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OpenDaylight, OpenStack, and Kubernetes Integration for High Performance Applications

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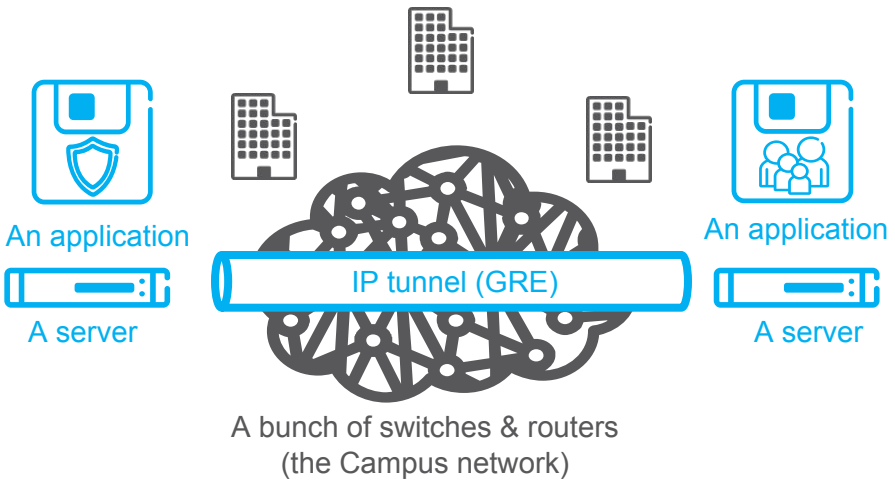
Agenda

- 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

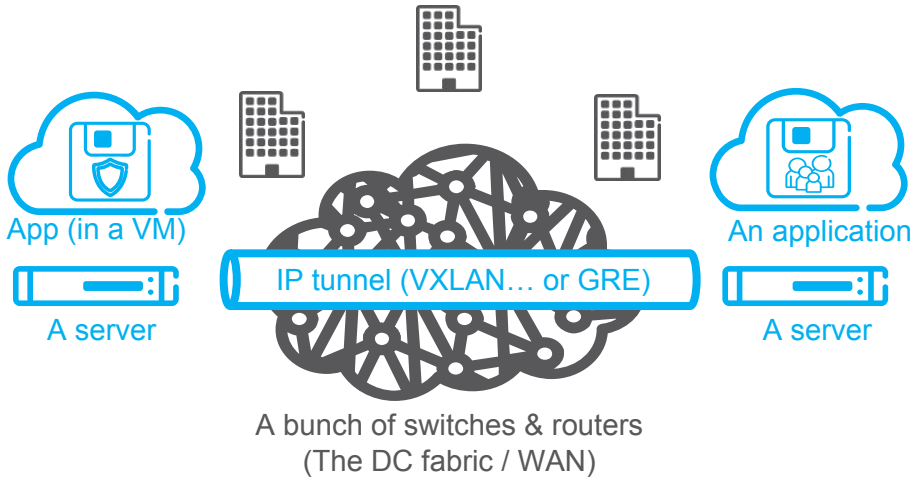
WHY SDN?

