Building Open Source-Based Cloud Solutions with OpenDaylight

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Part of a New OPEN Networking Stack
OpenDaylight Now

“OpenDaylight fundamentally changed the Linux Foundation’s world. It’s been wildly successful. It’s the de facto standard open source SDN controller for the industry today.”

- Dave Ward, Cisco CTO

*SDxCentral, 9/7/16

- Mature, Open Governance
- 800+ Contributors
- Over 100 deployments
- Leading use cases identified
- Dozens of ODL-based solutions
- Mature code base
- Focus on performance, scale and extensibility
Boron Features and Capabilities

Integration - industry frameworks
- OPNFV
- OpenStack enhancement
- CORD/vCO
- ECOMP
- ONF/Atrium

Common SDN toolchains
Net Virtualization + SFC:
- OF + OVSDB + OVS/FD.io
Mgmt plane programmability:
- BGP + PCEP + MPLS + NETCONF

Operational tooling
- Cardinal health monitoring
- Data analytics (TSDR & Centinel)
- OCP (Open radio I/F)
- Documentation

App developer tooling
- YANG-IDE toolkit
- NetIDE for cross-OSS controller interoperability
- NeXt UI toolkit
- “Singleton app” HA
- Documentation
OpenDaylight Boron in Open Clouds

The glue that holds together L2-7 networking functions

Coordinates physical and virtual resources
  • Network, compute, storage

Network virtualization with service function chaining
  • OpenStack-based network virtualization
  • Virtualized Central Office (vCO; AKA CORD)
OpenDaylight with OpenStack
OpenStack/OpenDaylight Integration

- Multiple Neutron implementations
- Target different use cases, southbound drivers
  - FD.io/VPP
  - OVS
  - Open Overlay Router (née LISPmob)
- Provide distributed implementations of scalable network virtualization for OpenStack
OpenStack/OpenDaylight Integration

- L2: ML2 plugin
- L3: ODL L3 plugin
- services
  - FWaaS
  - L2Gateway
  - QoS
  - LBaaS
  - BGPVPN
  - networking-sfc
  - trunk
OpenStack and OpenDaylight Integration

Network/Control Node
- Neutron
  - ML2 Plugin
    - Networking-odl
  - ML2 DB

Controller node
- OpenDaylight*
  - Neutron Northbound
  - ovsdb/NetVirt
  - Yang Model

Compute Node
- VM
- OVS

Networking Node
- DHCP Agent
- OVS

Management Network

Data Network

Public Network

Internet

Router
OpenDaylight in vCO and ROBO
What does Central Office do?

- **Subscriber management capabilities**: Gateway, authentication and authorization, event and subscriber information logging
- **Optical Line Termination (OLT) for PON/GPON** (Passive Optical Net.)
- **Service functions**: self-service portals, NAT, FW, routing, IP addr mgmt, QoS, quotas, video caching, mail and file stores

**A Virtualized Central Office (vCO):**
- Uses general-purpose compute, storage and network capabilities to deliver the above services
- Added agility (spin up VMs vs. rack and stack hardware)
- Cost savings (via increased automation and commodity servers)
vCO Data Center Architecture

Physical elements are divided into

- Network: provides fabric/underlay
- Servers: provides computer/storage for VNFs
Controllers and orchestrators use overlay networks to form service chains of VNFs
## vCO Data Center Software Architecture

<table>
<thead>
<tr>
<th>OSS/BSS</th>
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<tbody>
<tr>
<td><strong>Policy</strong> <em>(NIC, NEMO, GBP, Neutron)</em></td>
<td><strong>VNFO</strong> <em>(ECOMP, Open-O, OSM, …)</em></td>
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<tr>
<td><strong>Service Chaining</strong></td>
<td><strong>VNF Spec</strong> <em>(TOSCA)</em></td>
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<tr>
<td><strong>Overlay Network</strong></td>
<td><strong>VNF Catalog</strong></td>
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<tr>
<td><strong>Fabric</strong></td>
<td><strong>VNFM</strong> <em>(Tacker, Cloudify, …)</em></td>
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<tr>
<td><strong>SDN Controller</strong> <em>(OpenDaylight)</em></td>
<td><strong>VIM</strong> <em>(OpenStack, Kubernetes, …)</em></td>
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**Fabric/Underlay (Network)**

**Servers/VNFs (Compute, Storage)**
ROBO: Using vCO Blueprint in Enterprises

- vCO for Enterprises to provide for Remote/Branch offices
  - Maybe offered by ISPs as a service
- Integrating with public cloud will likely involved some form of vCO (either aaS or Enterprise-deployed)
- Hybrid Cloud will almost certainly involve vCO
Think Beyond the Controller

Product → Enabling solution component
Thank you