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OpenStack and OpenDaylight: An integrated IaaS for SDN and NFV

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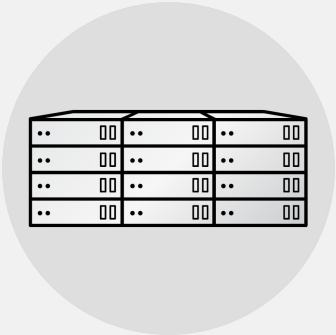
Agenda

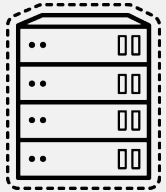
- An integrated infrastructure for SDN and NFV?
- OpenDaylight and how it interacts with OpenStack
- The NetVirt project
- OpenDaylight and Red Hat

SETTING CONTEXT

Enterprise IT VS. Telco?

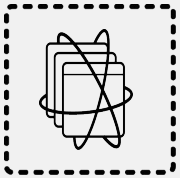


The Networks is Transforming



AUTOMATE EXISTING OPERATIONS

Move from manual tasks to automated tasks and shared knowledge

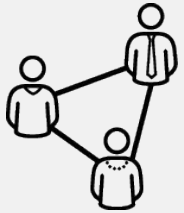


NEXT-GENERATION ARCHITECTURE

New ways of developing, delivering, and integrating applications

NETWORK FUNCTION VIRTUALIZATION

Deliver services faster and more reliably at lower cost