Me & My First Router

30 Years Later – Same Old?

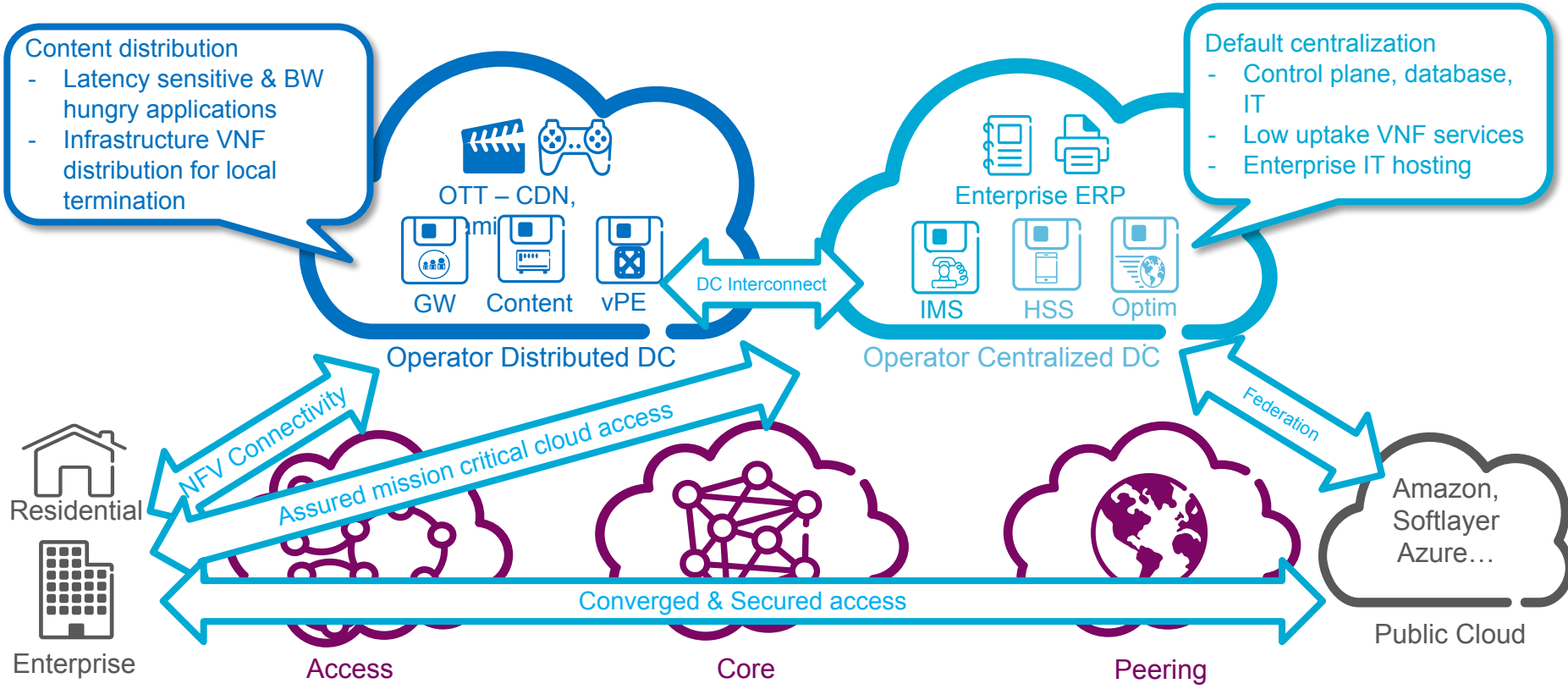


Then



Now

30 Years Later – Cloud & SDN

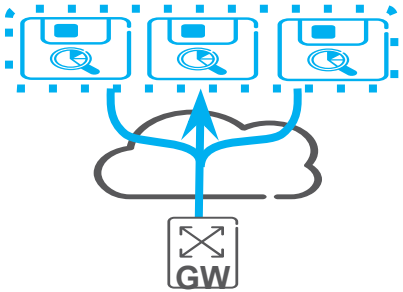


Cloud Networking Evolution

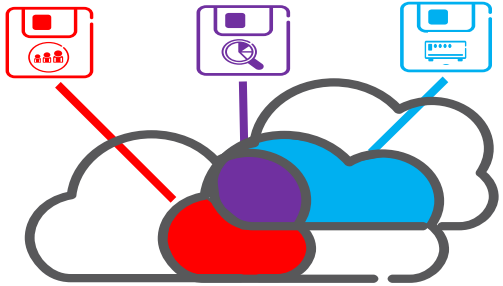
- 20 year old technologies
  - Subnets
  - Networks
  - Routers/static routes
  - VLAN's
  - VRRP
- Modern Platform
  - Open and hybrid datapath
  - Collaborative development
  - API/Model driven control plane and state distribution
  - Continuous Delivery
- Modern IP Routing
  - Inter-Domain, Hierarchical
  - P2P, P2MP, MP2MP
  - Policy driven routing
  - Traffic engineering
  - Fast Reroute / Segment Routing

Routing Capabilities Highlights

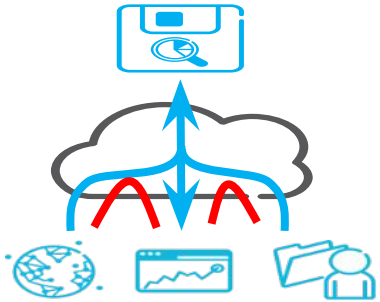
Native Fabric IP ECMP



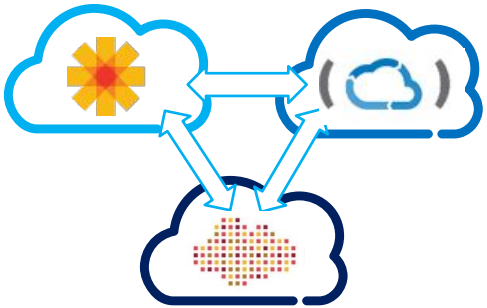
Intranet & Extranets



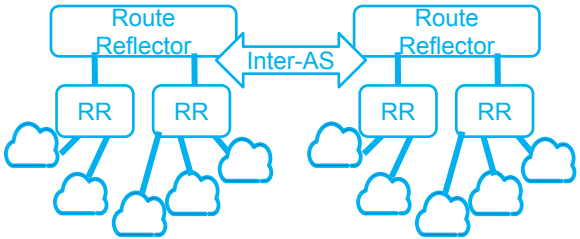
Hub & Spoke / Segmentation



Intra-DC



Open Interconnect clouds

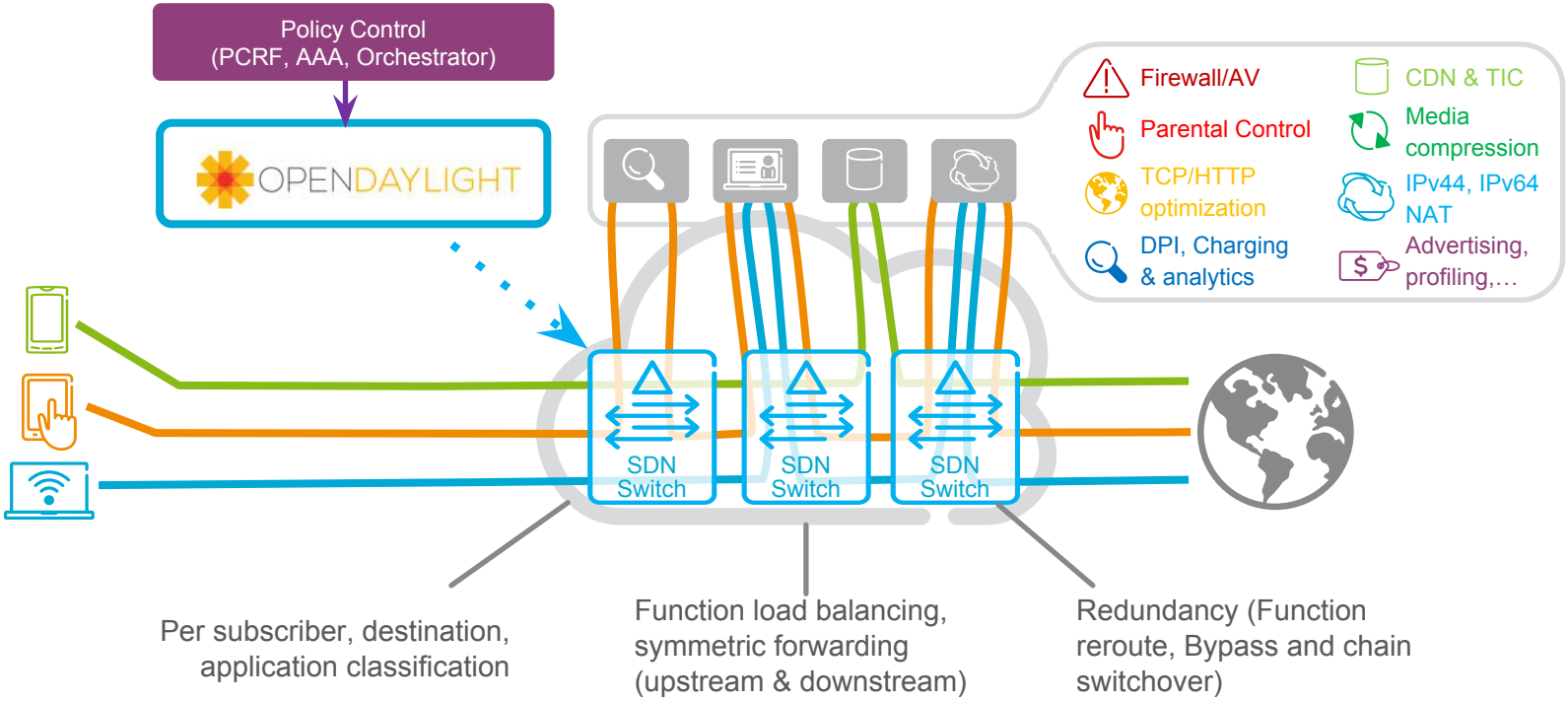


Dot it at Scale (of the internet)

And seamlessly (zero touch)

