

Journey to Software-Defined Cloud Networking

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Evolution of Server Configuration

1990's



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OR



Today



openstack™
CLOUD SOFTWARE

vmware®

Evolution of Network Configuration

1990s

```
Router> enable
Router# configure terminal
Router(config)# enable secret cisco
Router(config)# ip route 0.0.0.0 0.0.0.0 20.2.2.2
Router(config)# interface ethernet0
Router(config-if)# ip address 10.1.1.1 255.0.0.0
Router(config-if)# no shutdown
Router(config-if)# exit
Router(config)# interface serial0
Router(config-if)# ip address 20.2.2.2 255.0.0.0
Router(config-if)# no shutdown
Router(config-if)# exit
Router(config)# router rip
Router(config-router)# network 10.0.0.0
Router(config-router)# network 20.0.0.0
Router(config-router)# exit
Router(config)# exit
Router# copy running-config startup-config
Router# disable
Router>
```

2013

```
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```

The Scale has changed everything...

Networks are an order of magnitude larger; automation has lagged!

Pressure to deploy quickly has increased → Give me cloud!!



"You can't just keep adding people!"

Arista Networks: Did You Know?

As of March 2014...

Arista has approximately 2,500 end customers worldwide in over 50 countries, including:

Six of the largest cloud providers, such as **eBay, Facebook, Microsoft and Yahoo!**

Many of the world's largest financials, such as **Barclays, Citigroup, and Morgan Stanley**

A number of media and service providers, such as **AOL, Comcast, Equinix, ESPN, Netflix, and Rackspace**

Independent Market Research Analysts have Arista as **2nd largest switch vendor in 10Gb and above**

Shipped over **2 million 10GbE ports**

ARISTA



2016 Gartner MQ Data Center Networking

Magic Quadrant

Figure 1. Magic Quadrant for Data Center Networking



Source: Gartner (May 2016)

What is SDN?

Purist View

- a strict separation of control plane and data plane

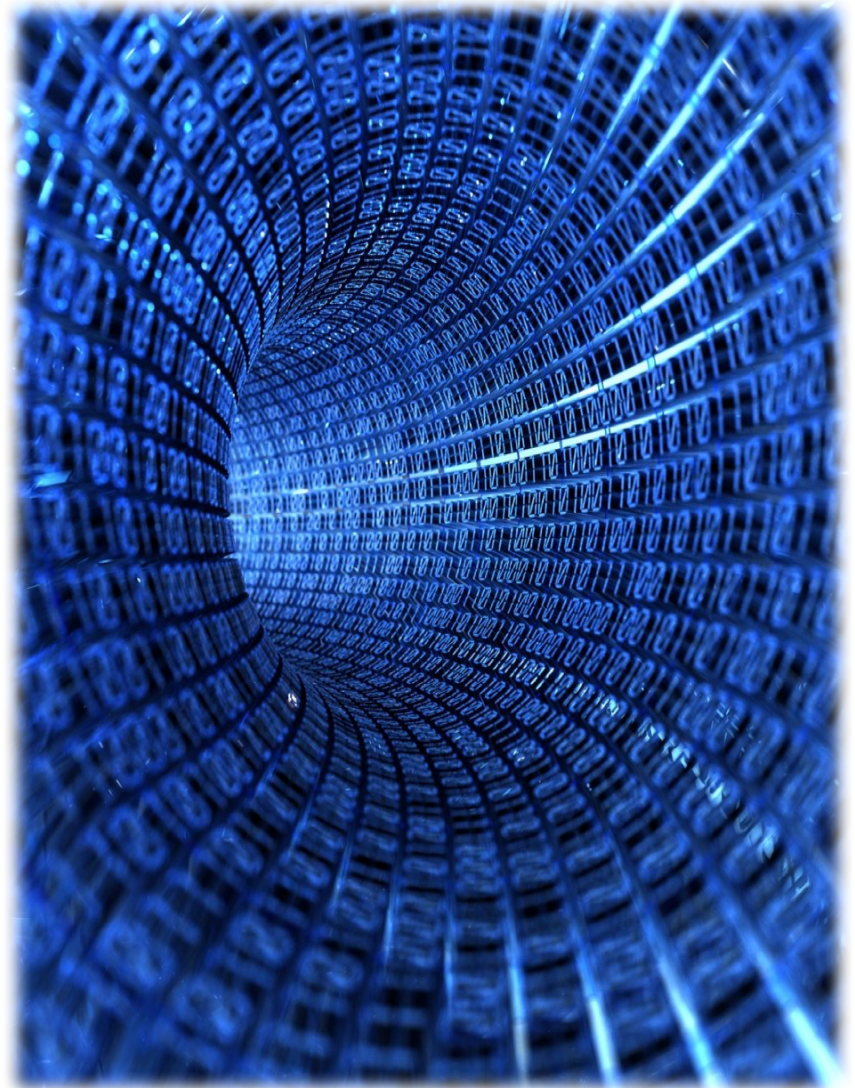
SDN = Openflow

Pragmatic View

- a network architecture designed to be programmed by high-level languages and APIs
- SDN = Programmability

A Common View

- SDN = Network Virtualization



How about “Cloud Networking”?

What does this mean?

- ❑ The end of silo's
- ❑ Data centers as Integrated Systems
- ❑ Network is just one component of the system
- ❑ In a modern Data Center all components must work together
 - Compute
 - Storage
 - Networking
 - Operating & Management Systems



The Cloud Titans Are leading the way

What are the benefits of the Cloud Computing model?

Business Agility

- ❑ The ability to deliver applications and services at speed and scale

Expectations for IT to deliver applications and services at speed and scale are greater than ever. We need to evolve past the limitations of outmoded, hardware-centric architecture to accelerate business.

How do we accomplish this?

Today's Data Centers require:

- ☐ Automation
- ☐ Self-service provisioning
- ☐ Simplified architectures
- ☐ Linear scaling of performance and data center economics
- ☐ Single point of management
- ☐ Integration
- ☐ Programmability
- ☐ Visibility

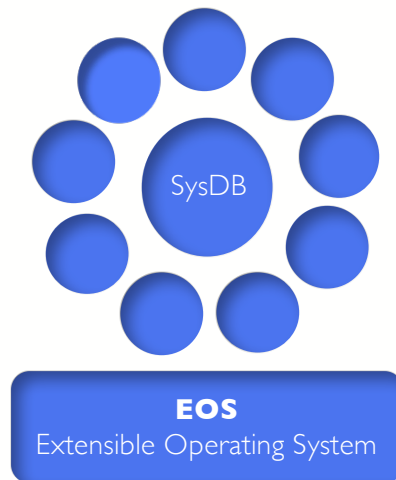
Who will benefit from this?