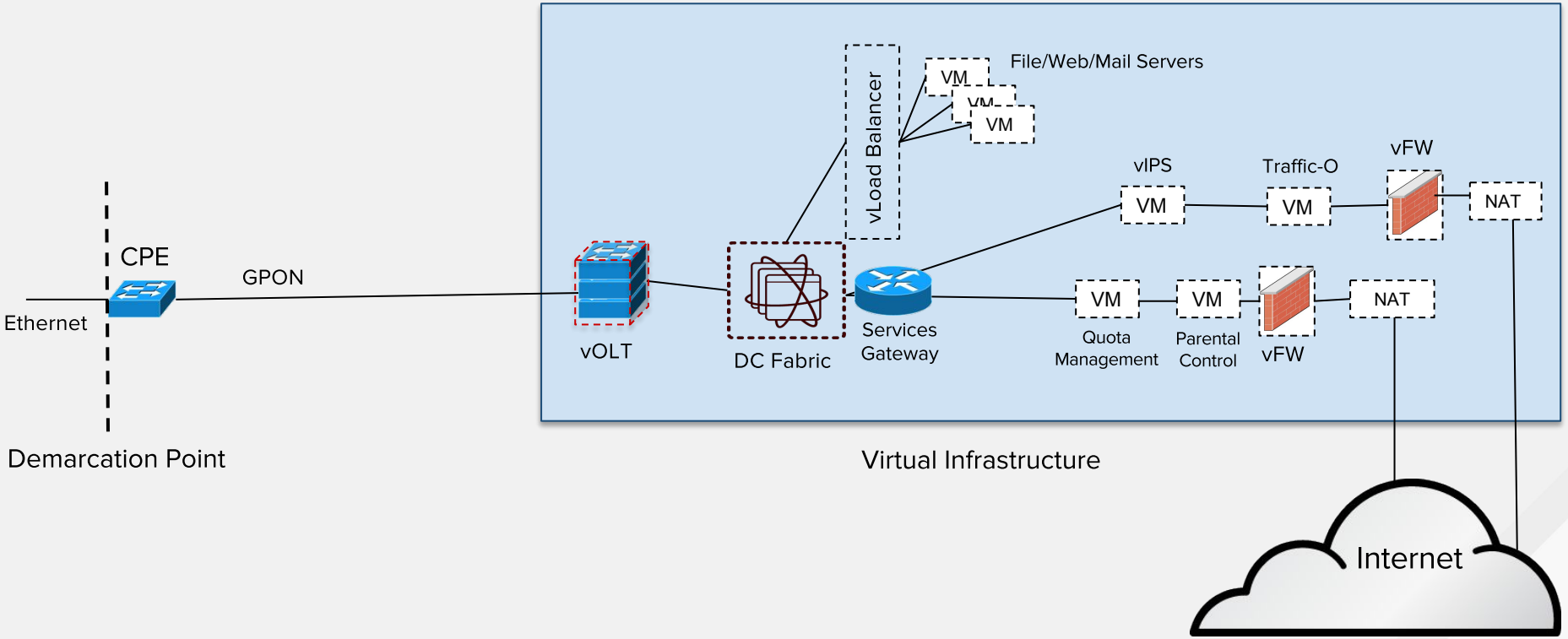
DEVOPS & CULTURAL CHANGES

Leverage enabling technologies and adapt new skill sets

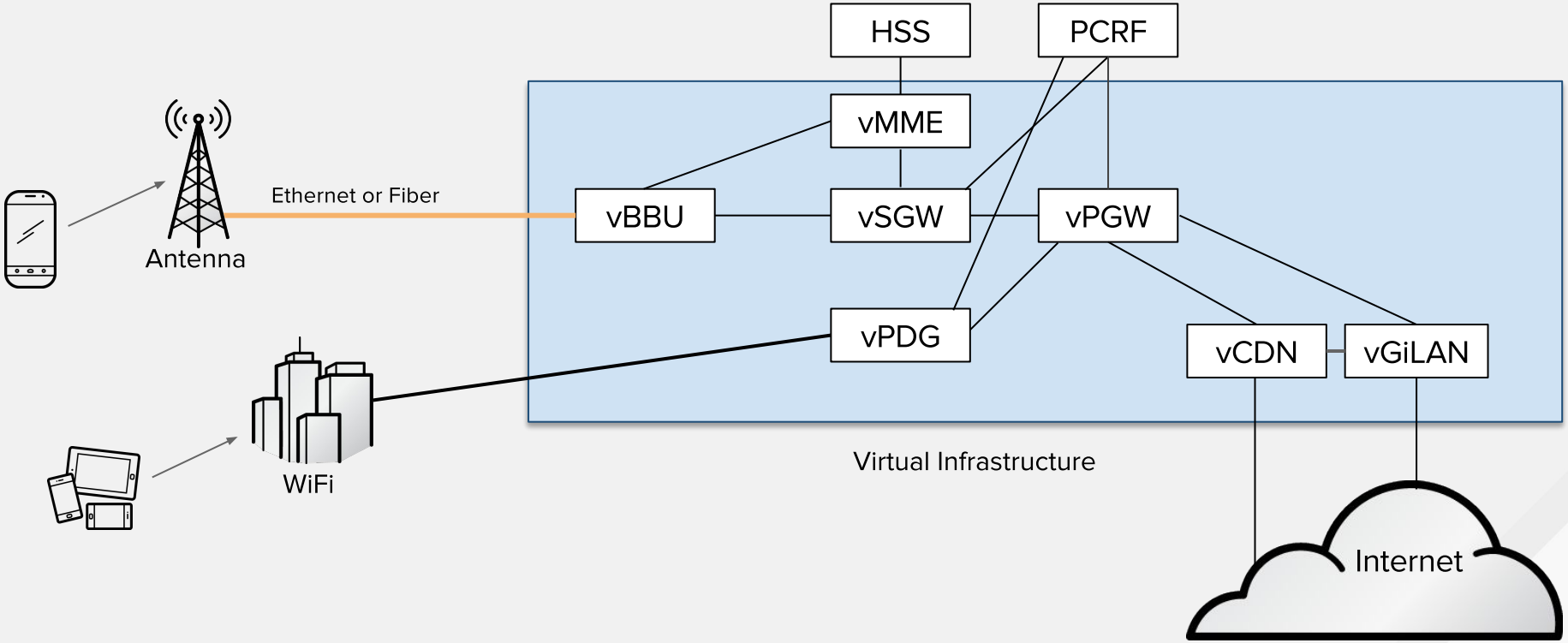
Common Use Cases

- **Network Virtualization**
  - Data Center Virtual Networks
  - Campus/Branch Virtual Networks
  - Micro Segmentation
- **Residential Services**
  - Virtualized Customer Premises Equipment (vCPE)
- **Mobile Services**
  - Virtualized Radio Access Network (vRAN)
  - Virtualized Evolved Packet Core (vEPC)
  - Virtualized value-added services (VAS), including GiLAN
- **Business Services**
  - Managed L2/L3 VPNs with different SLAs

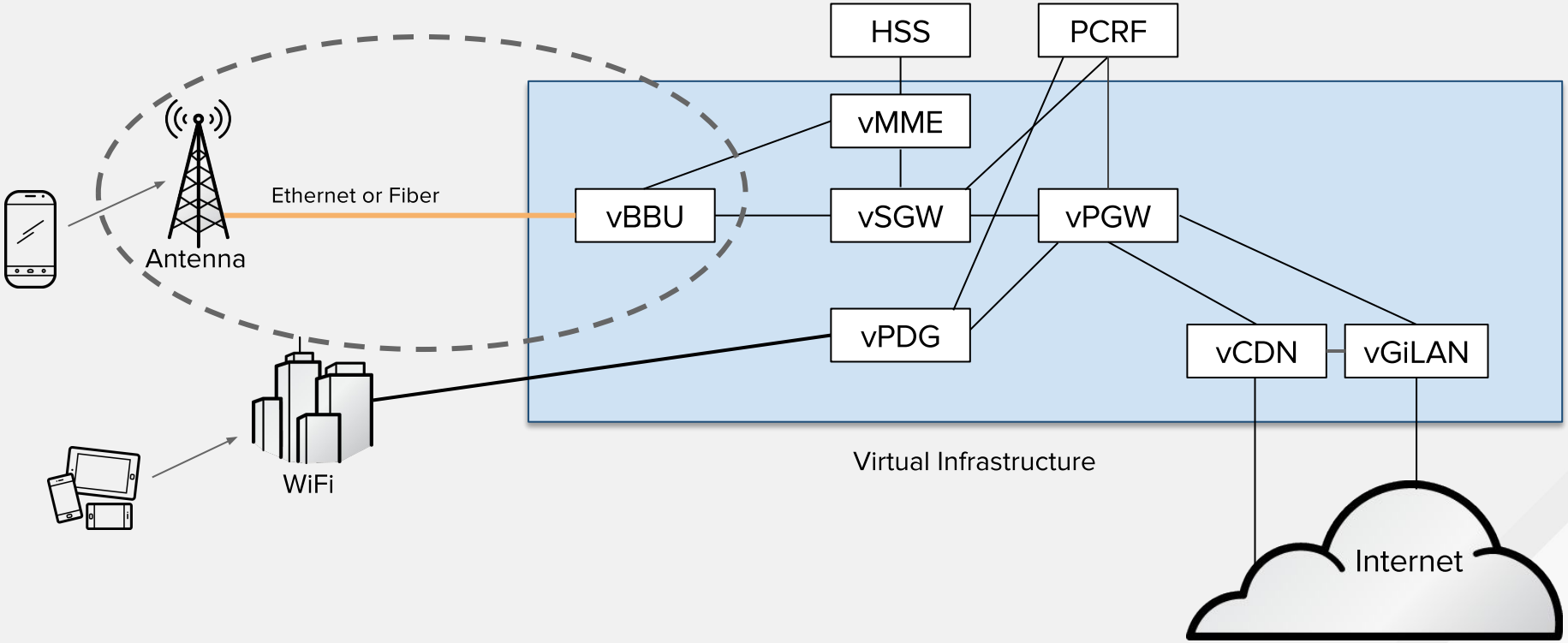
Residential Services - Example



Mobile Services - Example



Mobile Services - Example



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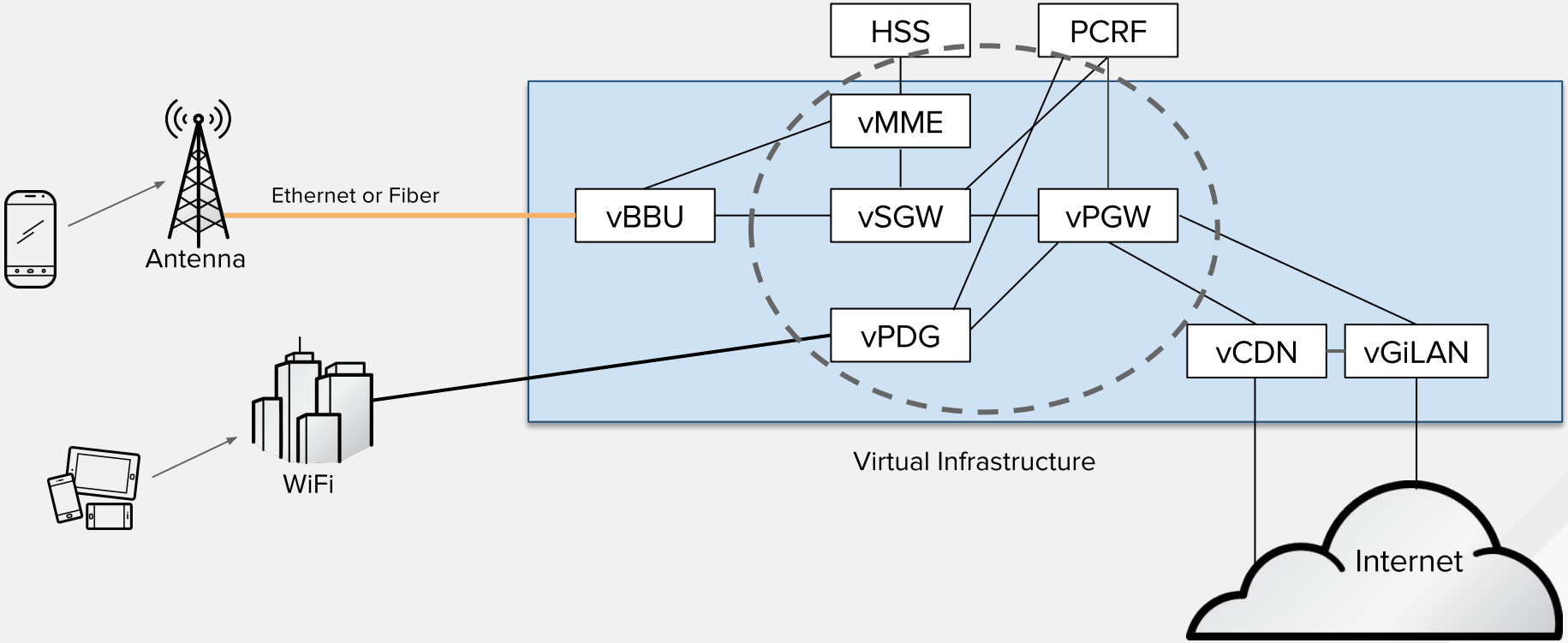

