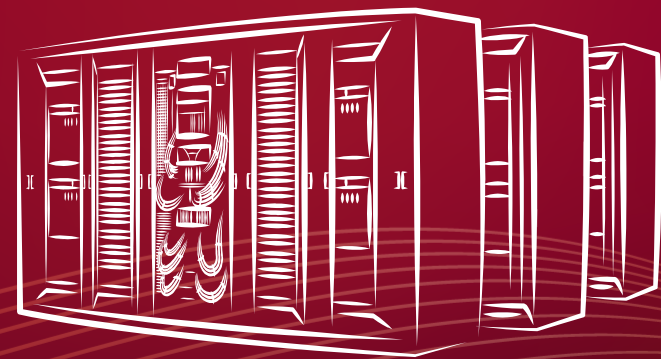**BROCADE**

Bridging NFV into Cloud Orchestration

Eugene Chang
Principal Solutions Architect APAC

Business Drivers and Requirements
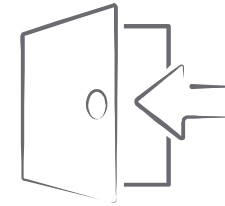
Agile

- Accelerate new service innovation
- Create competitive advantage

Reduce Cost

- Embrace cloud models for robust service automation
- Implement new operational teams, processes and architectures

Open

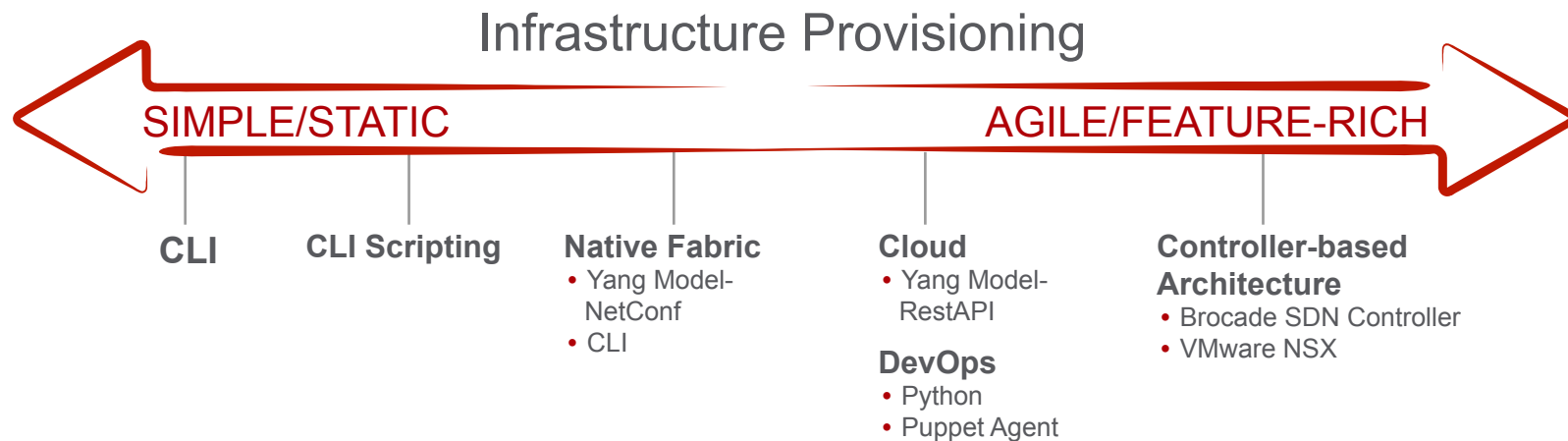- Reduce vendor dependence
- Deploy best-of-breed solutions at will and without compromise

