



# Cisco Virtual Networking Services for OpenStack

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# Agenda

- OpenStack Traction
- Canonical Ubuntu OpenStack Overview
- Cisco Virtual Networking Solution for OpenStack
- Summary

# OpenStack - Considerable momentum within 3 years

## What is OpenStack?

- Open source cloud platform
- Support for all type of clouds
- Highly scalable & feature-rich
- Set of Inter-related projects

## How is the traction?

- >200 Participating companies
- >1000 Contributors
- >100 Countries
- >1mil Lines of Code

# Cisco Investments in OpenStack

## Compute



UCS

## Network



Nexus Plugins

## Architectures (CVD)

Big Data, Hadoop, Orchestration, Flexpod,  
Cloud infrastructure, UCS + Nexus on  
OpenStack



- Cisco UCS Nova Plugin
- Cisco Intercloud, Webex
- Cisco OpenStack Services

- Cisco ACI Neutron Plugin
- Cisco Nexus Neutron Plugin
- Cisco Nexus 1000V Integration

# Why Customers are moving to Canonical & Cisco OpenStack



# Ubiquity has spoken

Host and Guest OS

P  
U  
B  
L  
I  
C  
  
C  
L  
O  
U  
D

## Cloud Speed Innovation

Regular release cadence

+

Instagram, Snapchat, Uber, Netflix,  
Heroku, Twitpix, FourSquare....

## Preferred platform for Cloud Development

>70% of AWS guest images (1)

>65% of DigitalOcean guest images (2)

>60% of Azure Linux guests (3)



Joyent *hp*



H  
O  
S  
T

## 9/10 OpenStack clouds run on Ubuntu

The reference architecture used  
by leading companies worldwide

## Juju, powerful cross cloud orchestration



# Why Openstack?

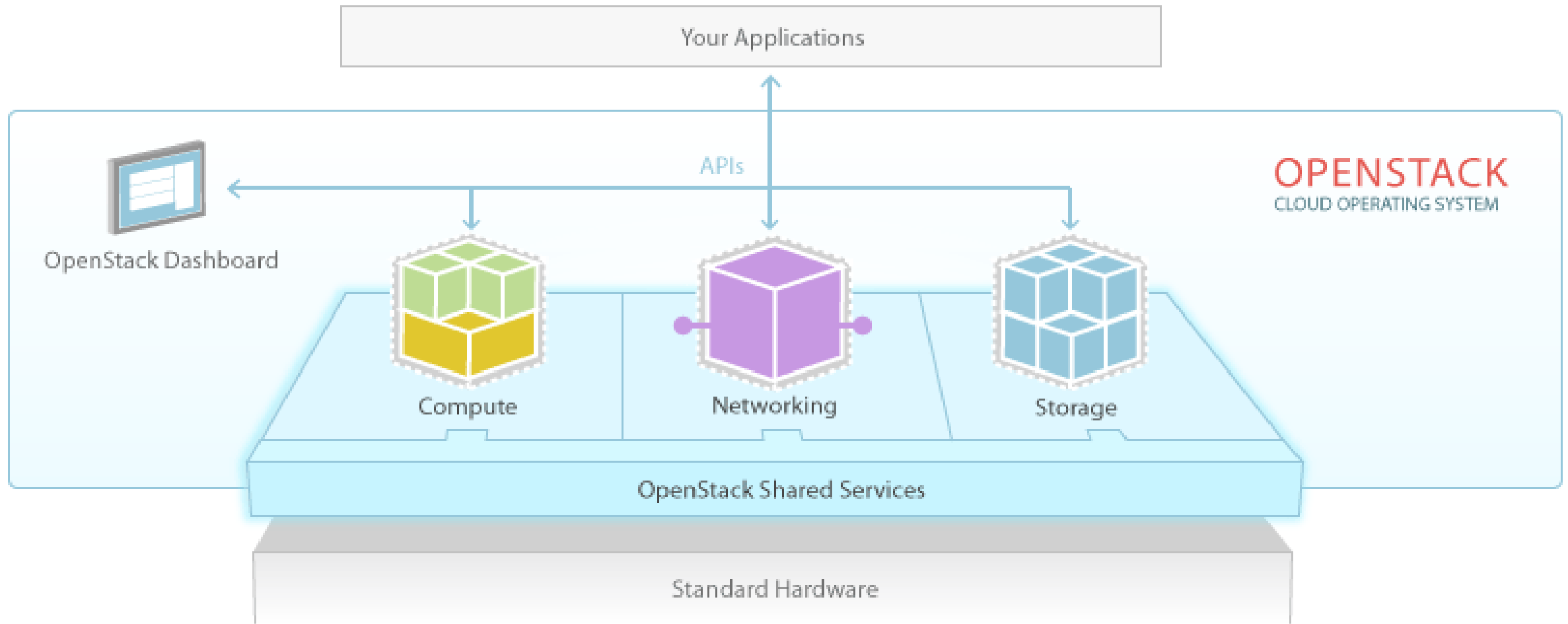
- **Control and Flexibility:** Open source platform means you're never locked to a proprietary vendor.
- **Innovation:** Leverage scale of Open Source community
- **Modular:** Integrate with various Cisco technologies.
- **Scalable:** OpenStack is already running in global corporations providing secure public and private cloud infrastructure.
- **Momentum:** Major Telcos, Service Providers, and Enterprises are moving to Openstack