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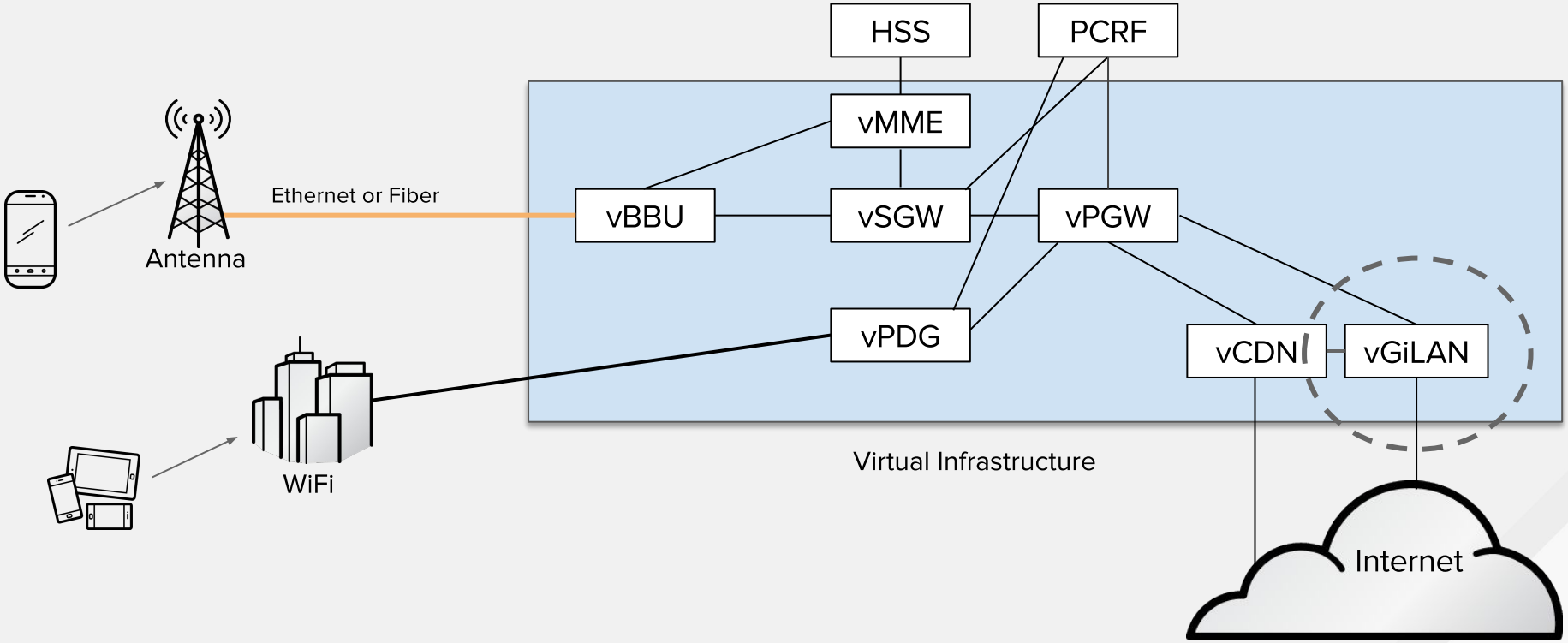
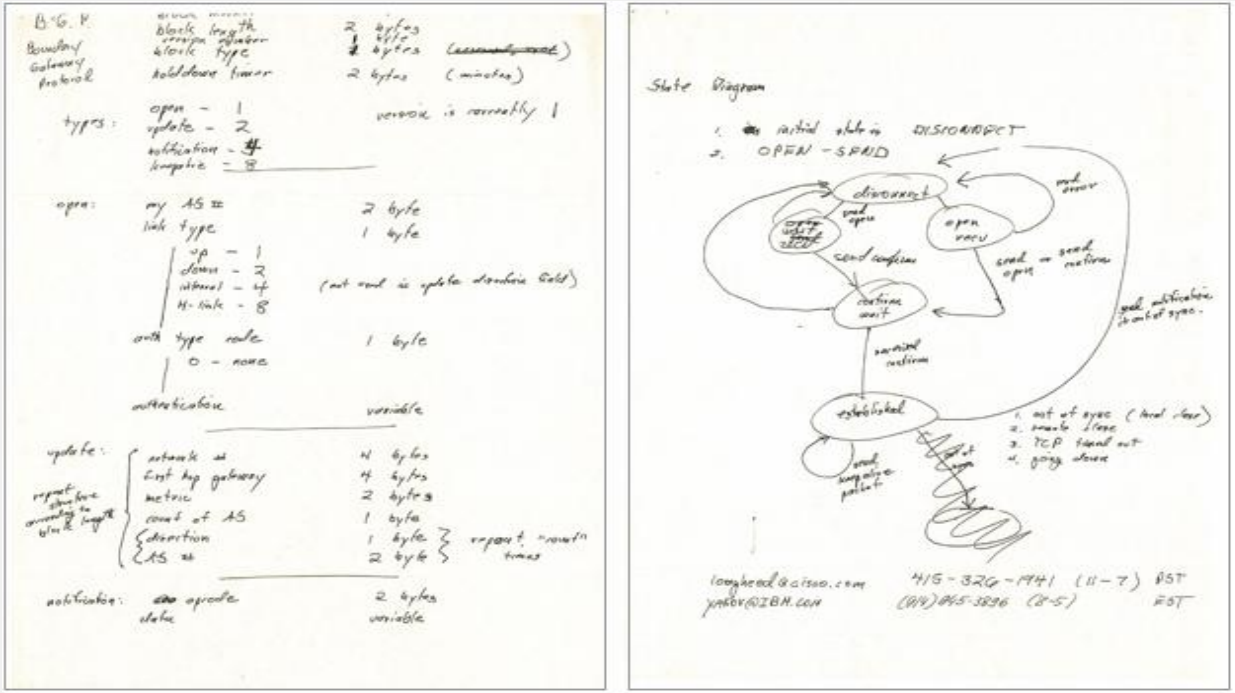