- ☐ Enterprise Customers embracing Public & Private cloud
- ☐ Service Providers

So, is all of this “SDN”?

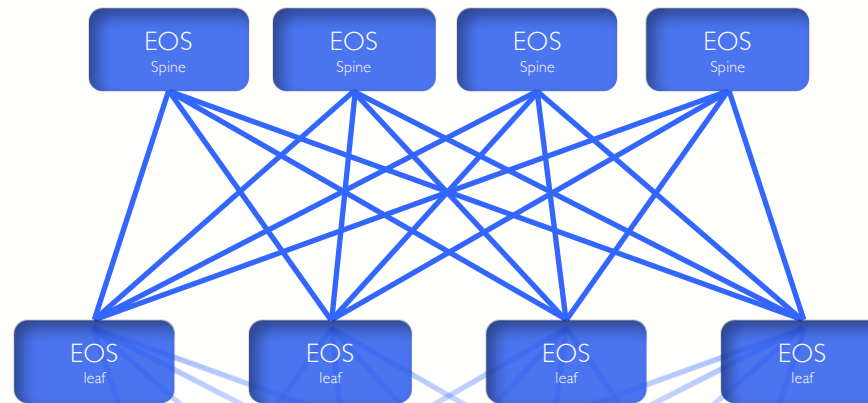
Arista's approach is a combination of SDN & Cloud Networking principles

Software **Driven** Cloud Networking



Arista EOS

+



Universal Cloud Network

Software Driven Cloud Networking (SDCN)

Arista SDCN combines the principles of cloud computing: (automation, self service provisioning and linear scaling) with trends in Software Defined Networking that deliver:

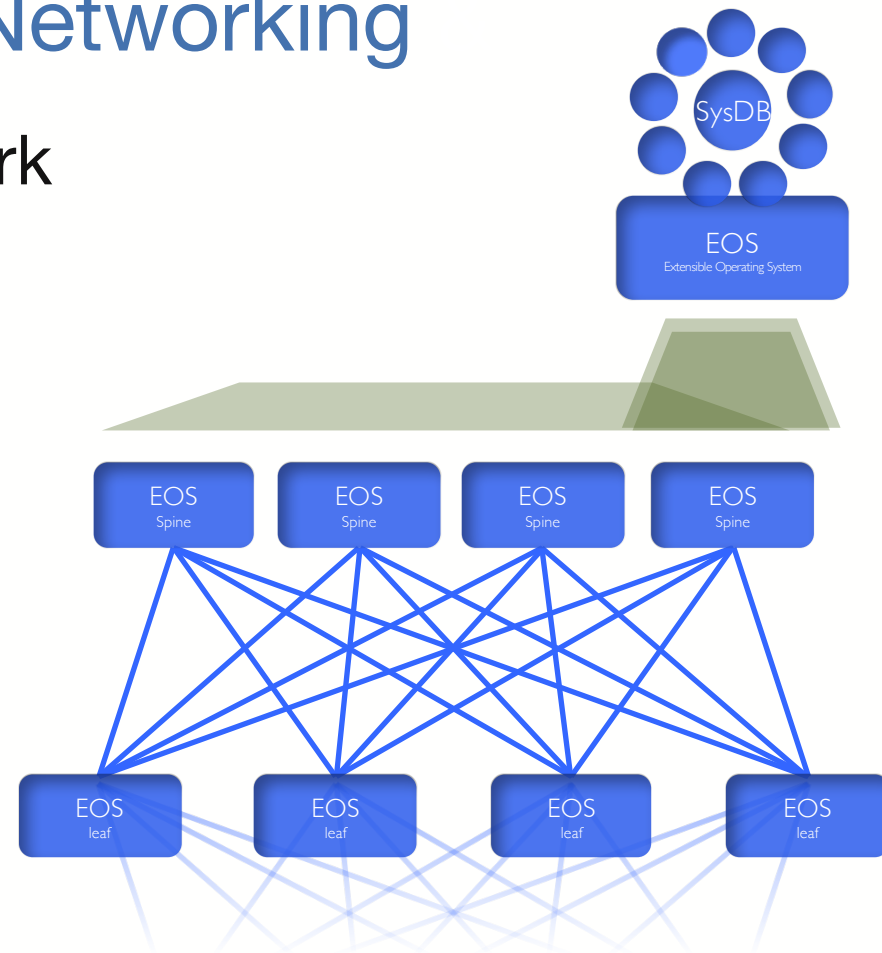
- ❑ network virtualization
- ❑ custom programmability
- ❑ simplified architectures
- ❑ more realistic price points

This combination creates a best-in-class software foundation for maximizing the value of the network to both the enterprise and service provider data center: a new architecture for the most mission-critical location within the IT infrastructure that simplifies management and provisioning, speeds up service delivery, lowers costs and creates opportunities for competitive differentiation, while putting control and visibility back in the hands of the network and systems administrators.