*“It is in my best interest to let the community know... We're running a serious business on this technology, and this is what we have to do to remain competitive and flexible in this environment.” - Glen Ferguson Wells Fargo*

*“AT&T has to move faster to compete, and OpenStack is helping to do that because we can expand to include workloads like Network Function Virtualization in Openstack” - Toby Ford AT&T*







# Putting the Pieces together

1

## Network

Neutron  
Gateway  
Drivers  
API's

2

## Storage

Glance  
Cinder  
Swift  
Drivers  
API's

3

## Compute

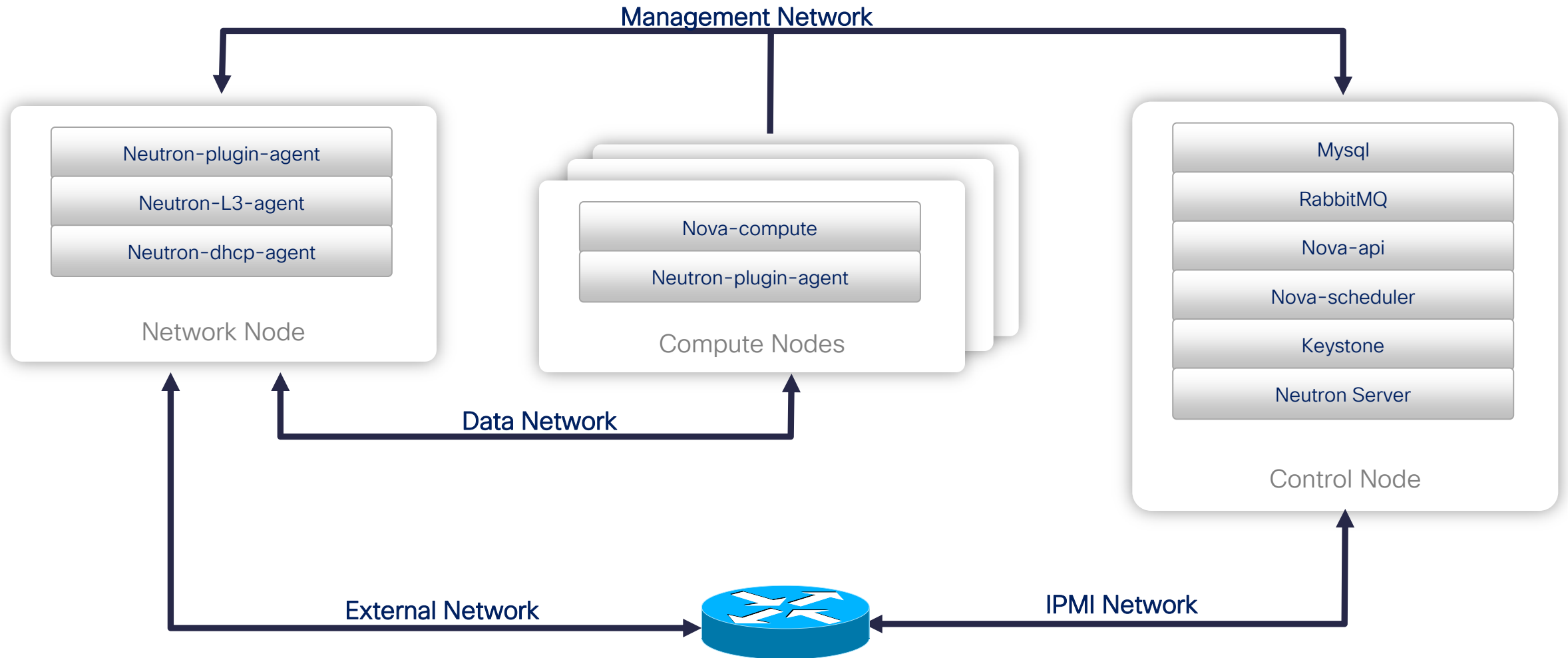
Nova Controller  
Nova Compute  
API'S



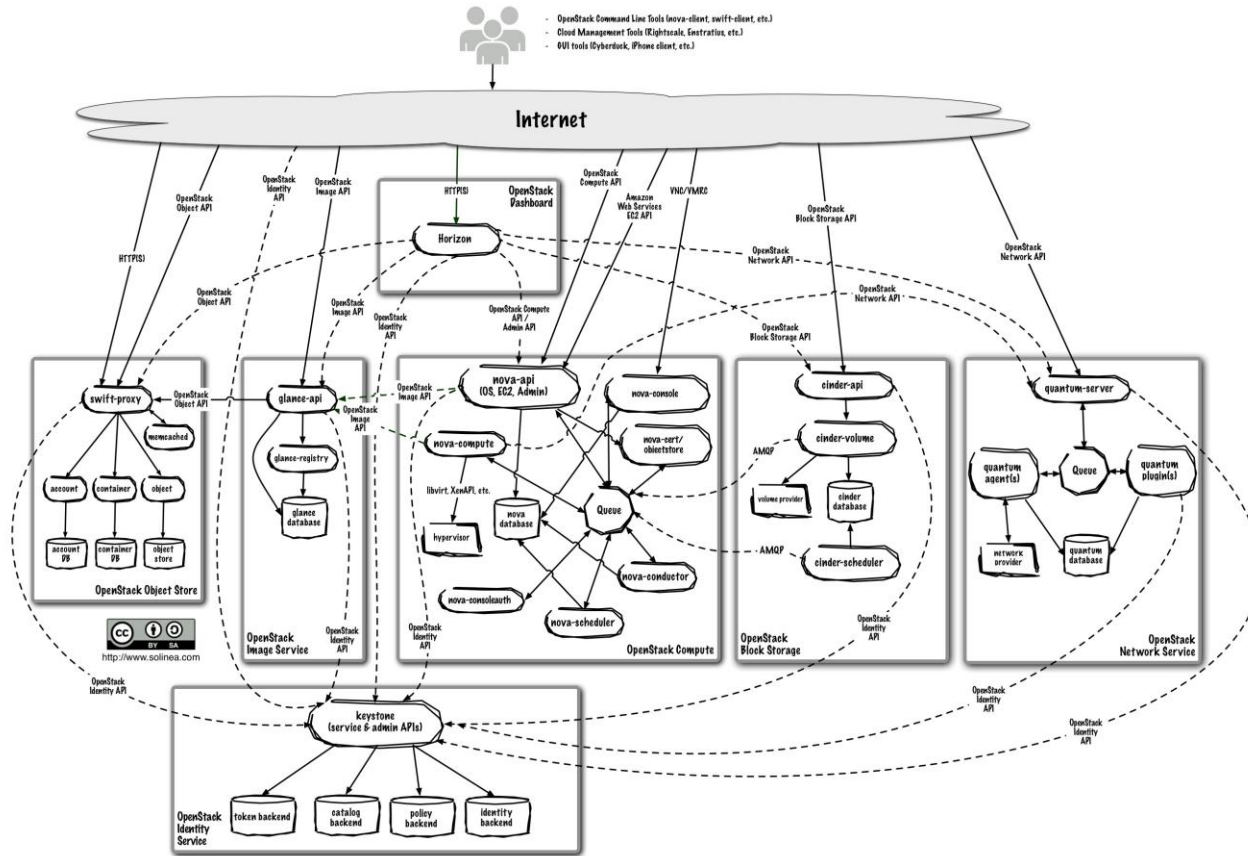
CANONICAL



# A simple OpenStack Deployment



# The OpenStack Challenge



80% of all Openstack Installation fail due to DIY Implementation and Integration Issues

# Complexities faced in DIY Openstack Deployments

- Configuring and running a set of processes in one or more machines.
- Interconnecting the processes that compose the system.
- Setting up physical or virtual machines, provision the operating system.
- Installing the applications and the necessary dependencies.
- Configuring servers, databases, and inter communications
- Dealing with processes including addresses and credentials and authentication
- Life Cycle Management with upgrades, configuration changes
- Integration of new services and high availability