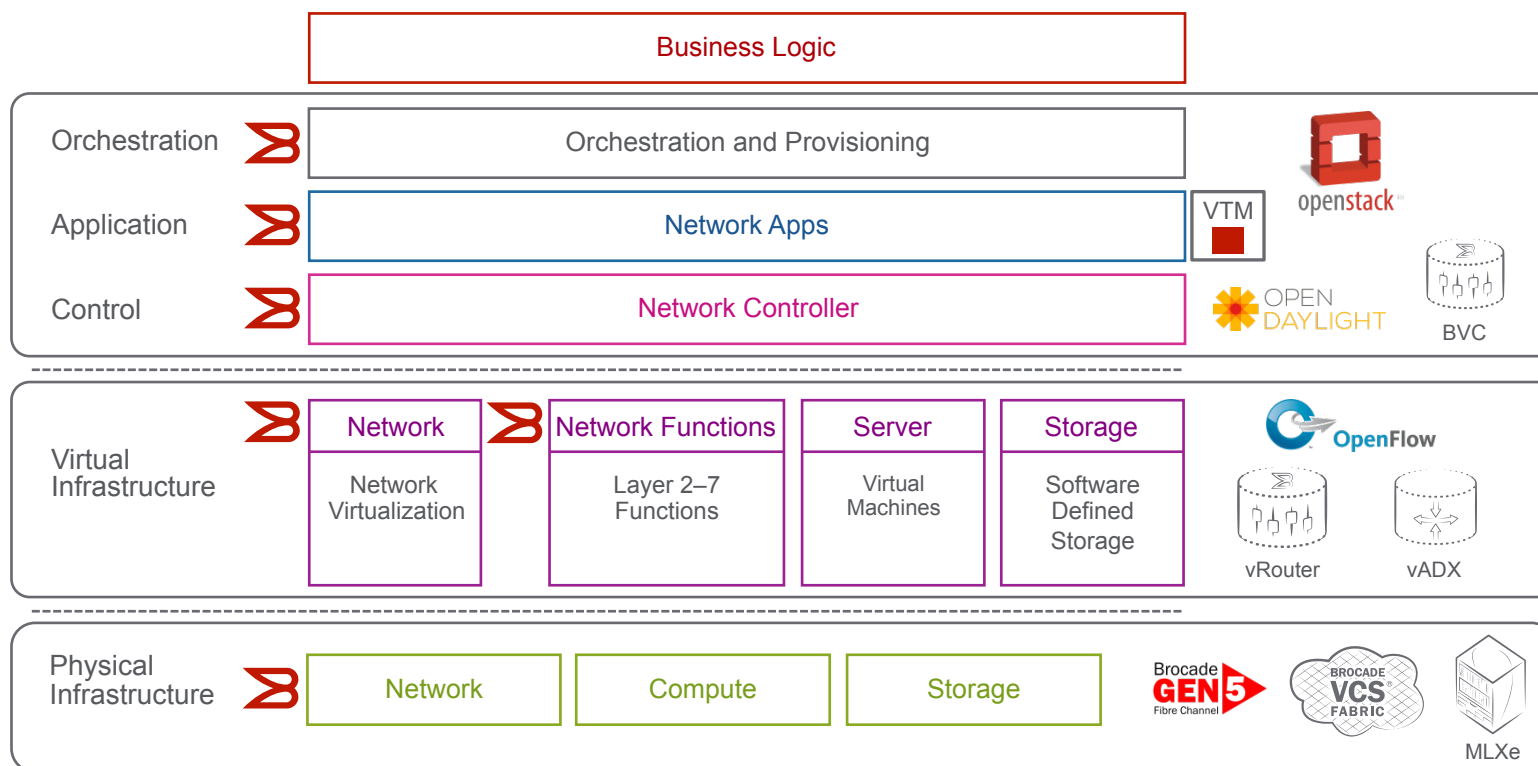Network vendor support for cloud automation is a primary customer buying consideration

The Evolution of Data Center

Cloud Management Platform (Tenant Provisioning)

OpenStack | CloudStack | RestAPI | Homegrown Scripting | Vendor Provided Solutions

Infrastructure Provisioning

SIMPLE/STATIC ←→ AGILE/FEATURE-RICH

CLI

CLI Scripting

Native Fabric
- Yang Model-NetConf
- CLI

Cloud
- Yang Model-RestAPI

DevOps
- Python
- Puppet Agent

Controller-based Architecture
- Brocade SDN Controller
- VMware NSX

Brocade Open Solutions

Business Logic

Orchestration		Orchestration and Provisioning			
Application		Network Apps		VTM	
Control		Network Controller			BVC

Virtual Infrastructure	Network	Network Functions	Server	Storage
	Network Virtualization	Layer 2–7 Functions	Virtual Machines	Software Defined Storage

vRouter   vADX

Physical Infrastructure	Network	Compute	Storage

Brocade **GEN5** Fibre Channel   Brocade **VCS FABRIC**   MLXe
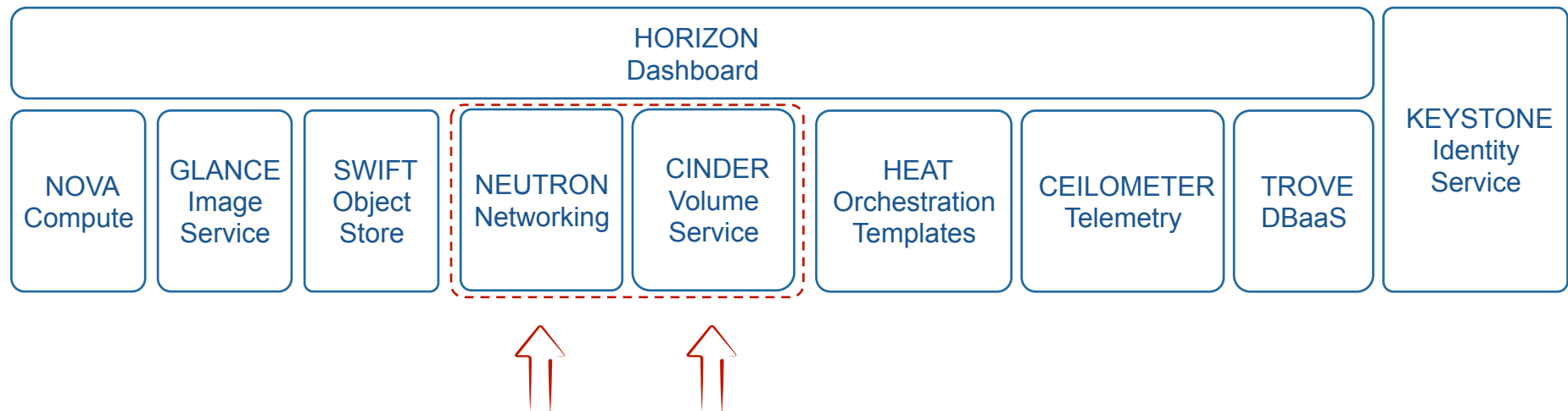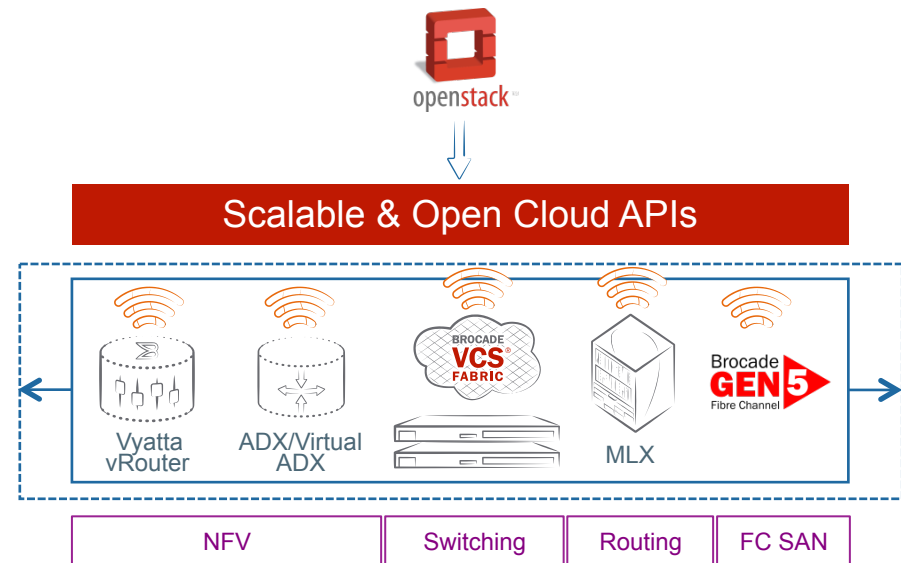
Main OpenStack Projects