Software Driven Cloud Networking

The Universal Cloud Network

- Automated
- Self-service provisioning
- Simplified architectures
- Linear scaling
- Single point of management
- Integration
- Programmability
- Visibility

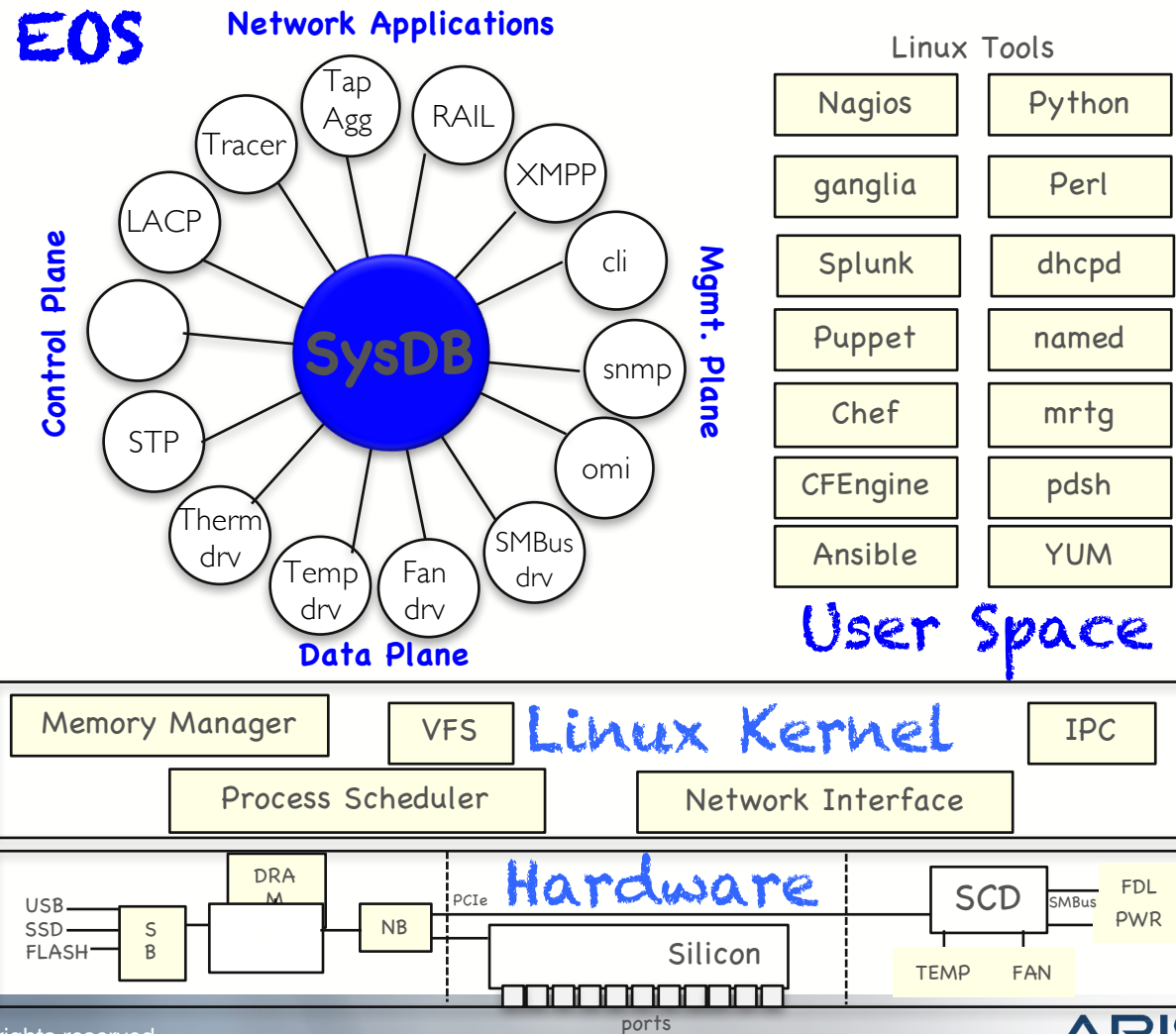




EOS : Extensible Operating System

EOS Architecture – Open

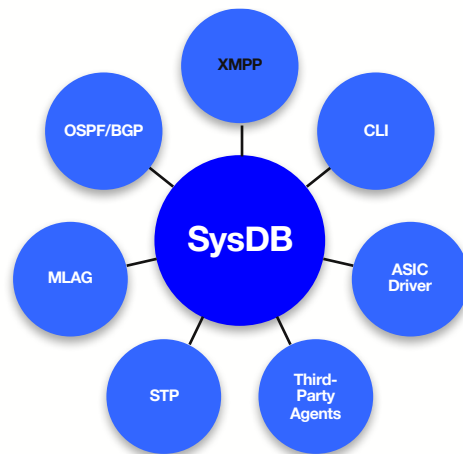
- Linux kernel
- Stateless Database
- Agents in user space
- No IPC
- Linux Tools
- Bash access
- Open API
- Merchant ASIC
- Nothing hidden



EOS Architecture – Resiliency

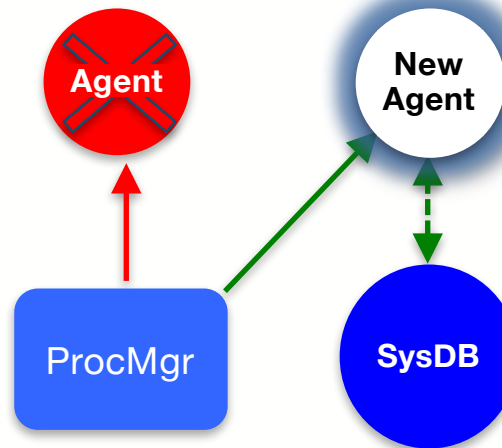
Proven Reliability

Modular



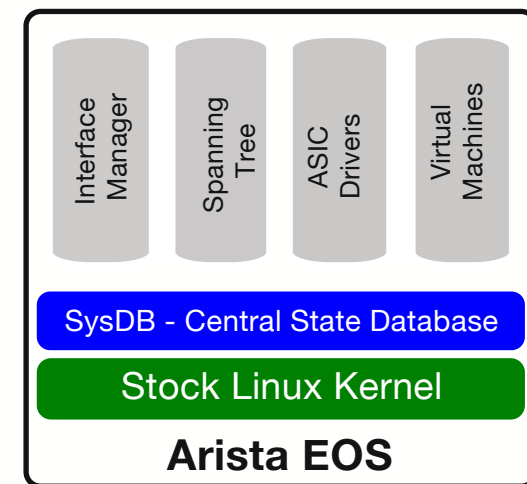
Stateless
Database

Resilient



Self
Healing