Common Requirements

- Standardized control of network - both physical (underlay) and virtual (overlay)
  - Fabric configuration and control
  - Overlay configuration and control
  - Support for the Neutron API
- Support for different datapath connectivity types
- Open source, standard-based approach, across the entire stack
- Service chaining for disaggregated composable services
- Platform reliability and availability
  - Fault and event correlation
  - Security
- Design with IPv6 in mind - from day one

The Two Napkin Protocol (1989)

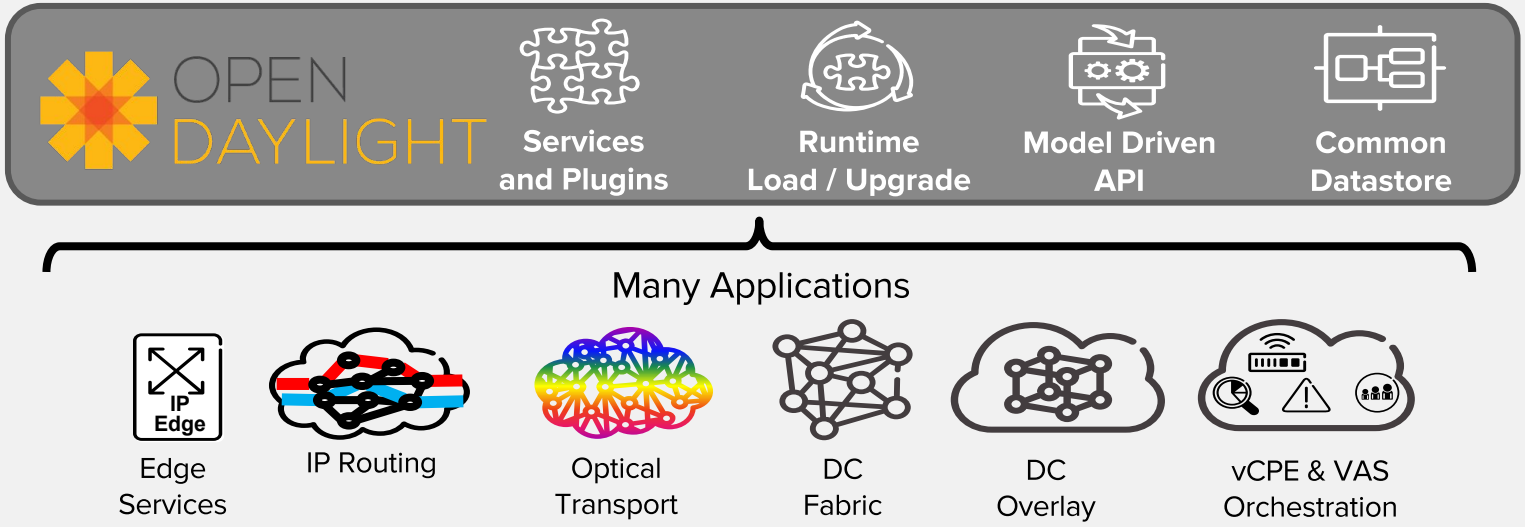


Source: www.computerhistory.org

MP-BGP (2017)

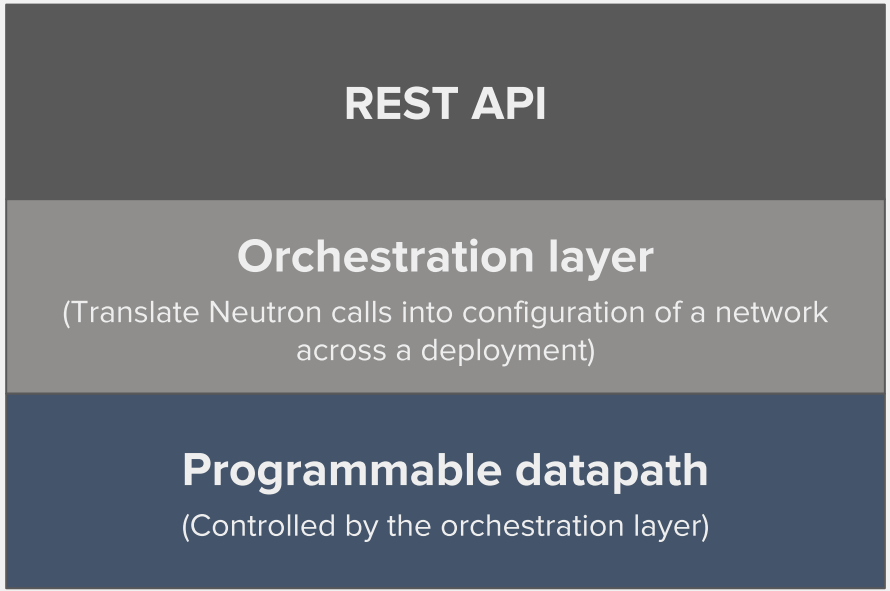
- IPv4 Unicast
- IPv4 Multicast
- VPN IPv4
- IPv6 Unicast
- IPv6 Multicast
- VPN IPv6
- IPv4 + label
- L2VPN
- VPLS
- EVPN
- ...