**UBUNTU  
CISCO  
INTEGRATED  
OPENSTACK**  
All you need to  
deploy a production  
OpenStack cloud

Workloads & Apps

**OPENSTACK**

Virtualisation  
(KVM, Xen, ESX etc)

**UBUNTU  
CLOUD  
ORCHESTRATION  
ENGINE**  
  
Juju  
MAAS

CISCO  
Nexus  
1000

# Ubuntu and Cisco Integrated Openstack

1

IaaS

Openstack

Cinder  
Nova  
Neutron  
Horizon  
Glance

2

Storage

Block/Object  
Software  
Defined  
Storage

3

Network

Nexus 1000  
ACI  
VxLan

4

PaaS

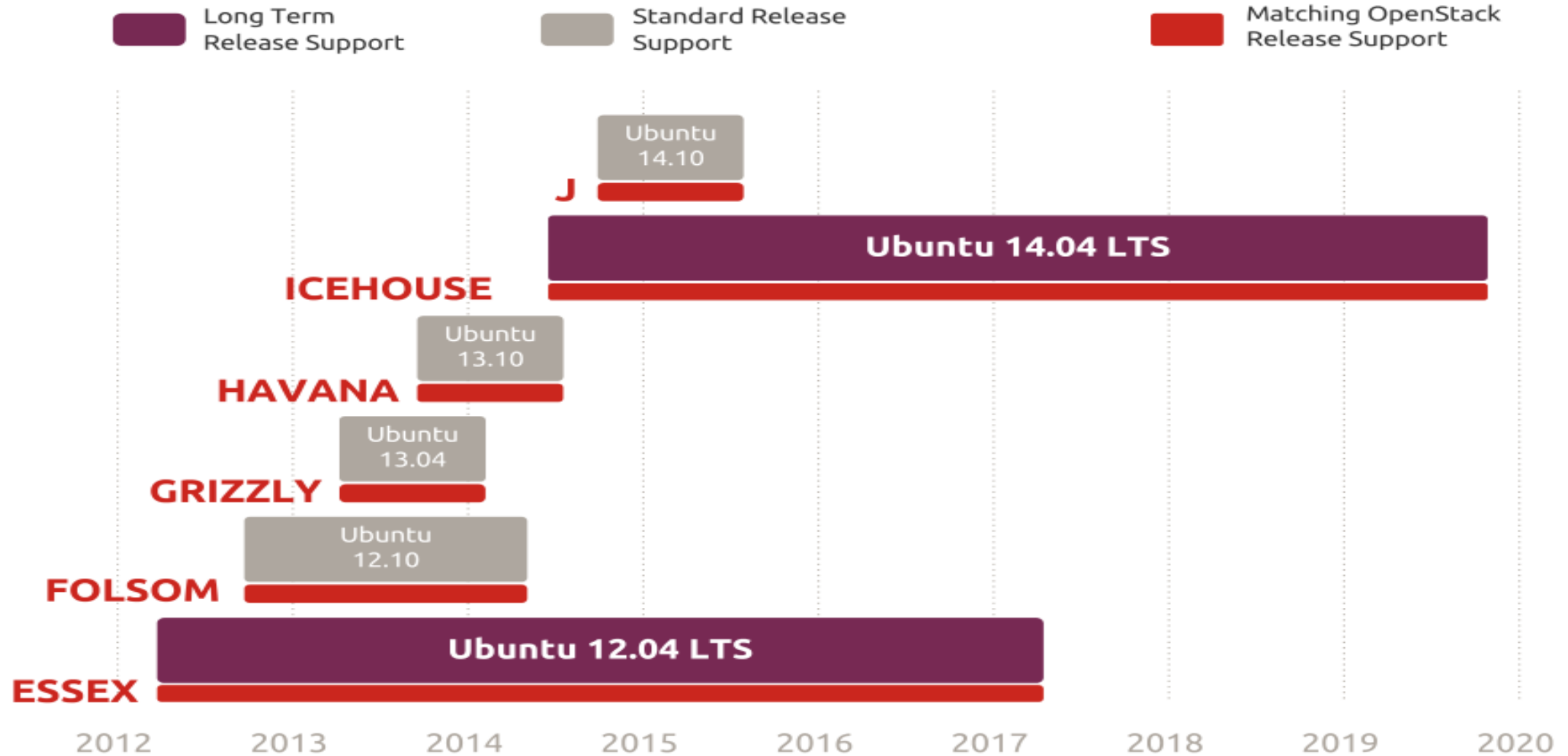
Hadoop  
Heroku  
Cassandra  
Couchbase  
Mongodb



