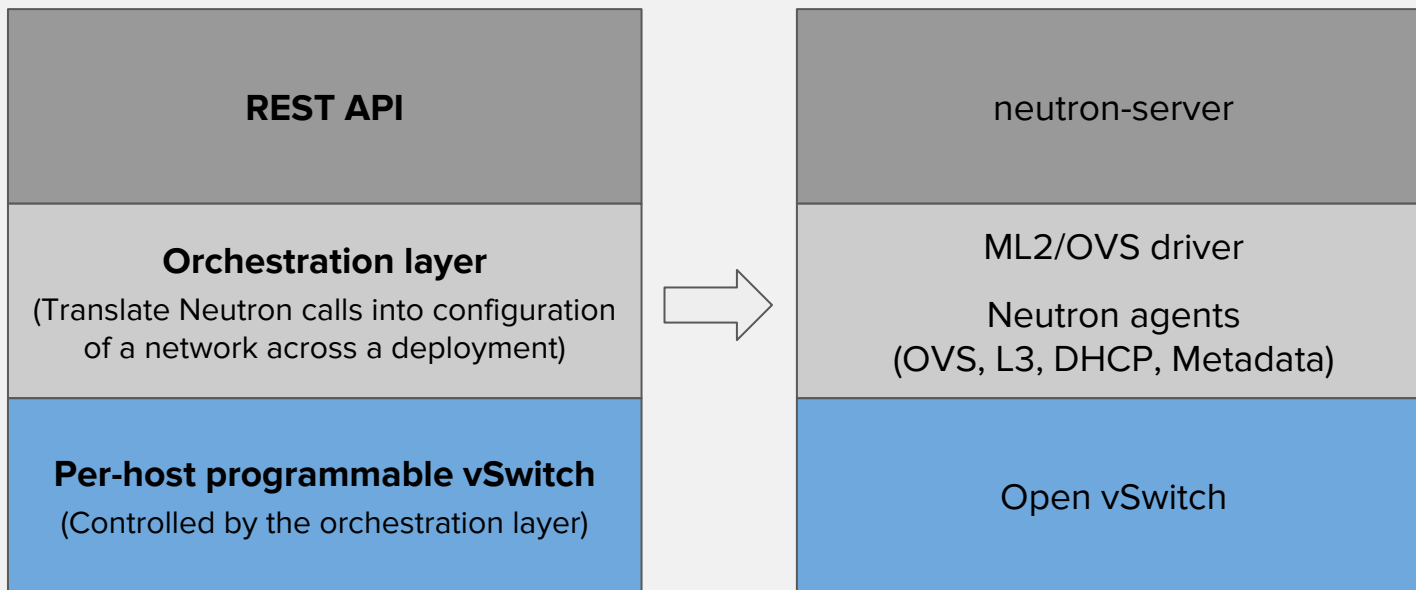


# OpenStack Neutron



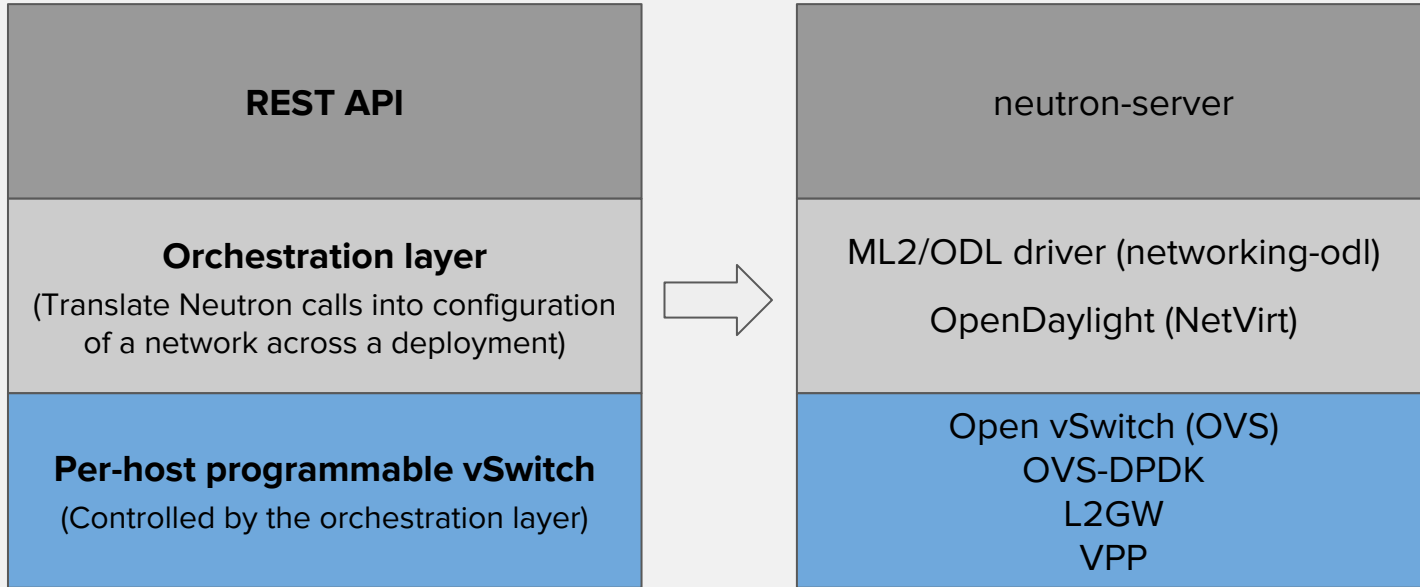
# OpenStack Neutron

Upstream “Reference Architecture”