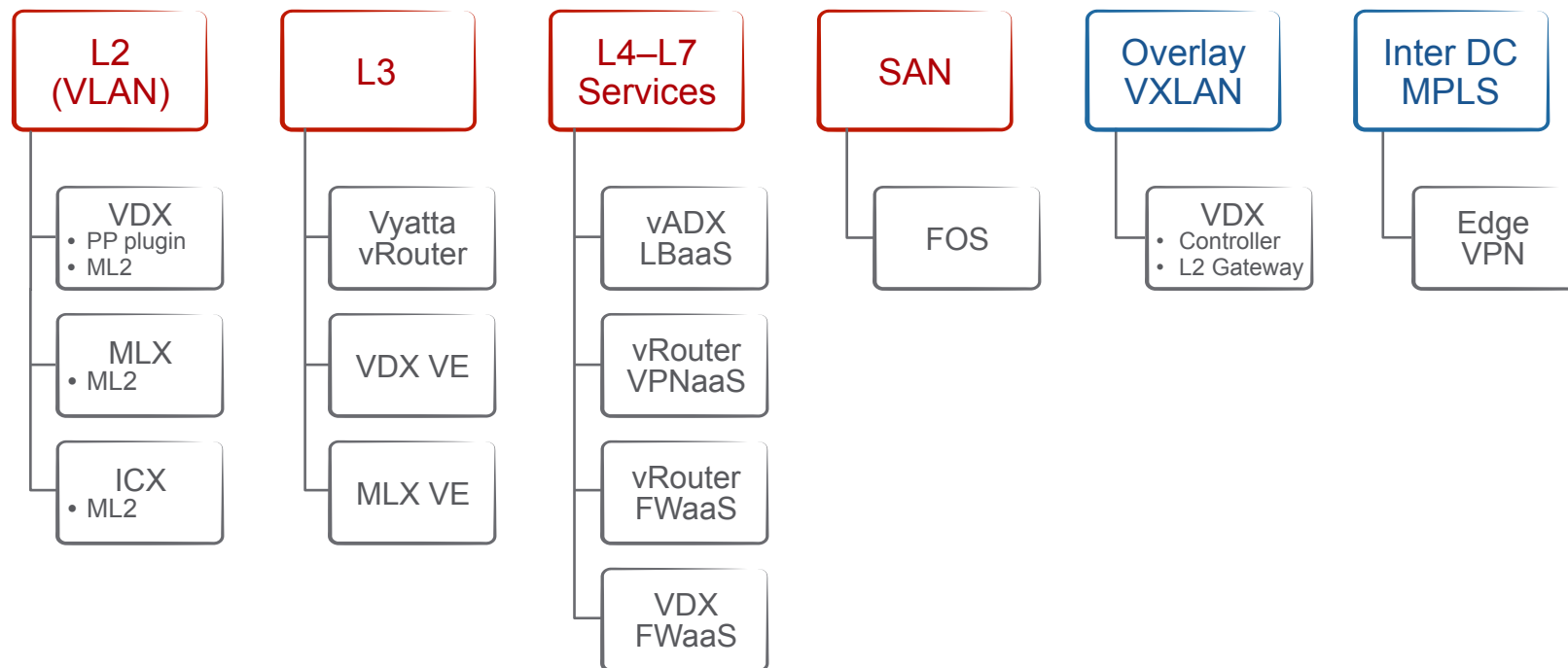Brocade Focus: Neutron (Networking) & Cinder (Storage)

OpenStack Current Investment

- Plugin developments:
  - VCS Ethernet Fabric, FC (upstreamed)
  - vADX, Vyatta vRouter (Juno privately certified)
  - vRouter FWaaS, vRouter VPNaaS (Kilo)
  - vTM LBaaS (Kilo)

- ETSI ISG NFV PoCs
  - Working with partner vendors and operators (IBM, RedHat, Telefonica) to define and deploy policy-based PoCs related to placement and scheduling of NFV through OpenStack.