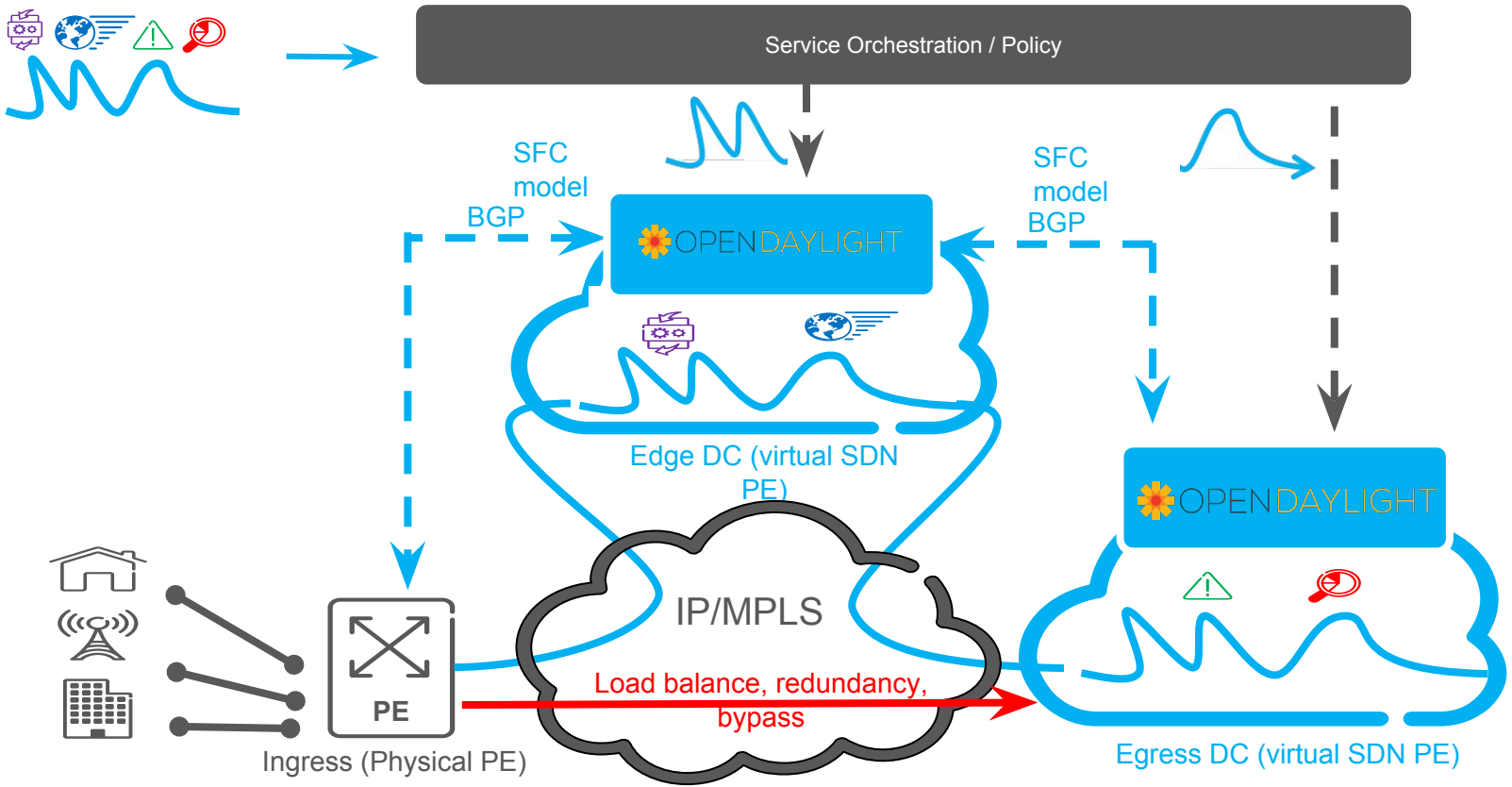
Inter-DC

Policy-driven, Subscriber Aware Service Composition

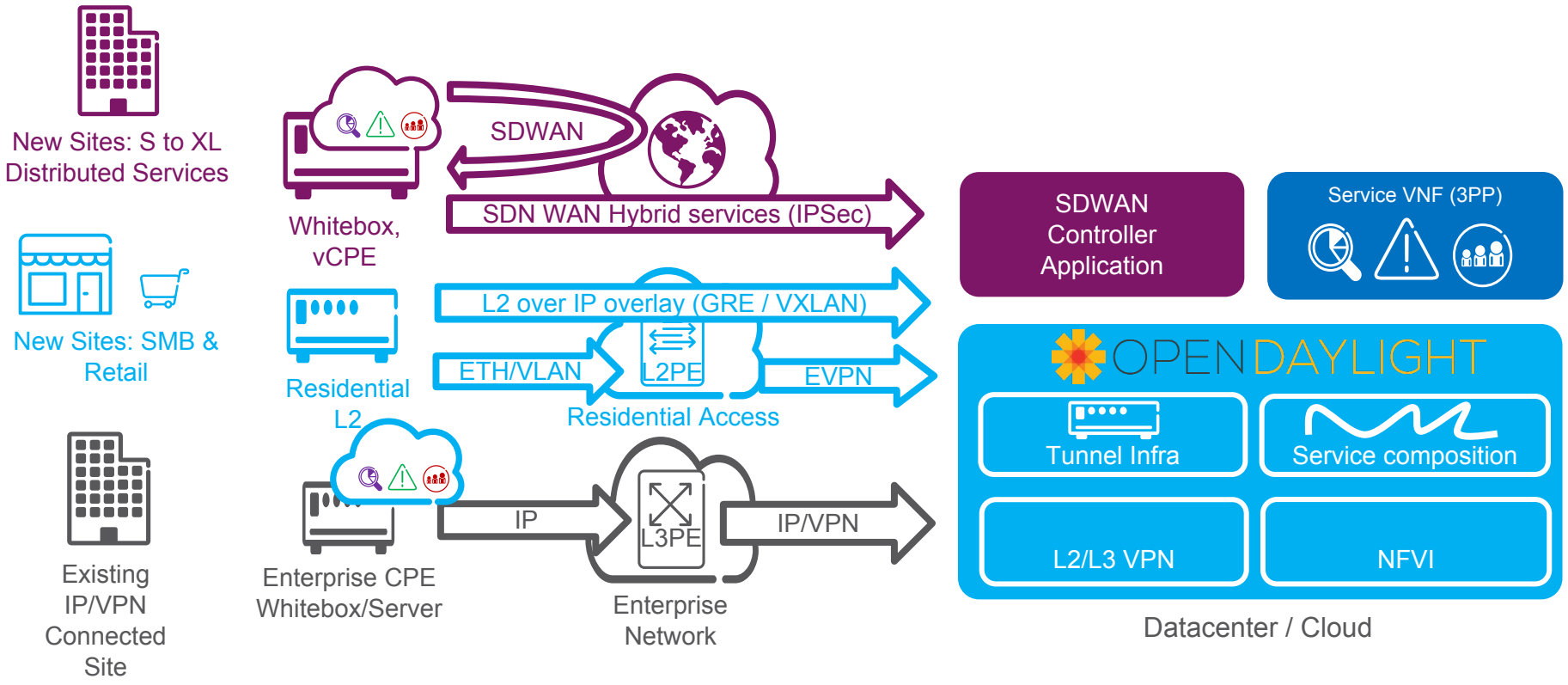


SFC & Routing Integration

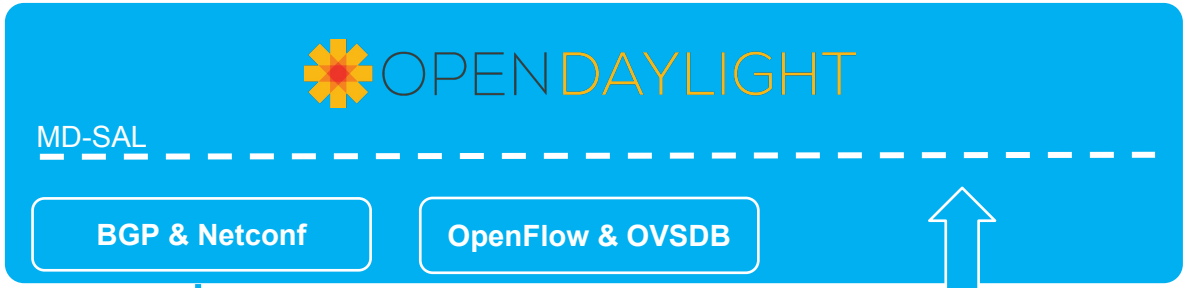
Distribution & Redundancy

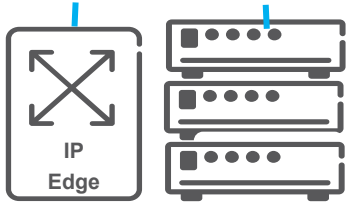


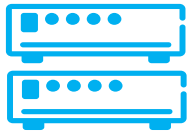
Virtual CPE: Site to Site Connectivity

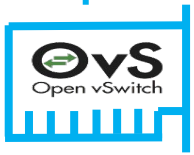


Open Data Plane Integration









Routers & Blackbox SW

DC virtual switch, white boxes and smartNICs

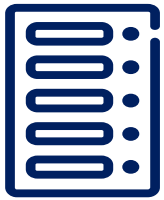