OpenDaylight is the New BGP



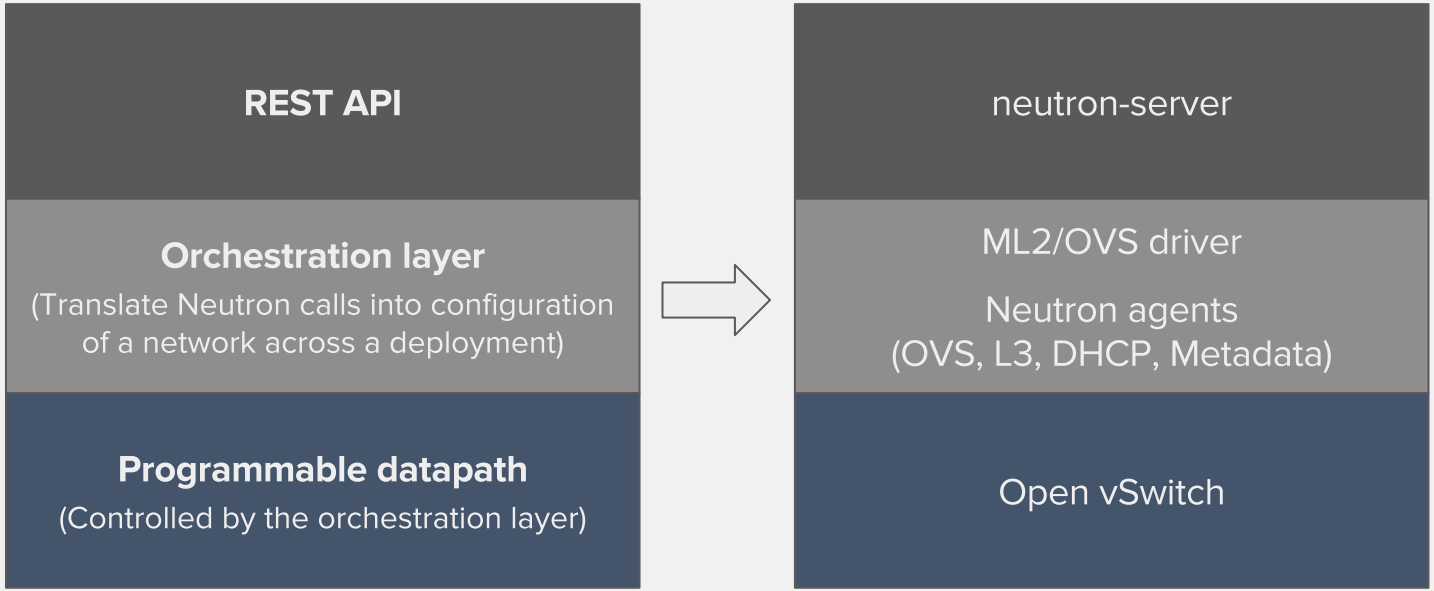
OPENDAYLIGHT AND OPENSTACK

OpenStack Neutron



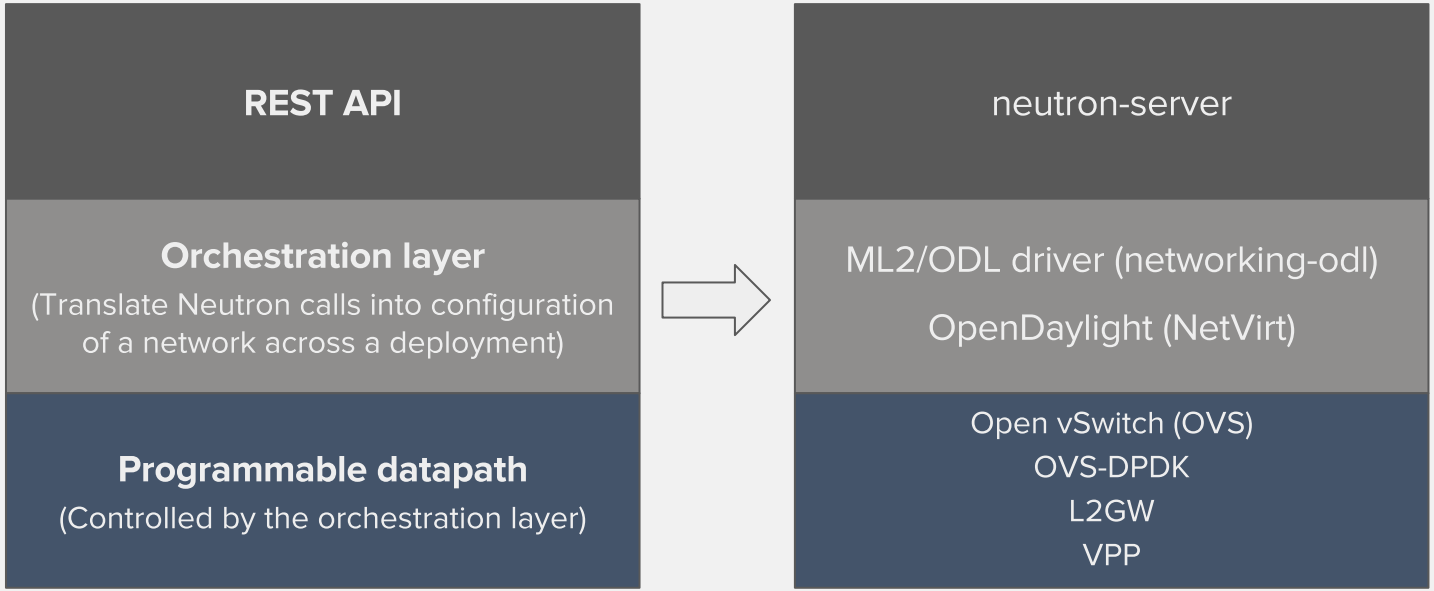
OpenStack Neutron

Upstream “Reference Architecture”



OpenDaylight with OpenStack

Using NetVirt

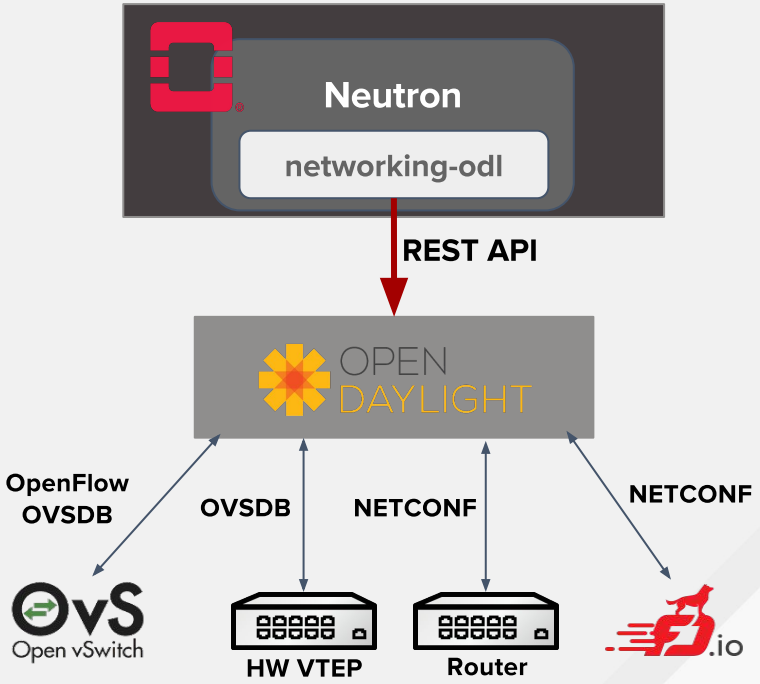


What is OpenDaylight?