Fully Integrated Cisco-Ubuntu Openstack



# OpenStack matches Ubuntu cadence





# Juju: Demystifies Openstack Deployments



- 1** Deploy and manage OpenStack
- 2** Deploy, Define and Scale workloads into OpenStack
- 3** Powerful service orchestration
- 4** Rich web based GUI
- 5** Speed

# MAAS



- 1 Automated bare-metal provisioning
- 2 Dynamic re-purposing of hardware
- 3 Intelligently match hardware to workload for **better efficiency**
- 4 Web based interface

# Cisco Virtual Networking for OpenStack – Nexus 1000V Charm



- 1 Easy Deployment ~ Charm for Nexus 1000V
- 2 Integration into Ubuntu Openstack
- 3 Dynamic service scaling based on workload requirements

Search for Charms



Featured (3)

mediawiki:single  
Deployed 62 times  
2 services | 2 units  
precise | Recommended

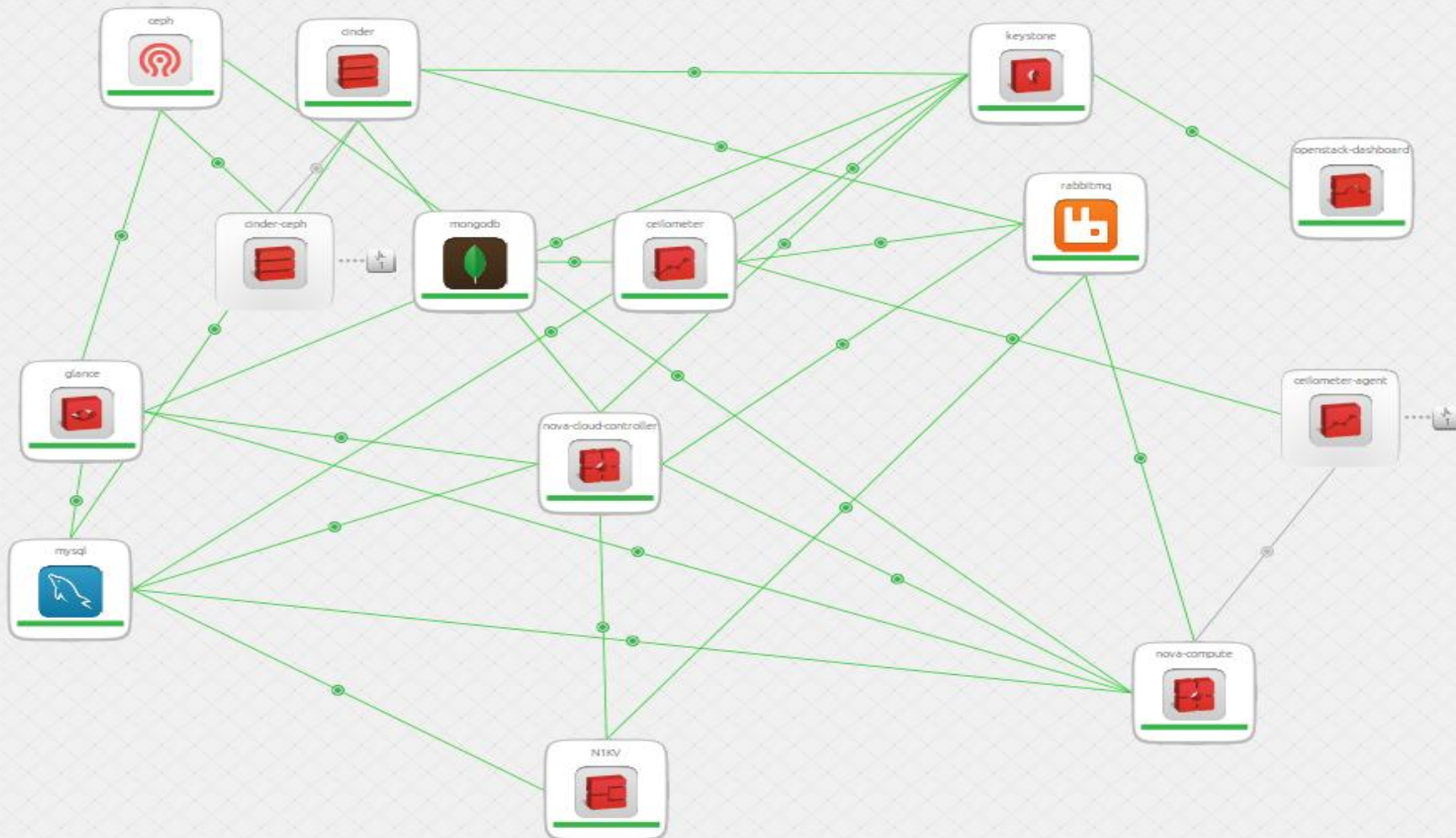
mongodb:clus...  
Deployed 13 times  
5 services | 13 units  
precise | Recommended