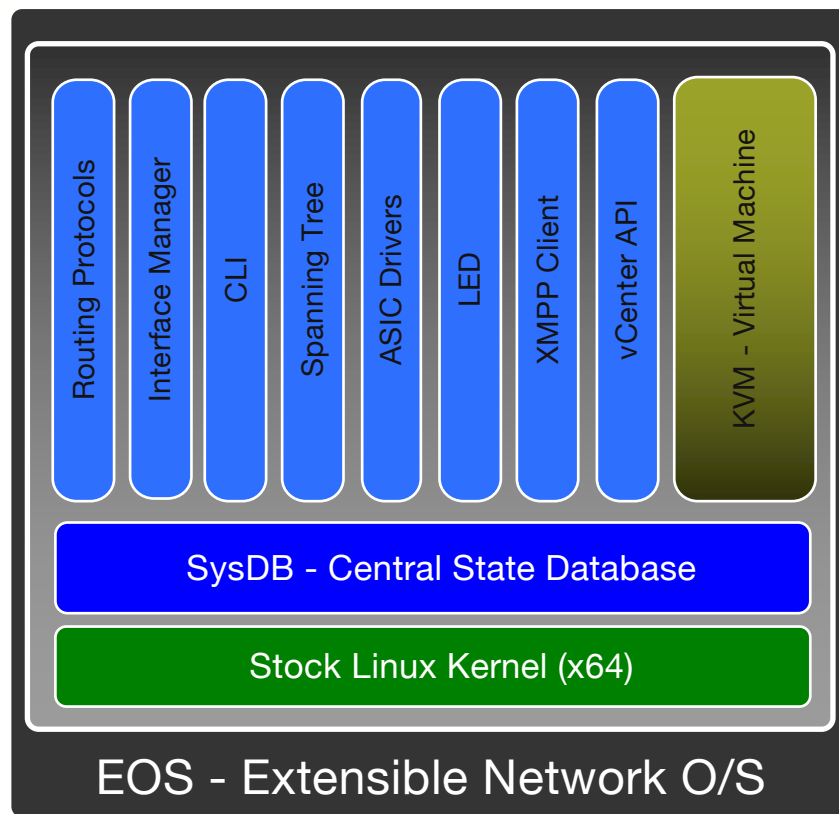
Programmable



Extensible Architecture

Feature Rich

Arista EOS – The Most Programmable Network OS



Partner Integration
- VMware, Palo Alto, F5, MS

Extensions
- Splunk, CloudVision, etc

Openflow 1.0/1.3 support
- multi-vendor services

Direct Flow Programming
- customized flow pathing

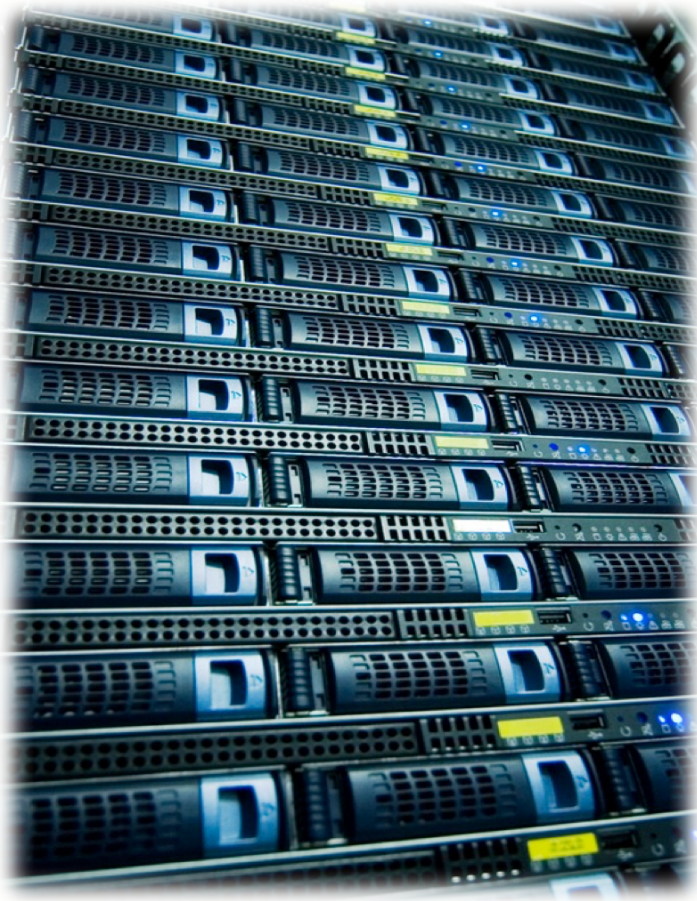
EOS eAPI
- JSON Web Services API

Scripting
- Python, TCL, Shell

Anything Linux
- KVM, C++, Shell Scripts, etc

Software Driven Cloud Networks

Open & Programmable – why does this matter?



Controller Agnostic – integrate with OpenStack, VMware vSphere and NSX

Orchestration – supports API connections to cloud and virtualization platforms to automate provisioning