- Open Source SDN Controller Platform hosted by the Linux Foundation
- ~4 Years Old
- ~1000 Individual Contributors from ~140 organizations
- Mature, Open Governance
- Mature code base
- Dozens of OpenDaylight-based solutions
- Over 100 deployments

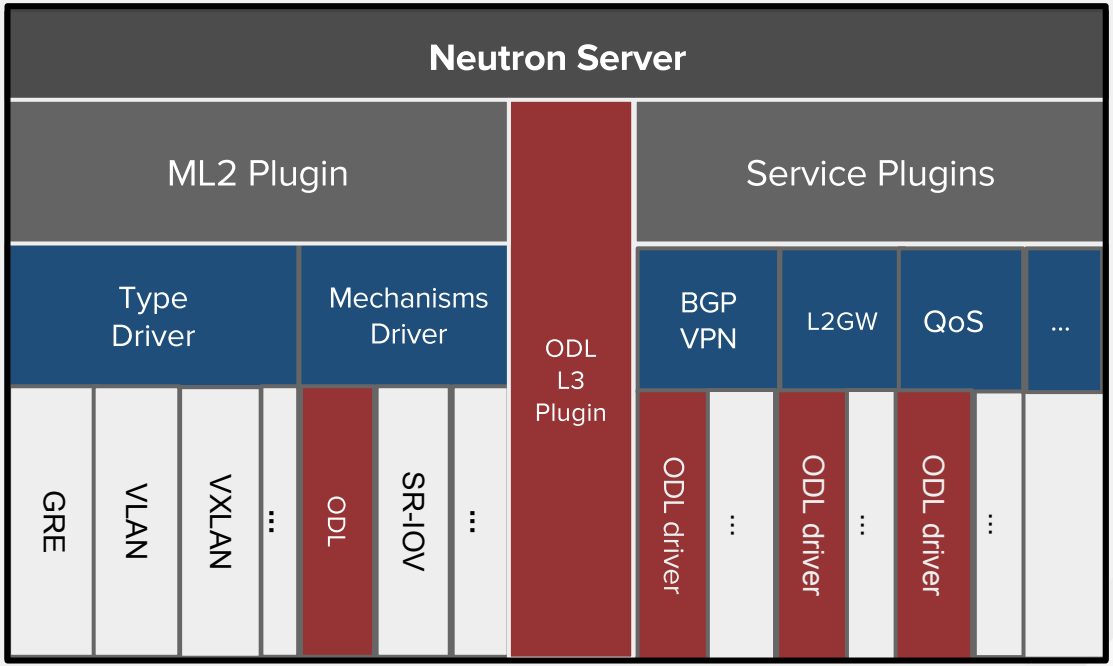
OpenStack and OpenDaylight

- OpenDaylight can be an SDN controller for OpenStack
- Provides network virtualization services for OpenStack via the Neutron API
- Supports Neutron API via the networking-odl driver
- Controls multiple devices



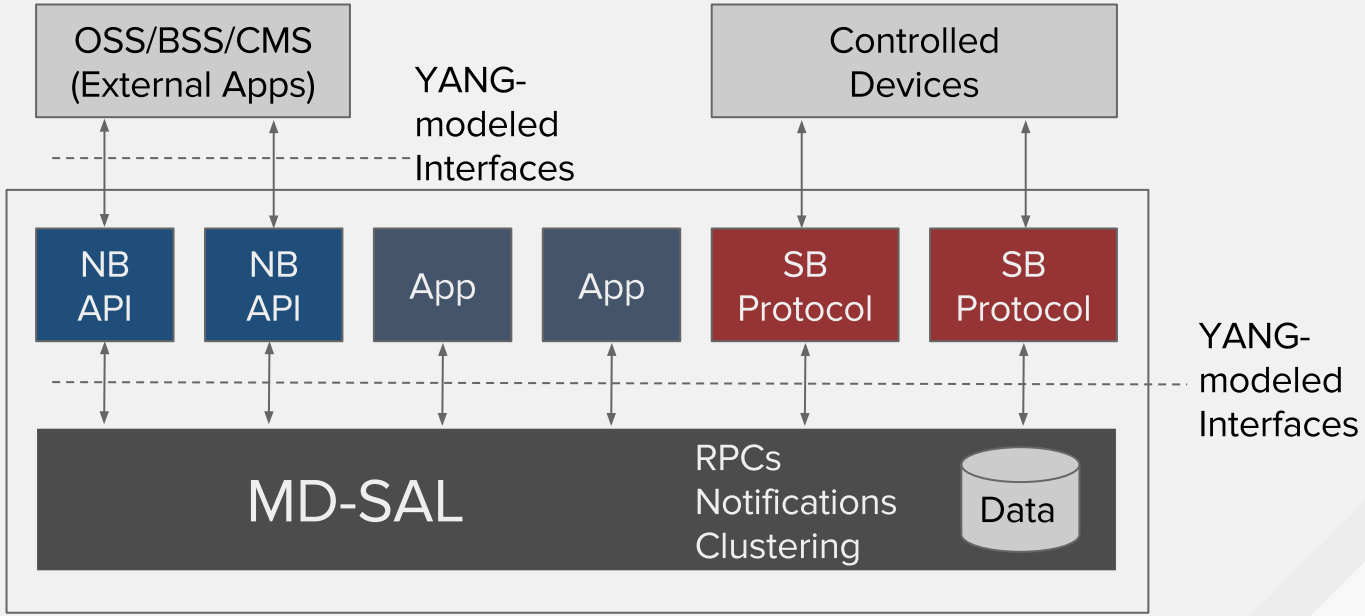
networking-odl

- L2: ML2 Plugin
- L3: ODL L3 Plugin
- Services
  - BGPVPN
  - L2GW
  - QoS
  - SFC
  - VLAN trunk