New data plans options

Interworking

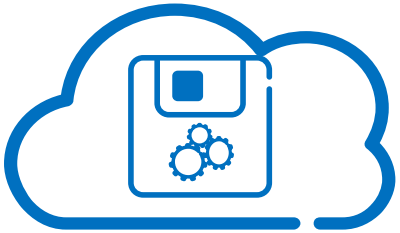
DC NFVi data plane

VNF acceleration

Complementary Technologies – Coexistence Required



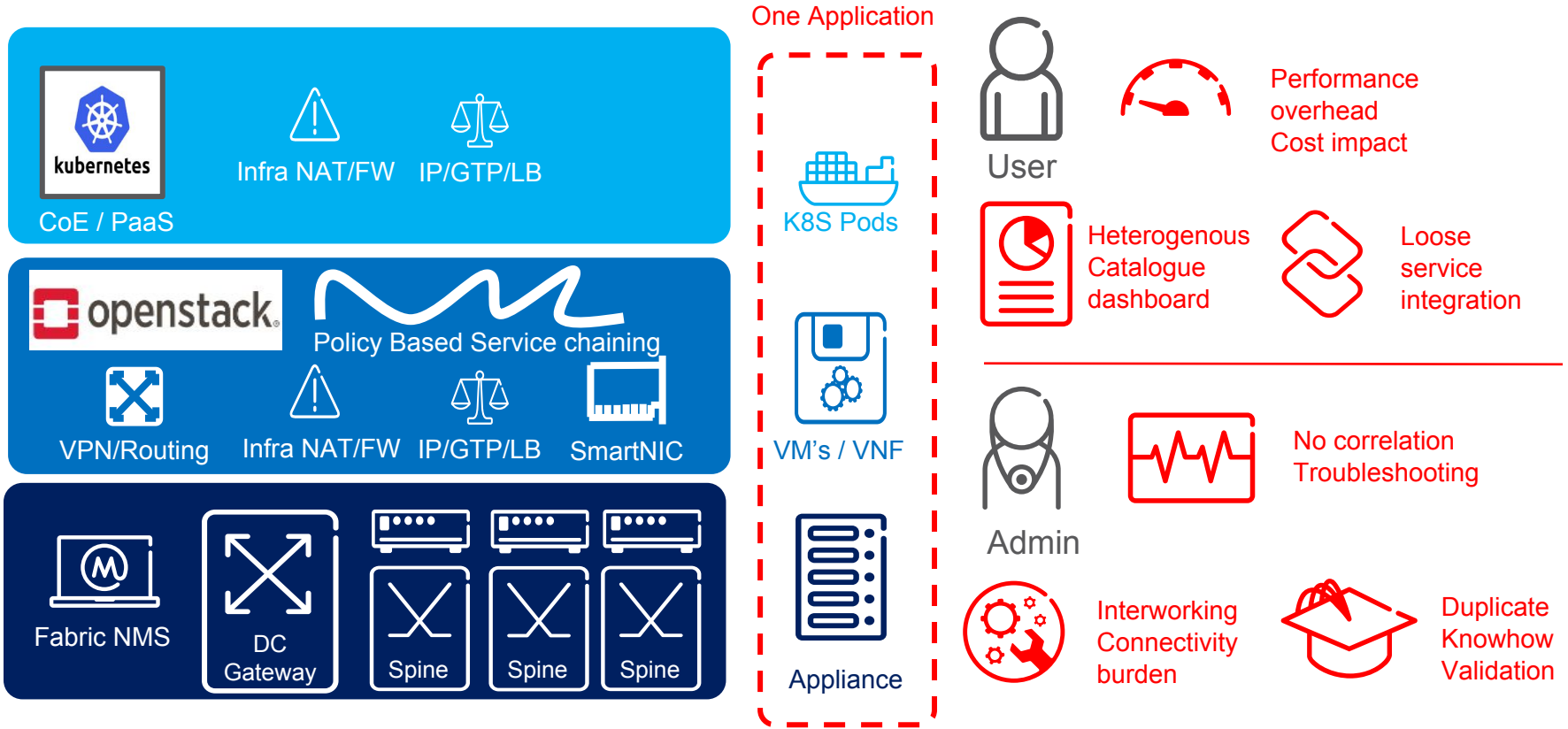
- Legacy Appliances
- SRIOV VNF
- Extreme performance
  - HW assisted
  - Specific HW/interfaces (e.g access equipment GPON/Radio)



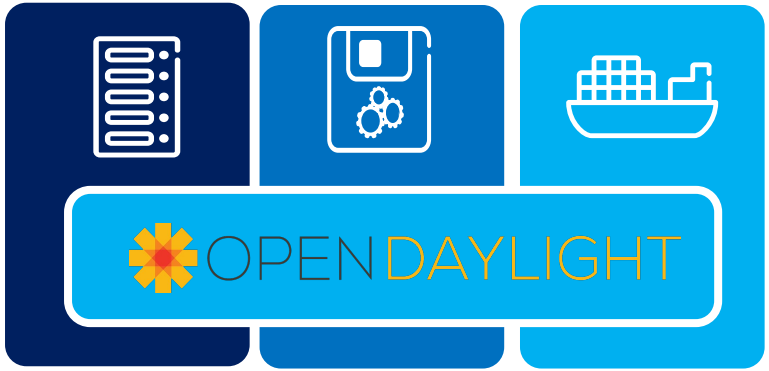
- Ease for legacy software (full stack bundling)
- Good performances
  - Multi-tenant VM optimized vs fragmented
  - DPDK enabled