Programmability – open and programmable network operating system (EOS)

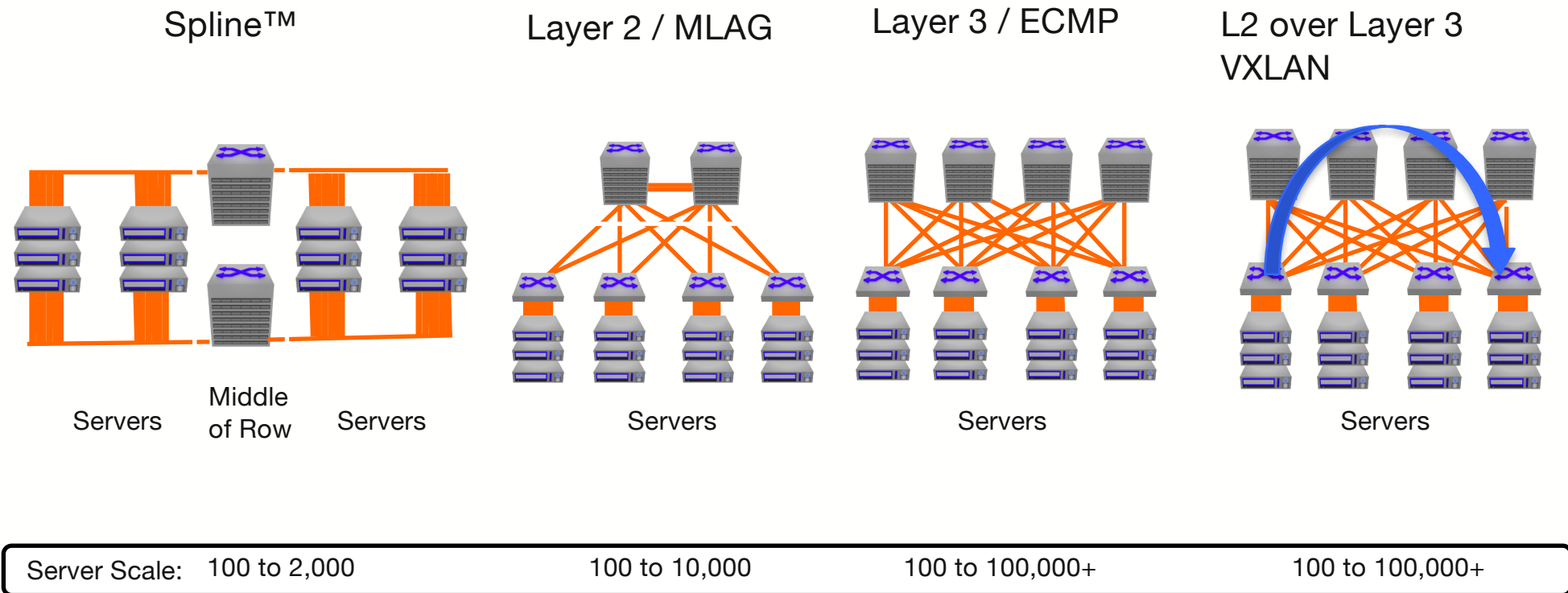
Network Virtualization – Open standards based overlays with VXLAN allows any workload to run anywhere

Traffic Engineering – broad set of controls and options for steering, shaping, redirecting and copying traffic



Simplified Architecture

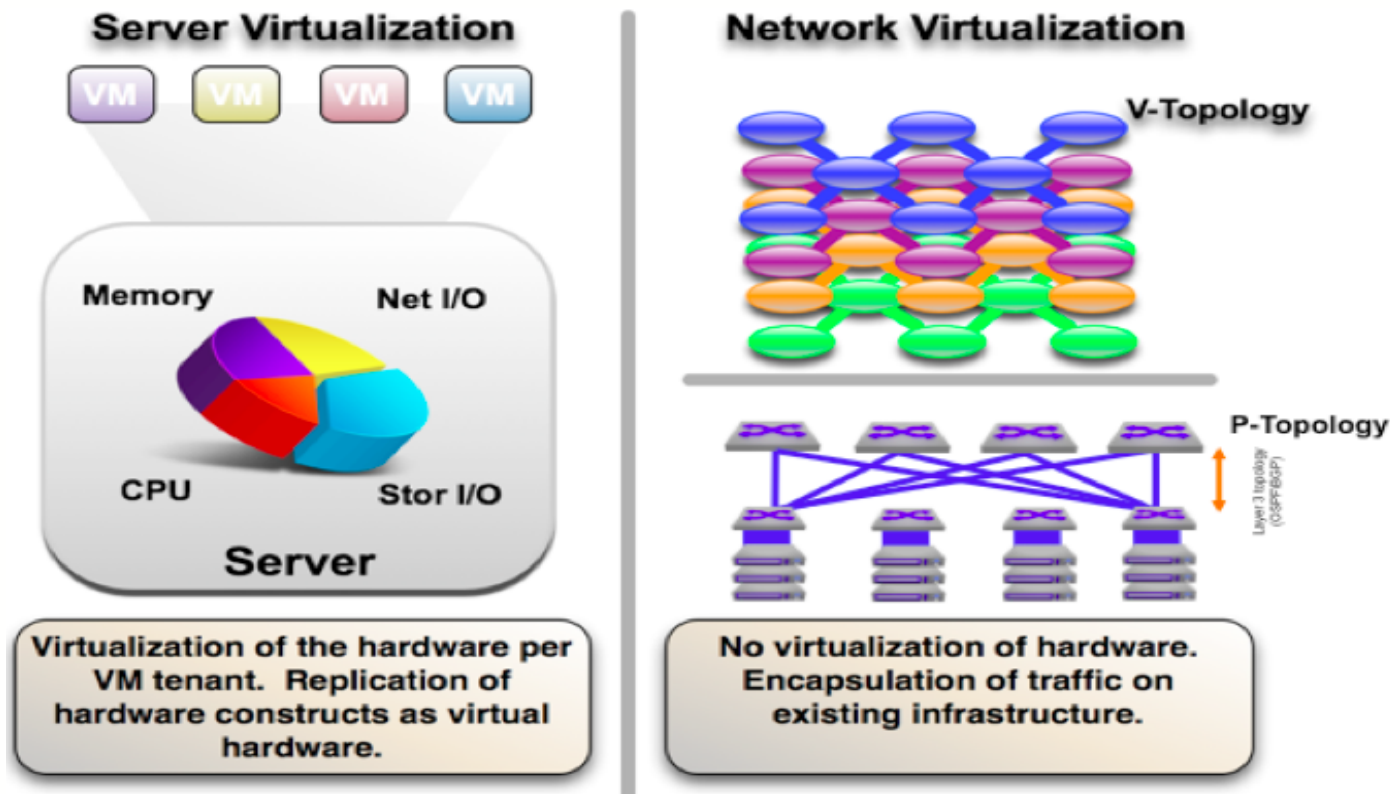
Cloud Networking: Scalability That Works



Network Virtualization

Network Virtualization

- Network virtualization is not the same as server virtualization



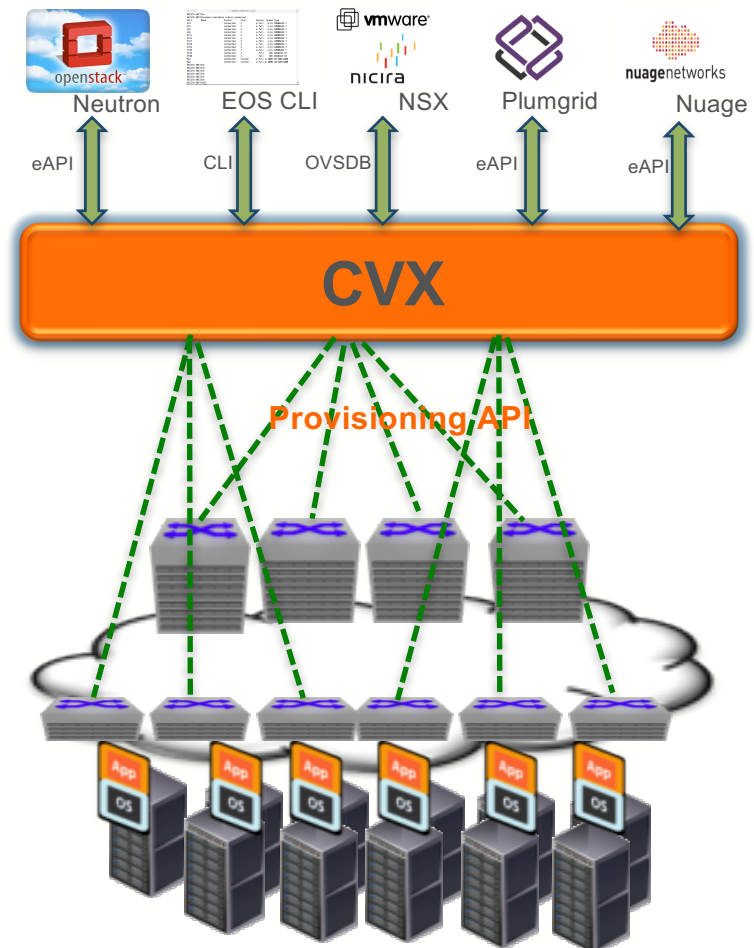
Network Virtualization – Types of Overlays

Three Models to choose from ...