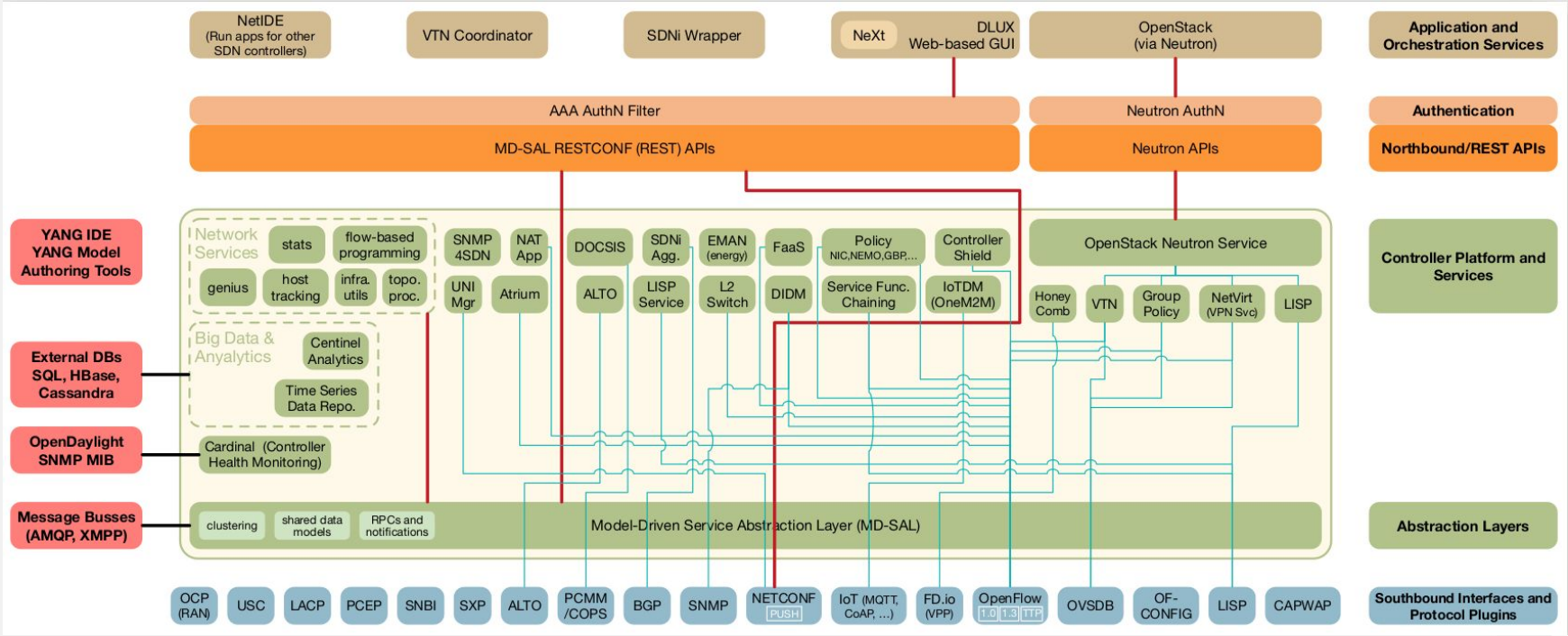


OpenDaylight: a YANG-Based Microservices Platform

- Based on Model-Driven Service Abstraction Layer (MD-SAL)
- Creates well-defined APIs
- Java and RESTCONF APIs auto-generated from YANG
- Controller Clustering

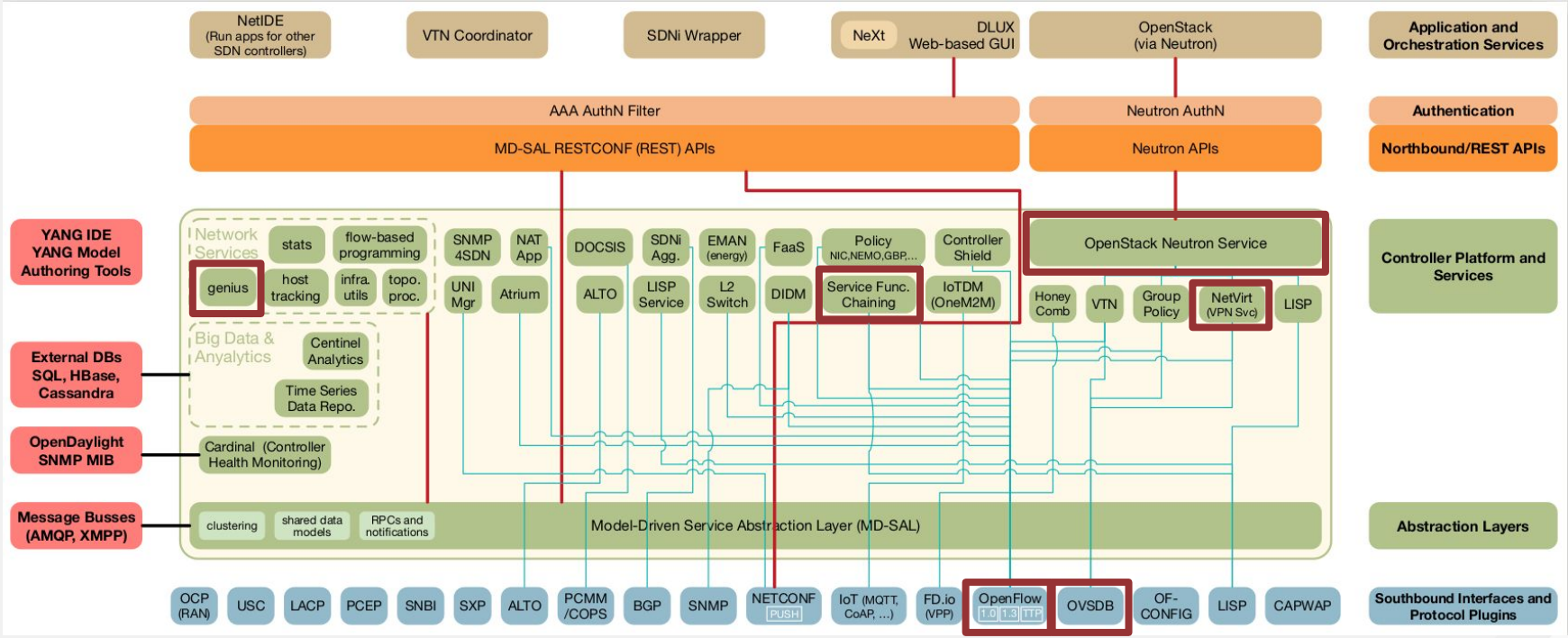


OpenDaylight Boron Architecture



Source: https://wiki.opendaylight.org/view/File:ODL-arch-B.pdf

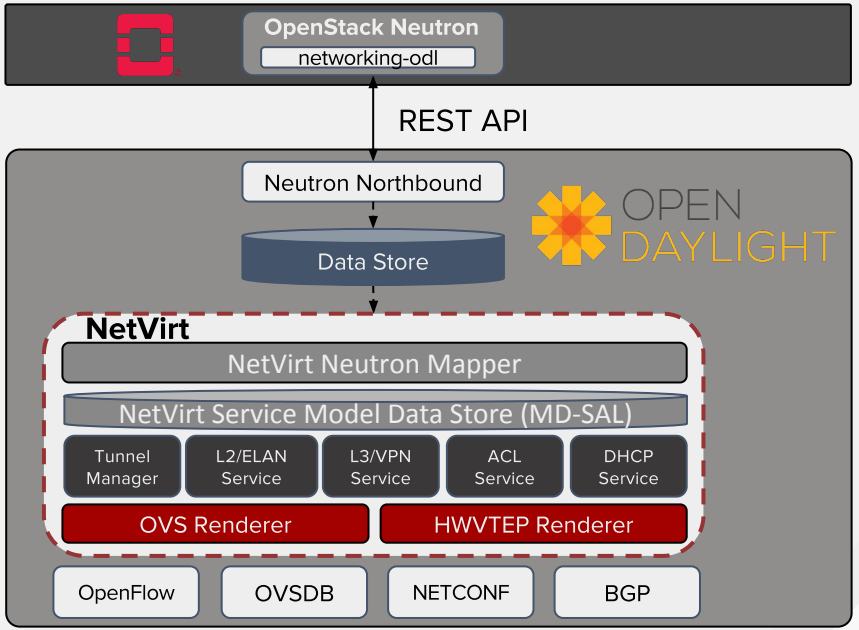
OpenDaylight Boron Architecture (NetVirt)