Scalable & Open Cloud APIs

Vyatta vRouter	ADX/Virtual ADX	VCS FABRIC	MLX	Brocade GEN5 Fibre Channel

NFV	Switching	Routing	FC SAN

Brocade OpenStack Plugins

Kilo timeframe (April/May 2015)

L2 (VLAN)	L3	L4–L7 Services	SAN	Overlay VXLAN	Inter DC MPLS
VDX • PP plugin • ML2	Vyatta vRouter	vADX LBaaS	FOS	VDX • Controller • L2 Gateway	Edge VPN
MLX • ML2	VDX VE	vRouter VPNaaS			
ICX • ML2	MLX VE	vRouter FWaaS			
		VDX FWaaS			

OpenStack Community Participation

OpenStack ODL integration

- ODL mechanism driver for MD-SAL

L2 Gateway

- VTEP support on VCS

L3 Services

- VPN, FW frameworks

Service VM (Tacker)

- VM Lifecycle Management for NFV

Edge VPN

- Inter DC connectivity with MPLS/VPLS

Telco WG (f.k.a. NFV subteam)

- Focus on Networking: VLAN trunking, Networking flavors

OpenStack Data Center/Cloud Use Cases

Service Provider and Enterprise

- Multi-tenanted, virtualized data center

- Scale out architecture

- Secure tenant isolation

- Varied workloads
  - Web workloads
  - Big data
  - Dev/Test
  - Enterprise applications

Data Center/Cloud Architecture

Physical, virtual, and DC interconnect network

MLX ML2 Plugin **MLX VE Plugin** **MLX Edge VPN Plugin**

- Multi-tenant support
- VLAN isolation
- Inter-VLAN routing
- VRRP support
- FWaaS (ACL based)

- Experimental
- DC Interconnect

Internet, Provider WAN, Private Fiber

MPLS/VPLS

Data Center #1

MLXe

MLXe

Core

MLXe

Inter DC

MCT

BROCADE **VCS**® FABRIC

Rack-1   Rack-2   Rack-n

- Flat topology, east-west optimized
- All links active, L1/2/3 multipathing
- VM-aware
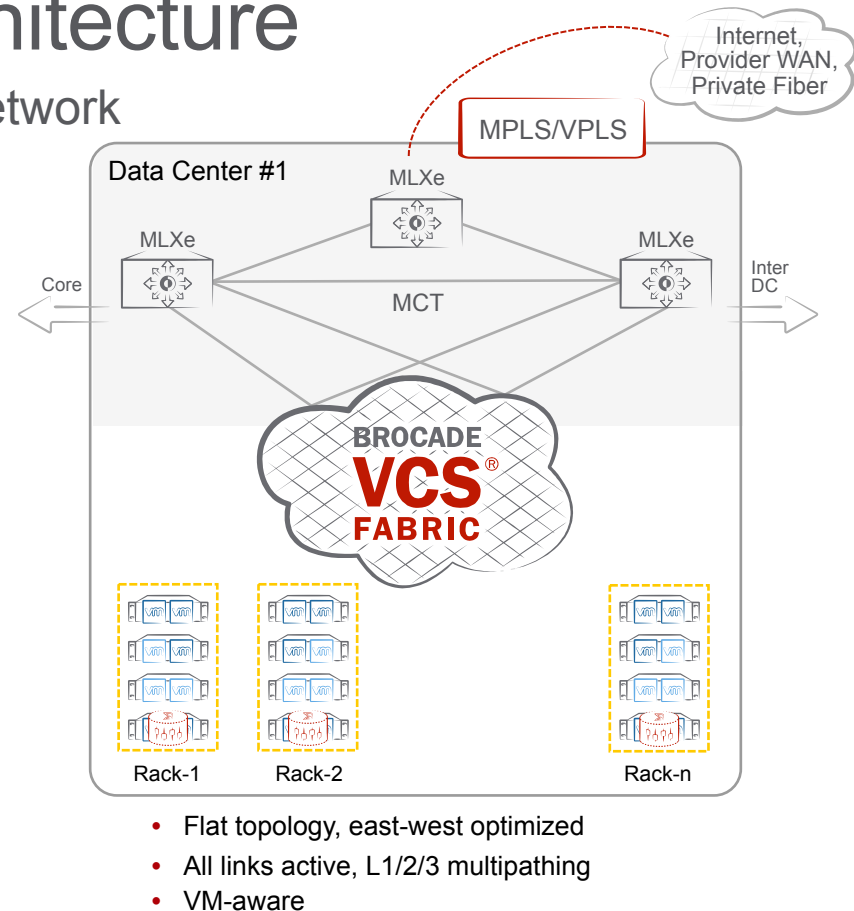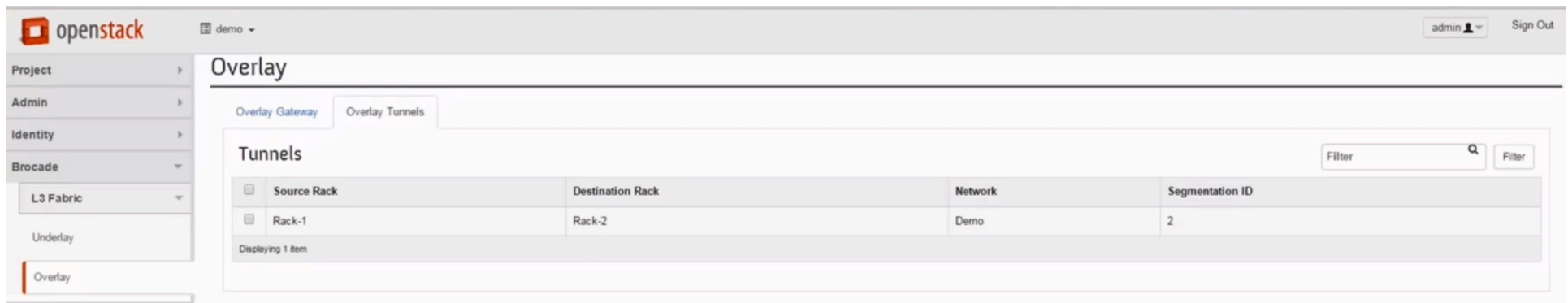
Intra-DC with Overlays