- Network Based (with VXLAN capable Switches)
- Hypervisor Based (VMware NSX)
- Hybrid – Network / Hypervisor with Integration

Arista Networks: CVX(Cloud Vision Services)

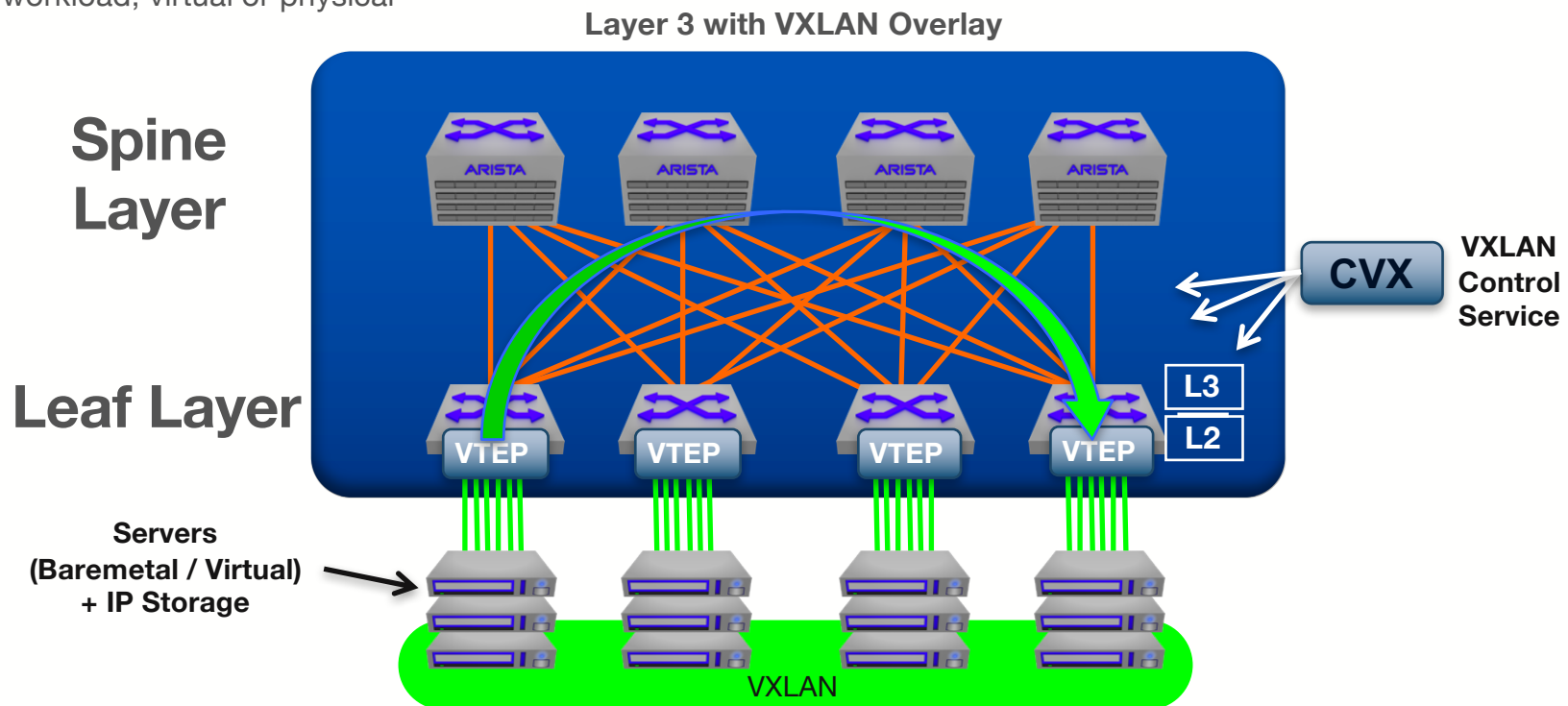
- Provides single point of network-wide visibility and management
- Serves as integration point into other controllers, orchestration systems, NMS
- Orchestrates network of physical switches running EOS
- Can be run as a standalone VM (vEOS) or directly on physical switches.



Network based Overlay Network

Native VXLAN support in hardware with VXLAN Control Service (VCS)

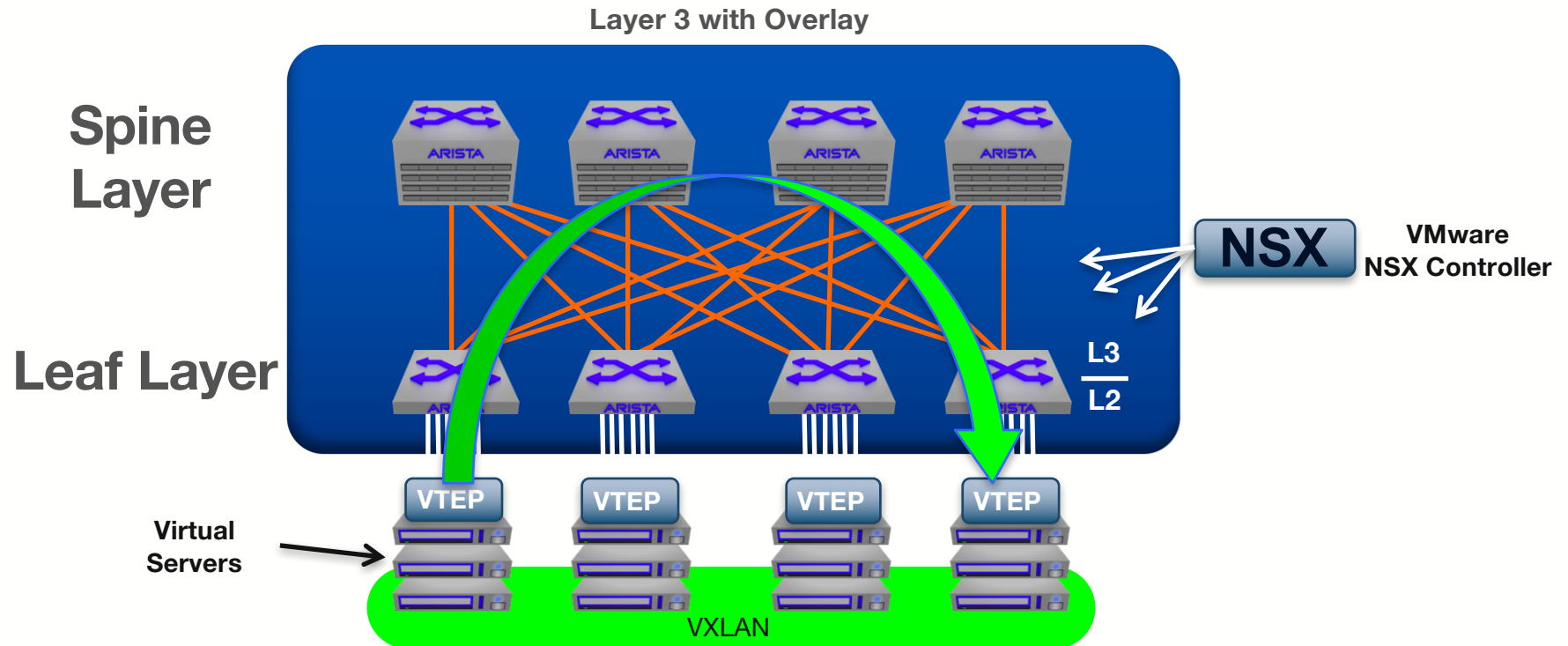
- VTEP's reside on physical switches
- VXLAN Control Service for Control Plane Learning