# OpenDaylight with OpenStack

Using NetVirt



# ERICSSON AND RED HAT

# Joint Strategic Vision

*Red Hat and Ericsson envision, through collaboration, the ability to provide scalable transformation with open, modern, efficient and agile solutions for the communications industry.*

*The infrastructure is software defined and compassable into new services, that allow both service providers and enterprises to deliver business value to their end customers.*

# What Was Announced?

- On October 19th, 2016, Red Hat and Ericsson announced a broad partnership that covers many areas

## **Upstream and Product Collaboration**

- Network Function Virtualization
- Software Defined Networking
- Software Defined Infrastructure
- Container Platforms
- Certified Solutions

## **Customer and Business Collaboration**

- Joint customer engagement
- Proof-of-Concepts
- Customer Support
- Professional and managed services
- Co-marketing

# Solution Offering



## NFVi

100% open and upstream-first solution with Red Hat OpenStack Platform support



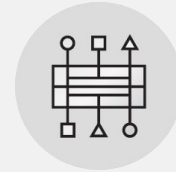
## SDN

Enhanced networking to support telco NFV and critical IT workloads



## SDI

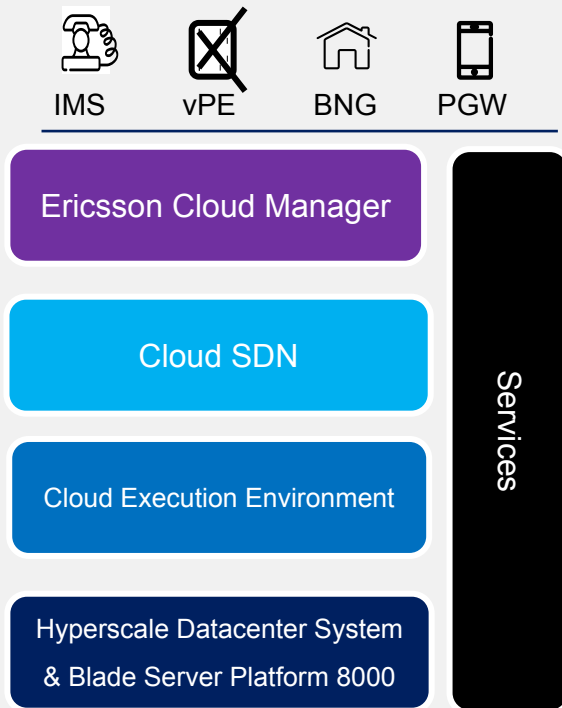
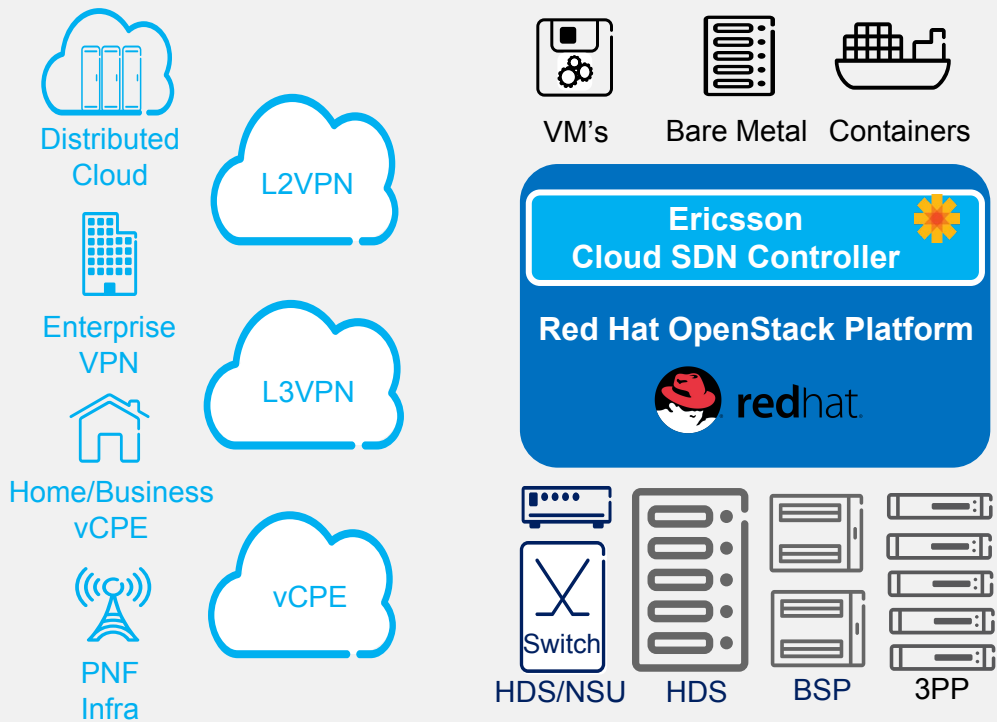
Red Hat OpenStack Platform on state-of-the-art Rack Scale hardware



## Containers

Collaboration with industry initiatives, and OpenShift Container Platform integration

# SDN Enabled Infrastructure



# Further Reading

- OpenDaylight NetVirt
  - [Upstream Wiki](#)
- Red Hat OpenStack Platform
  - [Product Documentation](#)
- [Ericsson's alliance with Red Hat](#)
- Red Hat NFV, SR-IOV and OVS-DPDK Guides
  - [Product Guide](#)
  - [Planning Guide](#)
  - [Configuration Guide](#)



# THANK YOU



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