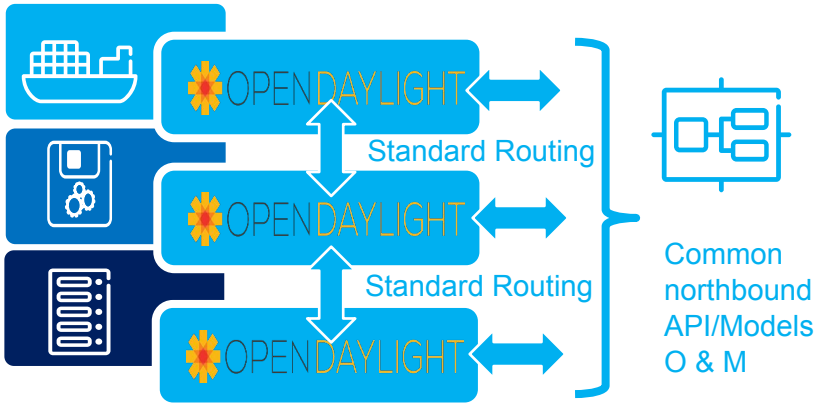
- Scalable multi-tenancy model for non multi-tenant software
- Best fit for cloud native software / PaaS optimized code

Duplication of Networking Layers



Two Approaches

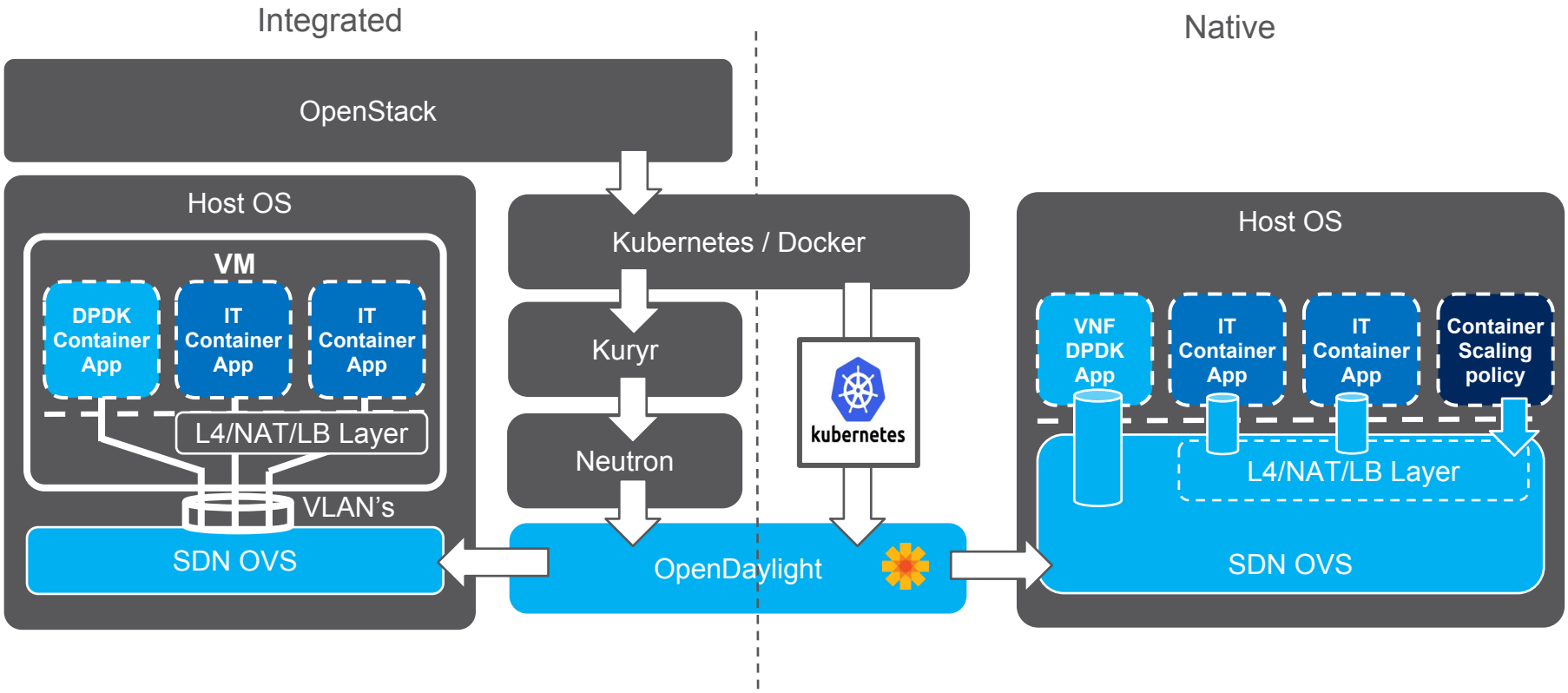




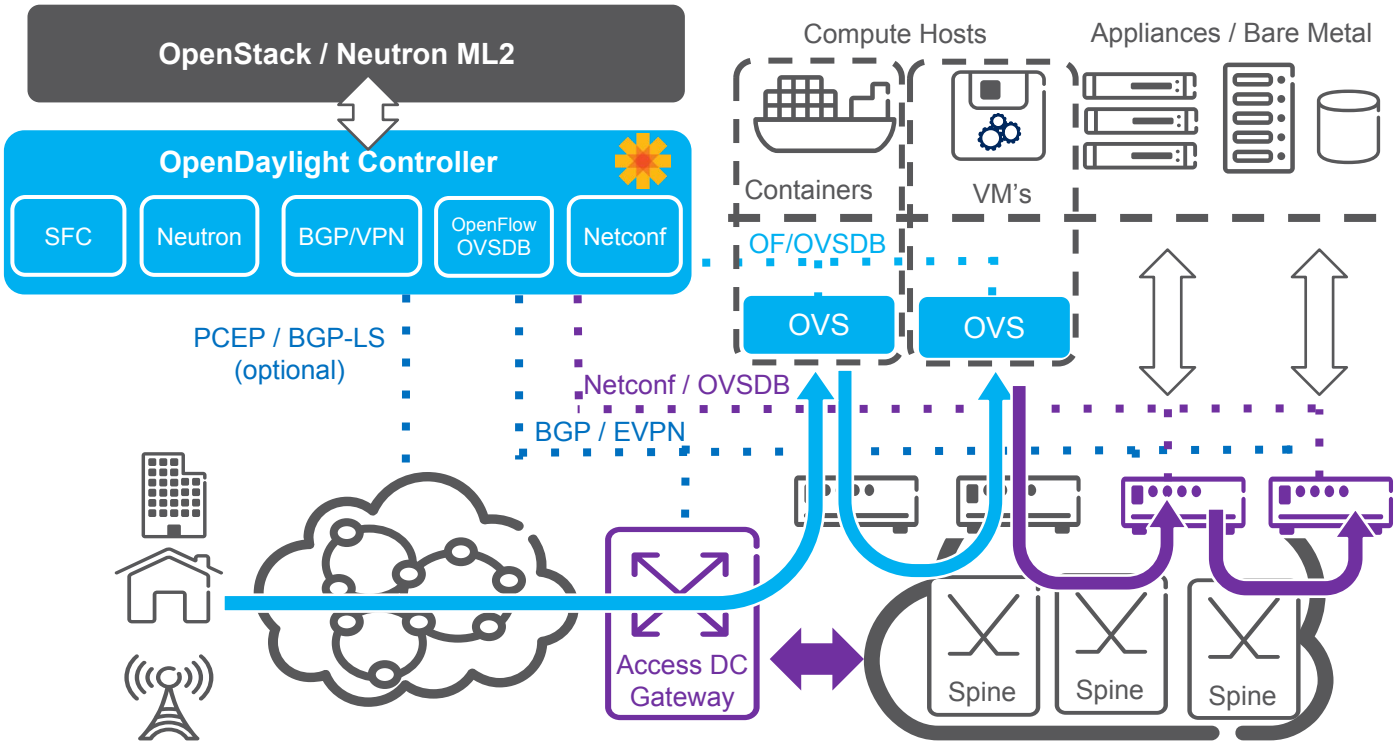
- Single controller instance that operates on all three layers
- Simpler approach to unify operations and provide uniform capabilities
- Harder validation / lifecycle management across multiple instances / version at each layers