Use OpenStack to create tunnels
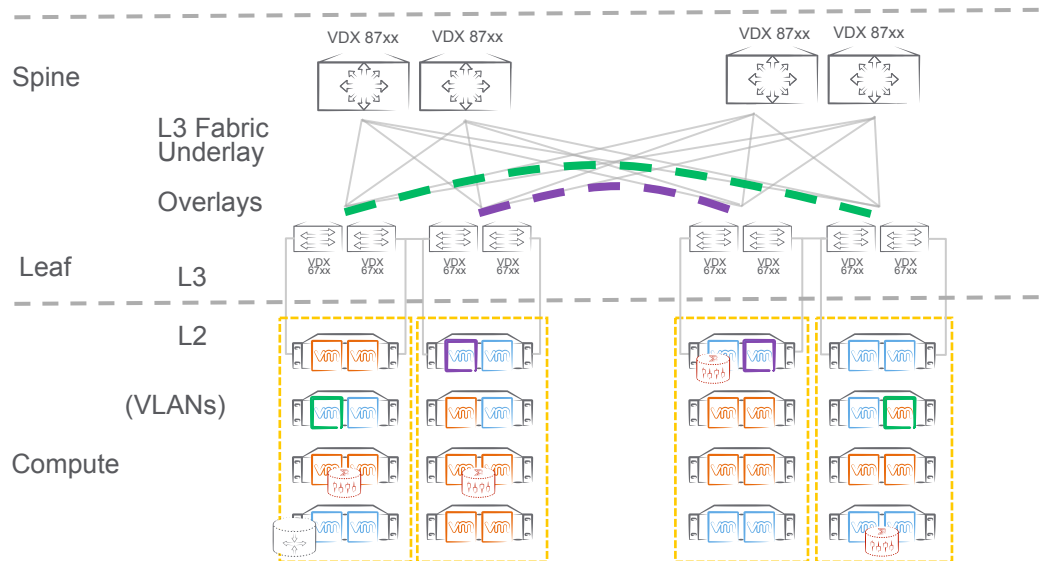
1. Create tunnels between leaf switches as needed