- Ability to extend L2 domains within and outside of the DC
- Benefits from the performance characteristics of the L3 underlay
- Any workload, virtual or physical



Hypervisor based Overlay Network

VXLAN (or other) Support at the hypervisor/vSwitch level

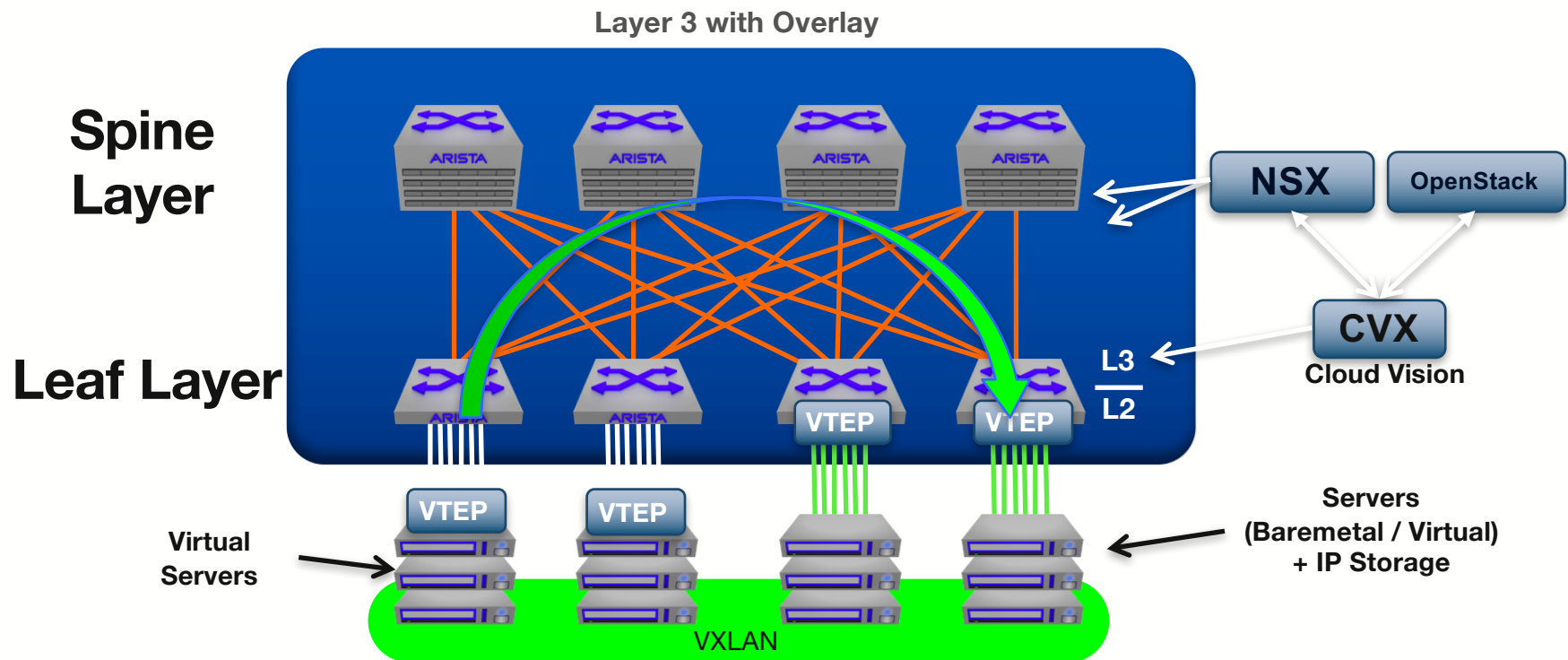
- VTEP's reside on hypervisors/vSwitch
- Controller (NSX or other) is used for configuration and control plane learning
- Extends L2 from Hypervisor to Hypervisor
- Benefits from the predictable performance characteristics of the L3 underlay



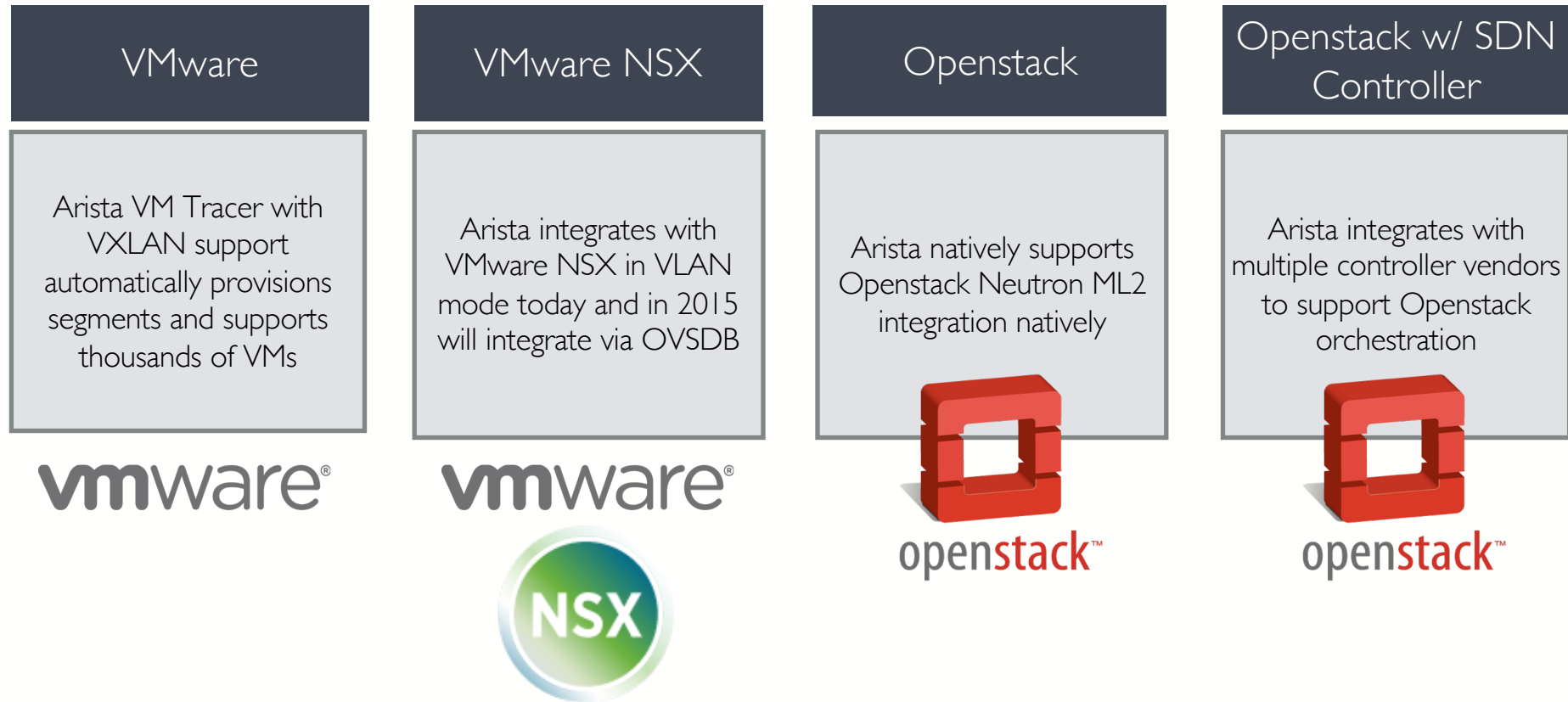
Hybrid Overlay Network

VXLAN Support

- VTEP's reside on Hypervisors and Network switches
- Supports both virtual and baremetal servers, + IP Storage