- 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



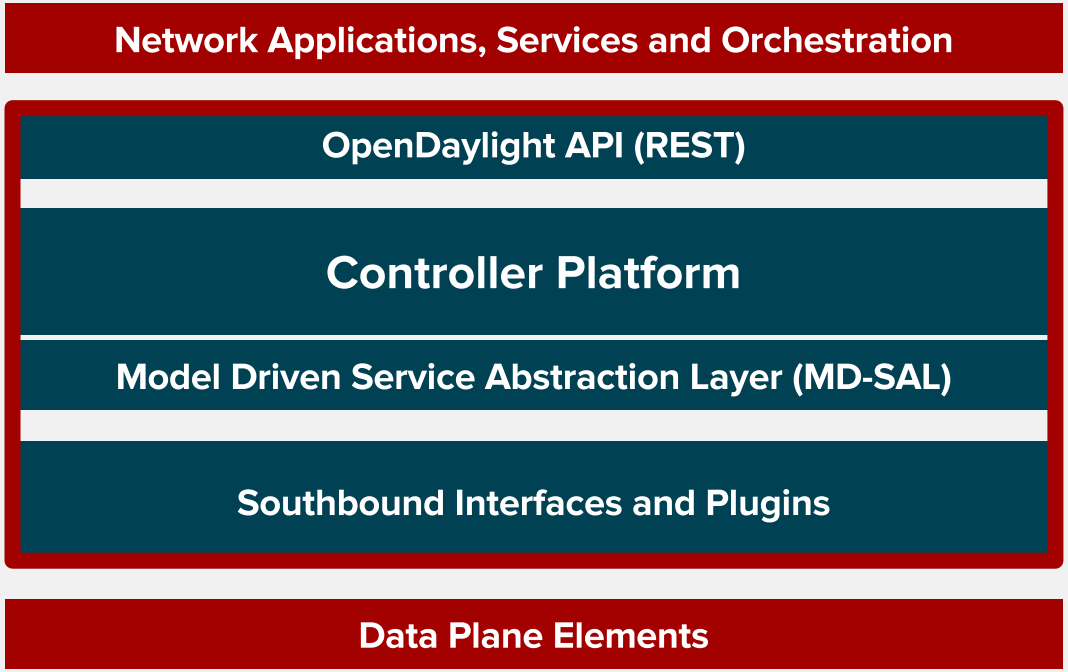
THE OPENDAYLIGHT PROJECT

What is OpenDaylight?