2. Create tenant VMs and VLANs

3. Map VLANs to VNIs

Intra-DC with Overlays (Demo May 2015)
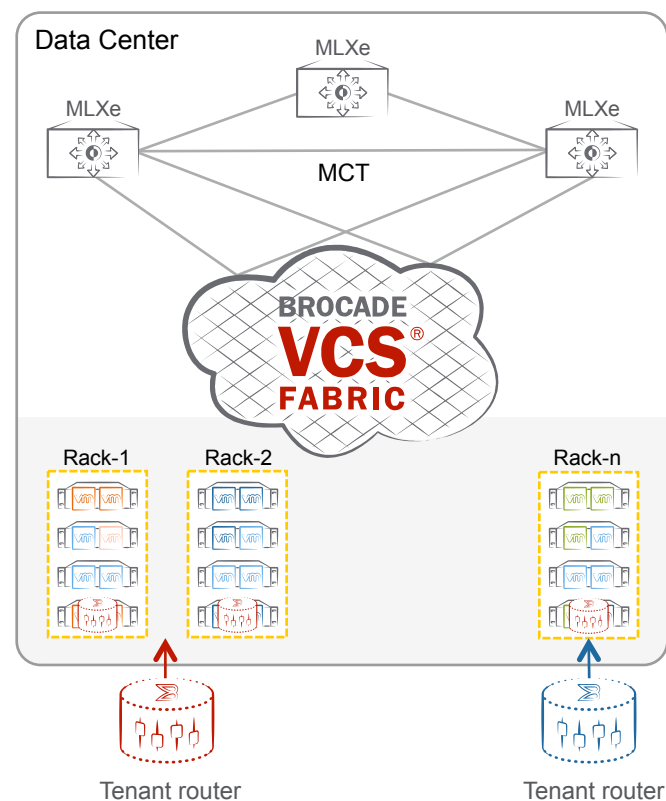
Inter Data Center Orchestration
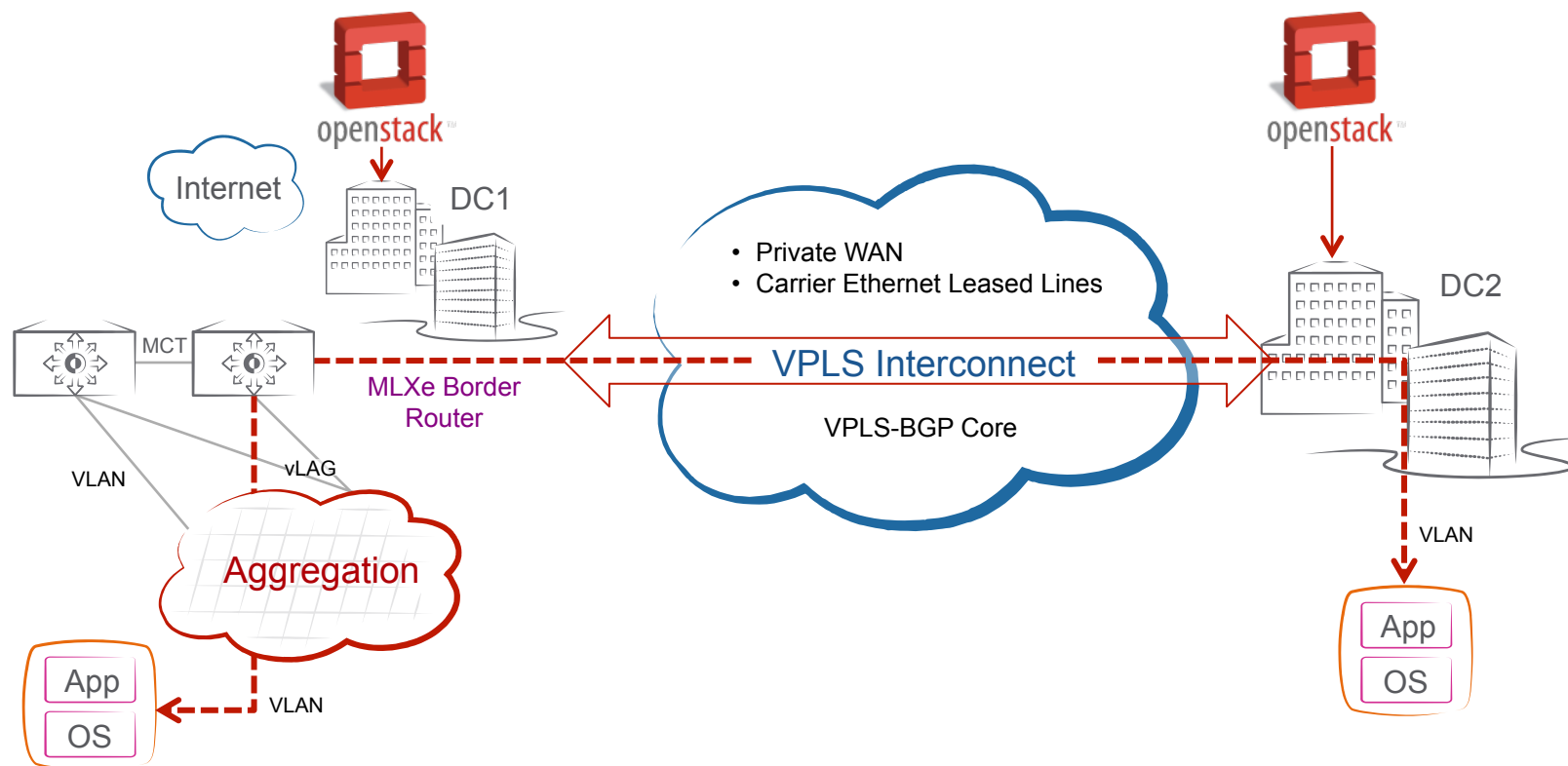
Vyatta vRouter

L3 Tenant router

vRouter
L3 Plugin

- External Gateway support for VMs
- Floating IP support for VMs
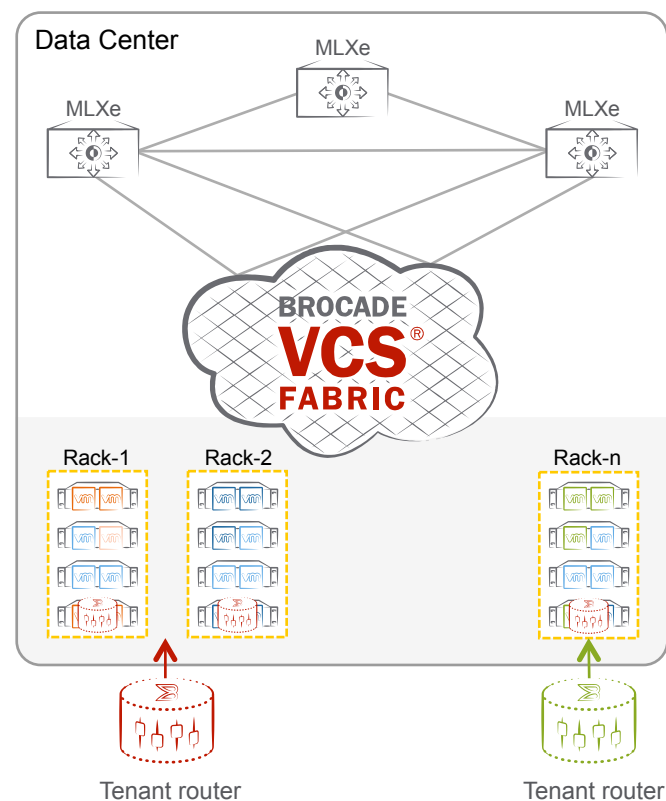- Automatic SNAT/DNAT rules using External Gateway