Source: https://wiki.opendaylight.org/view/File:ODL-arch-B.pdf

OpenDaylight NetVirt

- One of the OpenStack service provider in OpenDaylight
- Translates NB constructs to forwarding plane agnostic service yang models
- Services: L2, L3, BGP L3VPN, EVPN, ACL, DHCP, QoS, SFC, IPv6, L2GW
- Supports OpenFlow and OVSDB based devices
- BGP and NETCONF to interwork with physical legacy routers



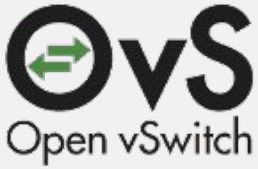
Existing Features (Carbon)

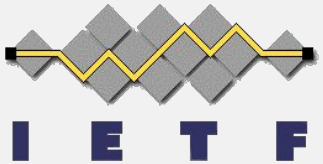
- Private Networks
  - L2/L3 implemented in OpenFlow
  - IPv4/IPv6
- Provider Networks
  - VXLAN, VLAN, Flat
  - IPv4
  - Support for multiple external networks
- OVS vSwitch control
  - Auto-bridge creation
  - Auto-tunnel creation
  - OVS-DPDK
- NAT support
  - Floating IPs
  - SNAT
- Security Groups
  - Stateful using conntrack
  - Learn (for OVS-DPDK)
- Layer 2 Gateway
  - Bare metal
  - SR-IOV
- SFC integration (NSH)
- Multi-site (BGP VPN, EVPN)

Key Future Work Items

- Container Orchestration Engine (COE) Project
  - kuryr integration
  - CNI Plugin for Kubernetes
- Physical Network Control
- EVPN for Intra-Cloud
- VPP/GBP Integration

Cross-Community Collaboration





OPENDAYLIGHT WITH RED HAT

Red Hat Current OpenDaylight Focus

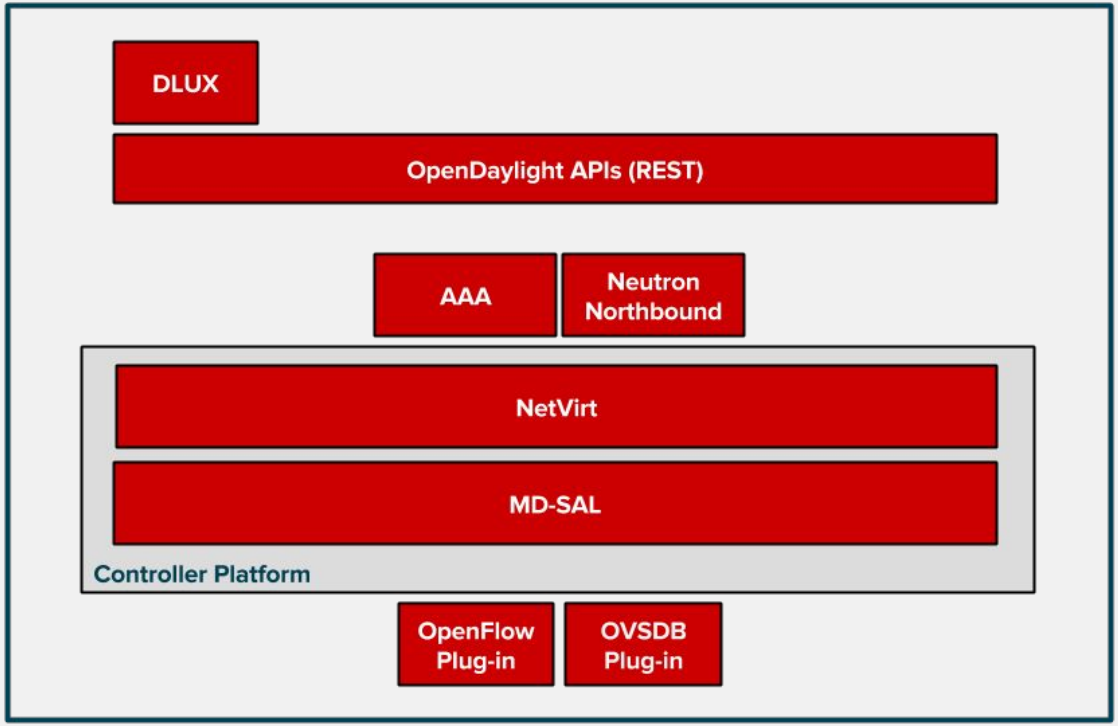
- MD-SAL
- Neutron Northbound
- NetVirt as a Neutron service provider
- SFC
- Integration and Testing
- Southbound protocols
  - OVSDB
  - OpenFlow
- OpenStack
  - Neutron
  - networking-odl
  - TripleO

OpenDaylight with Red Hat OpenStack

- Starting with Red Hat OpenStack Platform 8, Red Hat is bundling a distribution of OpenDaylight as part of the base channel/subscription as a Technology Preview*
- Red Hat provides you with a tested and integrated OpenDaylight NetVirt package
  - The OpenDaylight components included with Red Hat OpenStack Platform is limited to the modules required to support OpenStack deployments via NetVirt
- Find out more here: https://goo.gl/EBZwQk
- Tell us about your use-cases and experience at opendaylight-feedback@redhat.com

***Technology Preview:** https://access.redhat.com/support/offerings/techpreview

Red Hat Package



Further Reading

- Select OpenDaylight Projects
  - NetVirt
  - Genius
  - Container Orchestration Engine (COE)
- Red Hat OpenStack Platform
  - Product Documentation
- Red Hat and OpenDaylight
  - SDN with Red Hat OpenStack Platform: OpenDaylight Integration
  - OpenDaylight Product Guide
  - OpenDaylight Installation and Configuration Guide
- Red Hat NFV, SR-IOV and OVS-DPDK Guides
  - Product Guide
  - Planning Guide
  - Configuration Guide

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