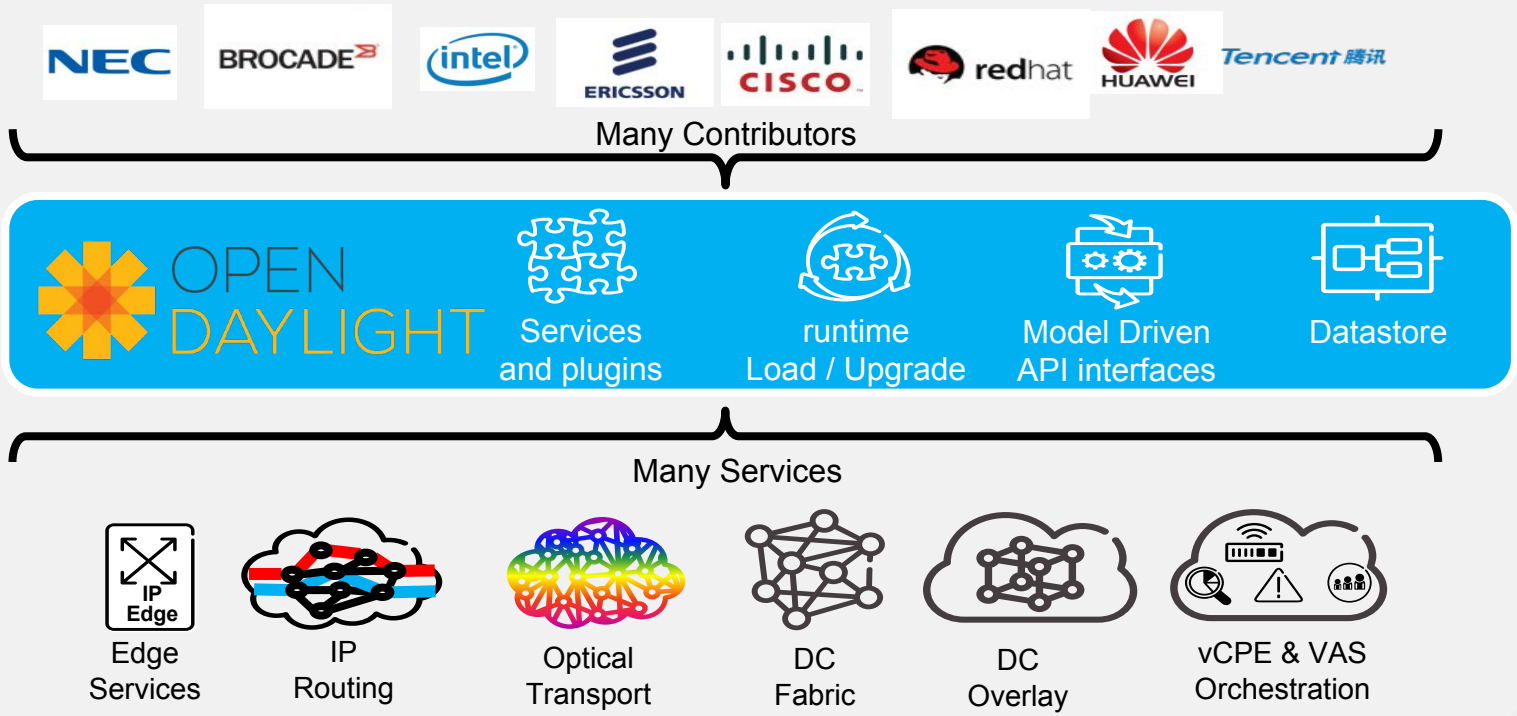
Overview

- 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

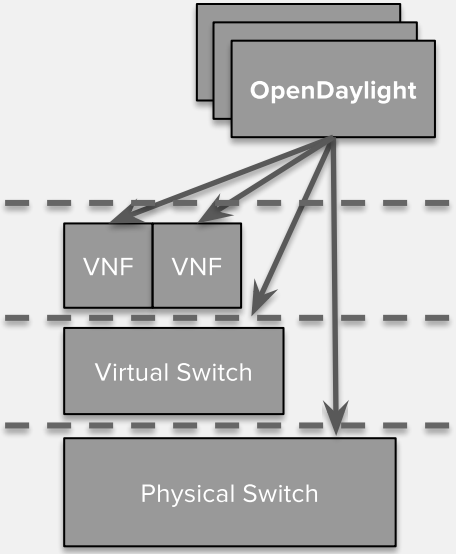
- It became apparent that the VPNService* had it's own version of NetVirt
- During the Boron cycle the two projects joined efforts so that:
  - NetVirt became the main Network Virtualization engine of OpenDaylight
  - NetVirt is more feature rich
  - The two projects are now using the same common service 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

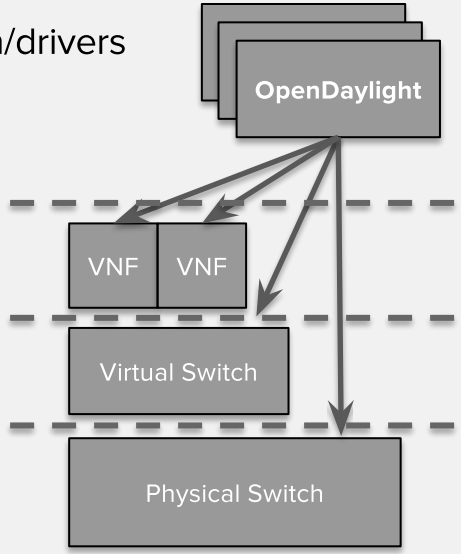
- Network Virtualization application developed on OpenDaylight consisting of modular sub-services such as L2, L3, ACL, NAT, DHCP, IPv6 control, and more
- Configure and manage the:
  - Overlay networks and virtual switches
  - ToR switches
  - OpenStack tenant networks
- Uses NETCONF and YANG to model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