Vyatta FWaaS

Perimeter firewall

FWaaS Plugin

- Perimeter Firewall deployment—FW between private and public networks
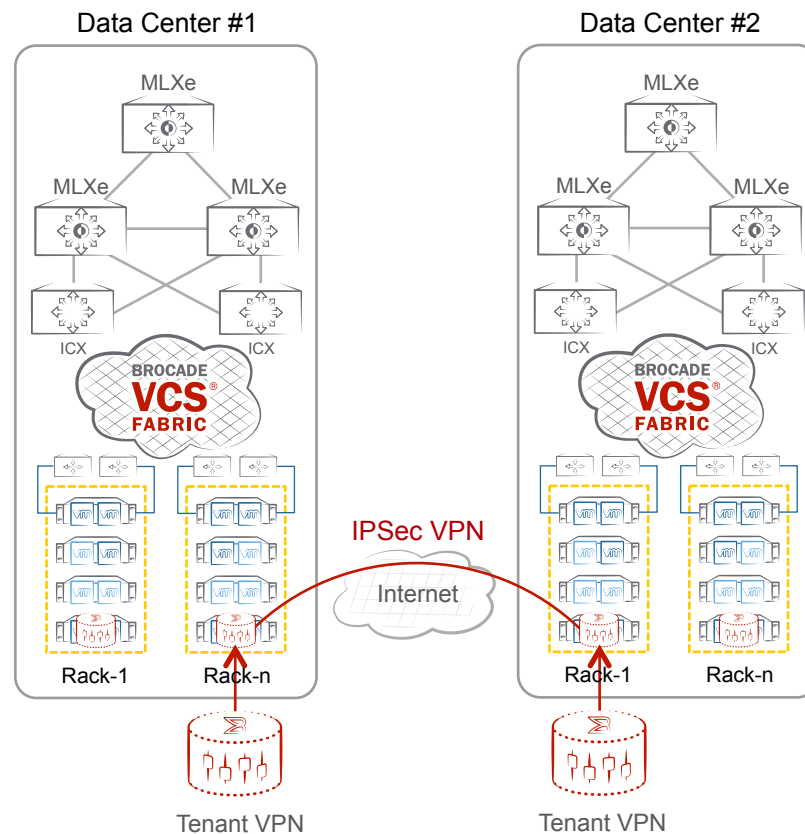- Deployment of Firewall rules

Data Center

MLXe
MLXe
MLXe

BROCADE VCS® FABRIC

Rack-1   Rack-2   Rack-n

Tenant router   Tenant router

Vyatta VPNaaS
IPSec VPN plugin—Kilo April 2015

VPNaaS Plugin

- Static IPsec VPN
- IKE and IPSec policies

Data Center #1

Data Center #2

MLXe

MLXe MLXe

ICX ICX

BROCADE
VCS®
FABRIC

MLXe

MLXe MLXe

ICX ICX

BROCADE
VCS®
FABRIC

Rack-1 Rack-n

Rack-1 Rack-n

IPSec VPN

Internet

Tenant VPN

Tenant VPN

VPNaaS Demo
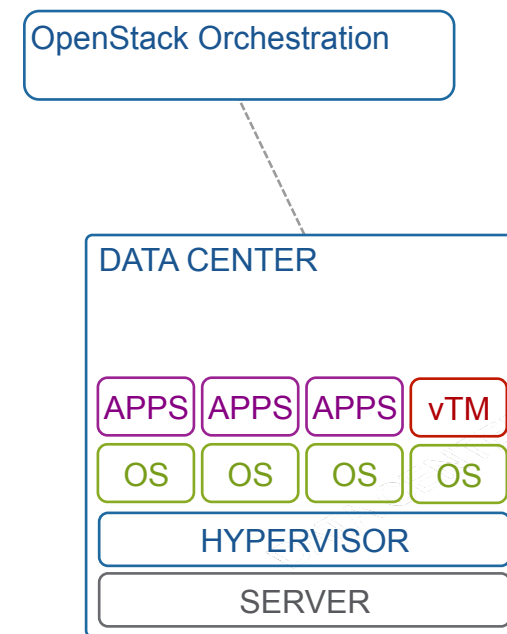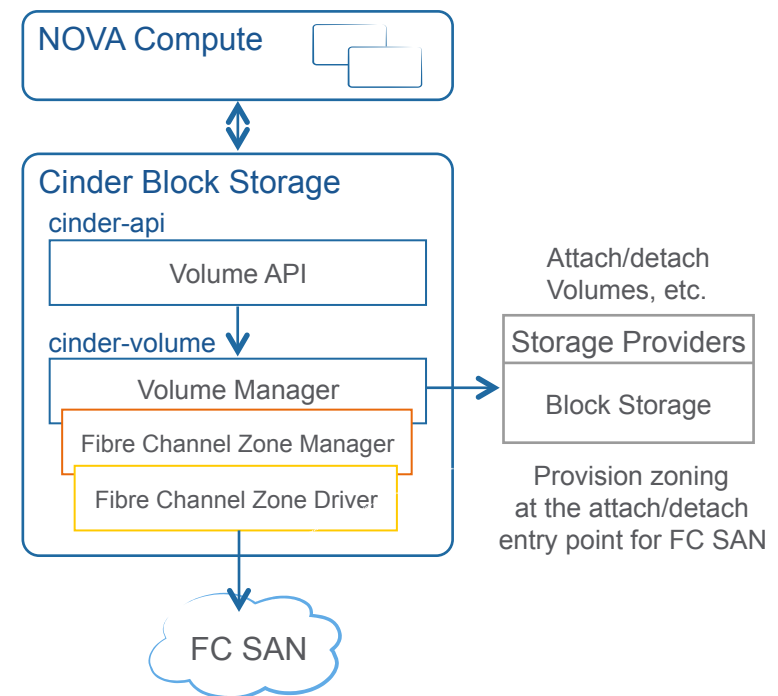
OpenStack LBaaS