- Extends L2 over L3 Topology
- Tighter coupling through CVX integration with NSX / Openstack



Network Virtualization: Deployment Options



Open to all Controllers and Programming Models



OpenFlow
support with all
major controller
vendors



OpenStack
support with
contributions to
Neutron to
enable seamless
provisioning



Native VMware
integration into
vSphere, vCloud
and NSX - VXLAN
integration



Native API calls
being developed
with key partners.
Enables network
automation
through event
manager

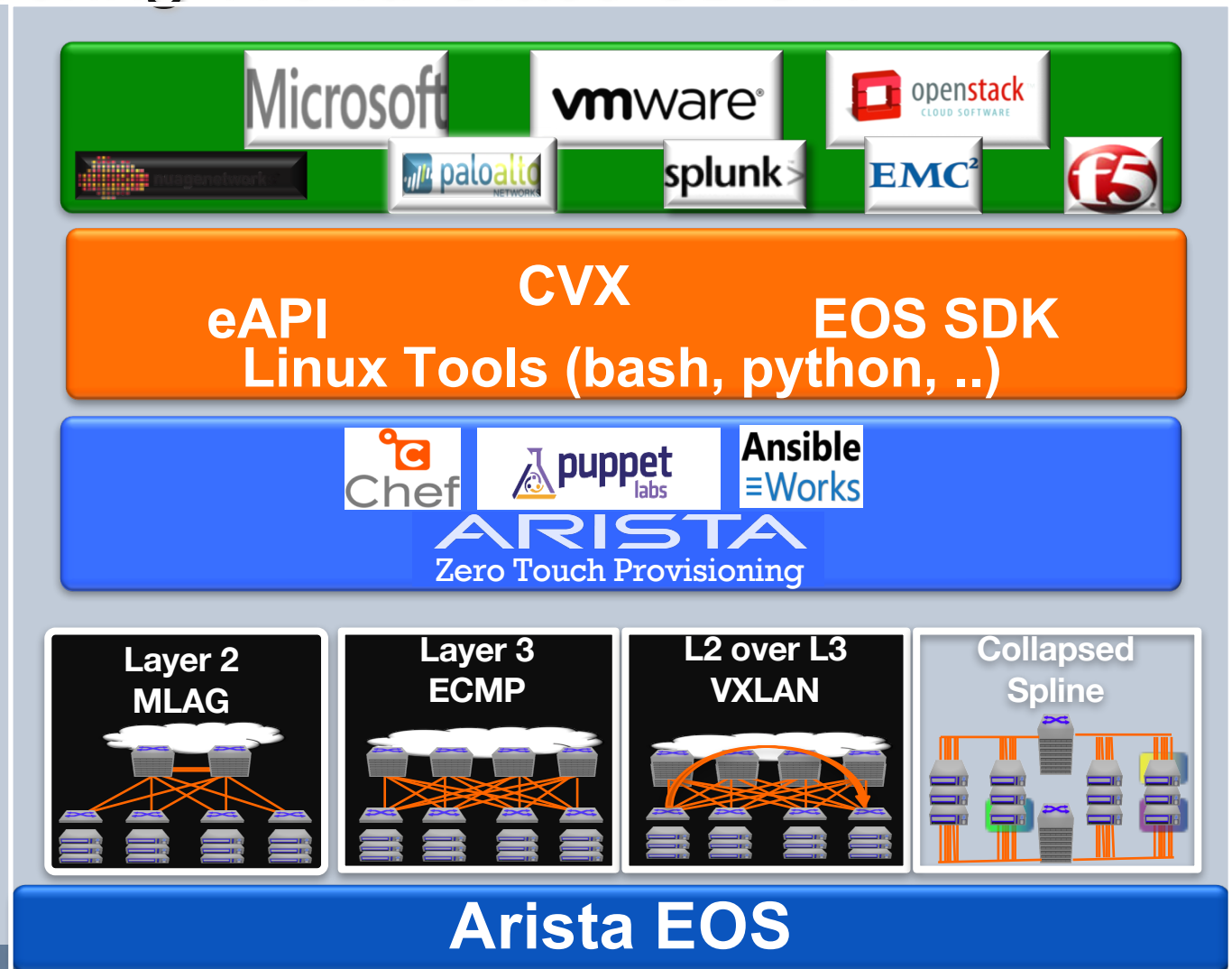
Summary – Delivering World Class SDCN

Integration

Extensibility

Operations
Deployment

Universal Cloud
Network





Thank You

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