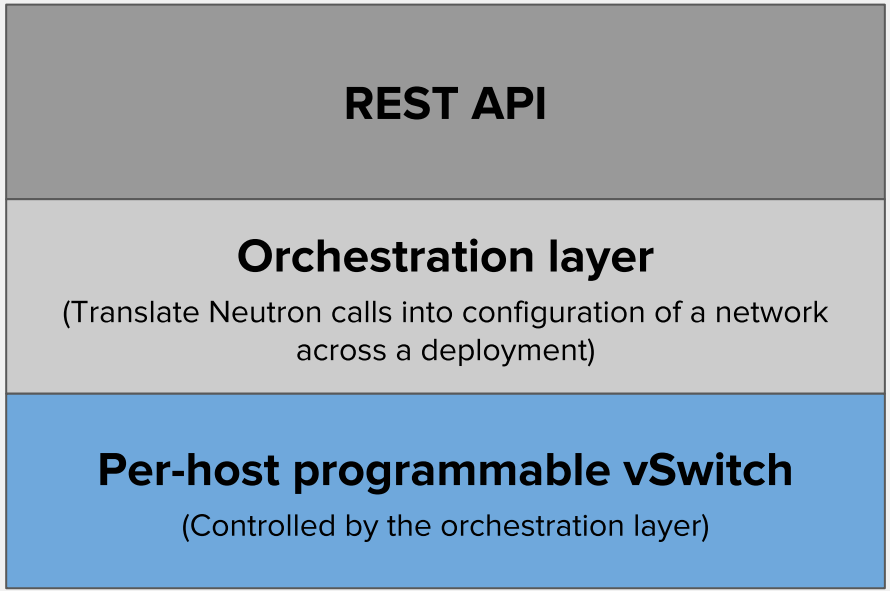
OpenDaylight NetVirt

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

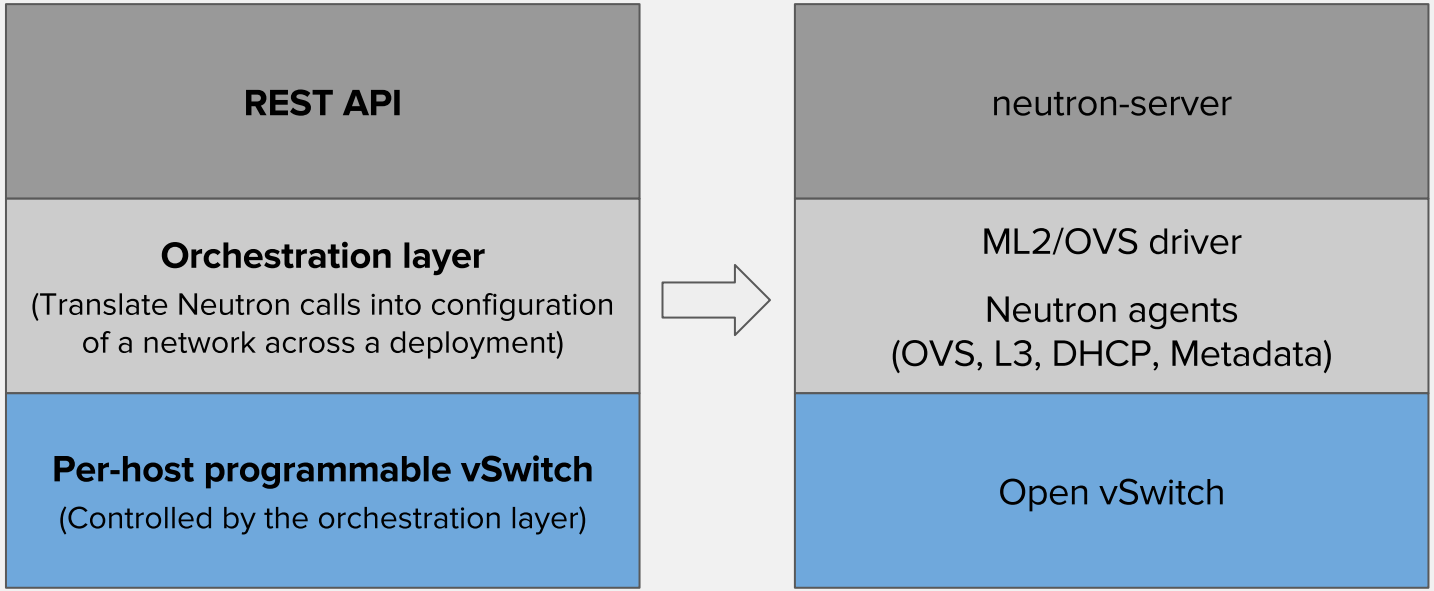


OpenStack Neutron



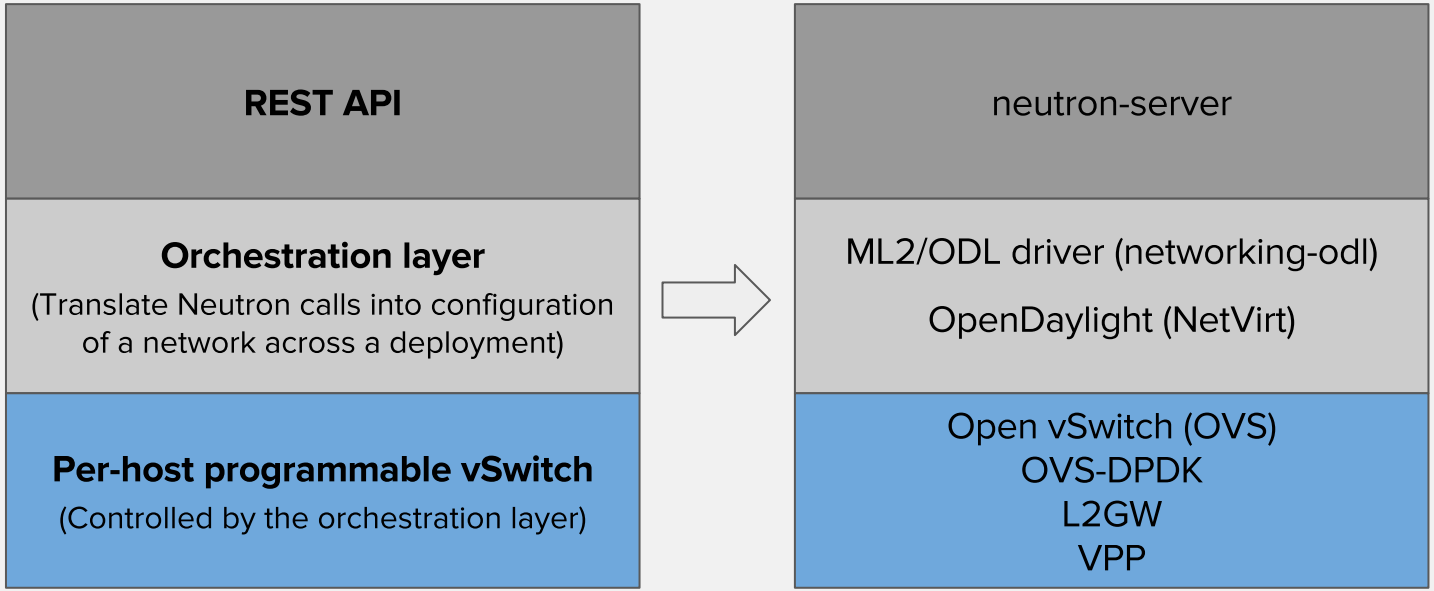
OpenStack Neutron

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

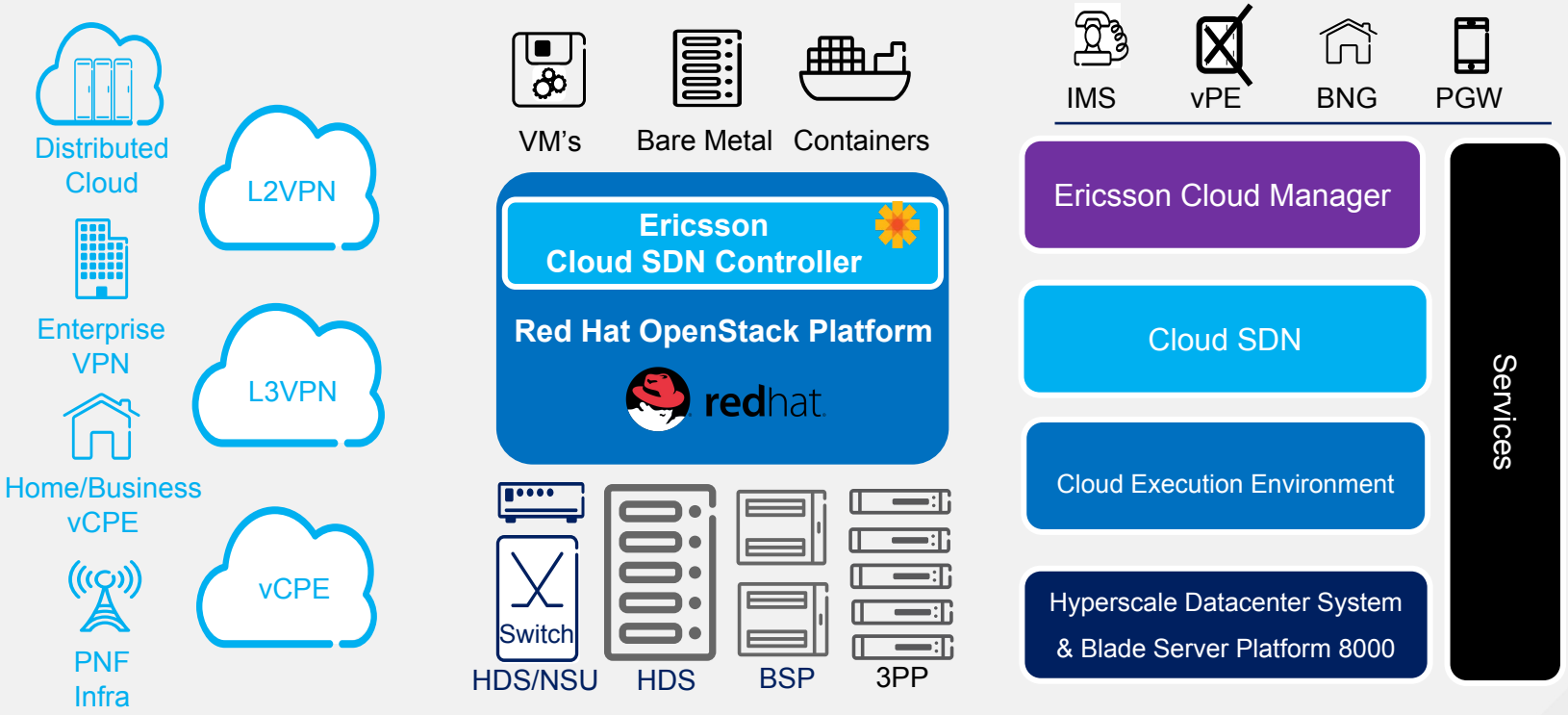
SDI

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

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