Features supported

- Life Cycle Management (Create/Update/Delete) of:
  - Virtual Server
  - Virtual Server Port
  - Real Server
  - Real Server Port
  - Port Policy
  - Bind of virtual Server Port to Real Server Port
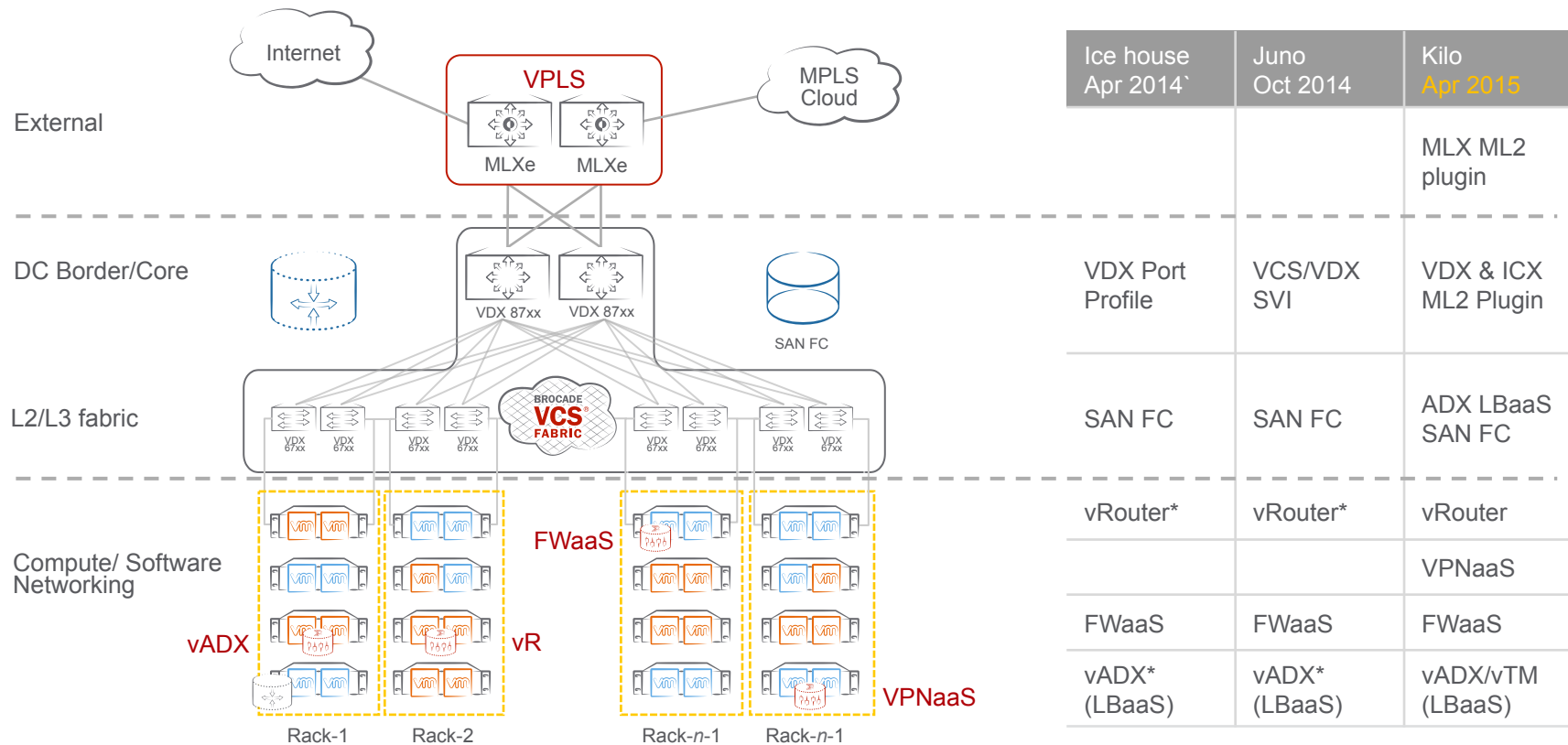 - Monitor of connection related parameters.

OpenStack Orchestration

DATA CENTER

| APPS | APPS | APPS | vTM |
| OS | OS | OS | OS |

HYPERVISOR

SERVER

Fiber Channel Storage Orchestration

FC SAN Zone/Access Control Manager

- Simplified active zone set management by automatically detecting the zone configuration and SAN context and applying the changes to currently active zone set without manual intervention
  - Add or Update a zone
  - Remove a zone
  - Read or Get a zone

- Introduce Fibre Channel Zone Manager for zone lifecycle management
  - Fibre Channel Zone Manager for zone lifecycle mgmt. when fabric zoning is enabled for FC volumes

- Fibre Channel Zone Driver interface to enable SAN providers to add support for pluggable implementations

NOVA Compute

Cinder Block Storage

cinder-api

Volume API

cinder-volume

Volume Manager

Fibre Channel Zone Manager

Fibre Channel Zone Driver

FC SAN

Attach/detach Volumes, etc.

Storage Providers

Block Storage

Provision zoning at the attach/detach entry point for FC SAN

Comprehensive Data Center and Inter DC Solution

	Ice house Apr 2014`	Juno Oct 2014	Kilo Apr 2015
			MLX ML2 plugin
	VDX Port Profile	VCS/VDX SVI	VDX & ICX ML2 Plugin
	SAN FC	SAN FC	ADX LBaaS SAN FC
	vRouter*	vRouter*	vRouter
			VPNaaS
	FWaaS	FWaaS	FWaaS
	vADX* (LBaaS)	vADX* (LBaaS)	vADX/vTM (LBaaS)

Thank you