hadoop:cluster  
Deployed 21 times  
4 services | 7 units  
precise | Recommended

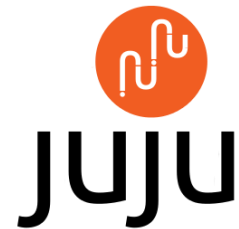
Popular (10) ~

mysql  
Deployed 22366 times  
precise | Recommended

wordpress  
Deployed 11833 times  
precise | Recommended



# Ubuntu – Cisco OpenStack Deployment demo Using

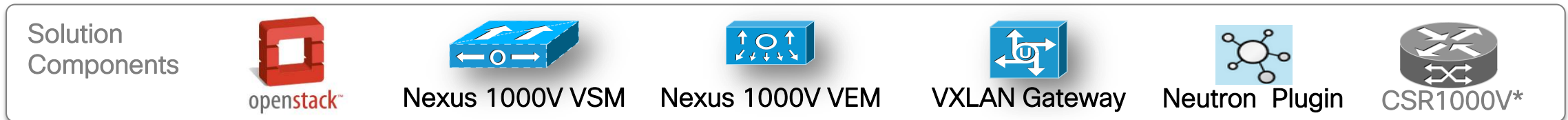
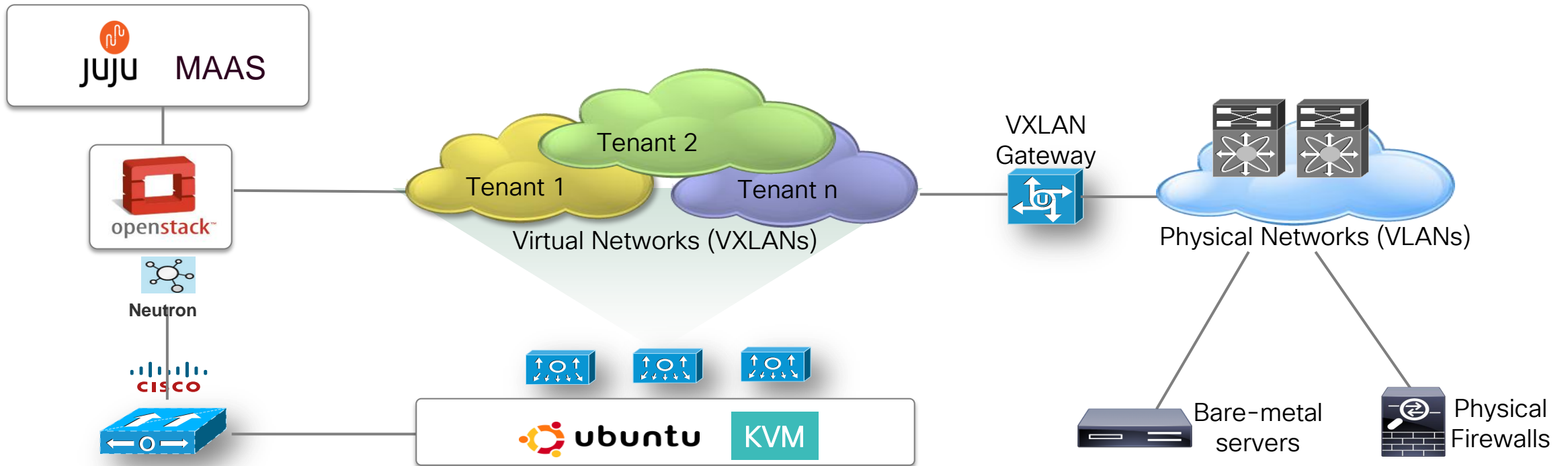


# Virtual networking challenges in OpenStack

- reliable networking
- scalable, multi-tenant support
- strong network services eco-system
- Network operations & troubleshooting

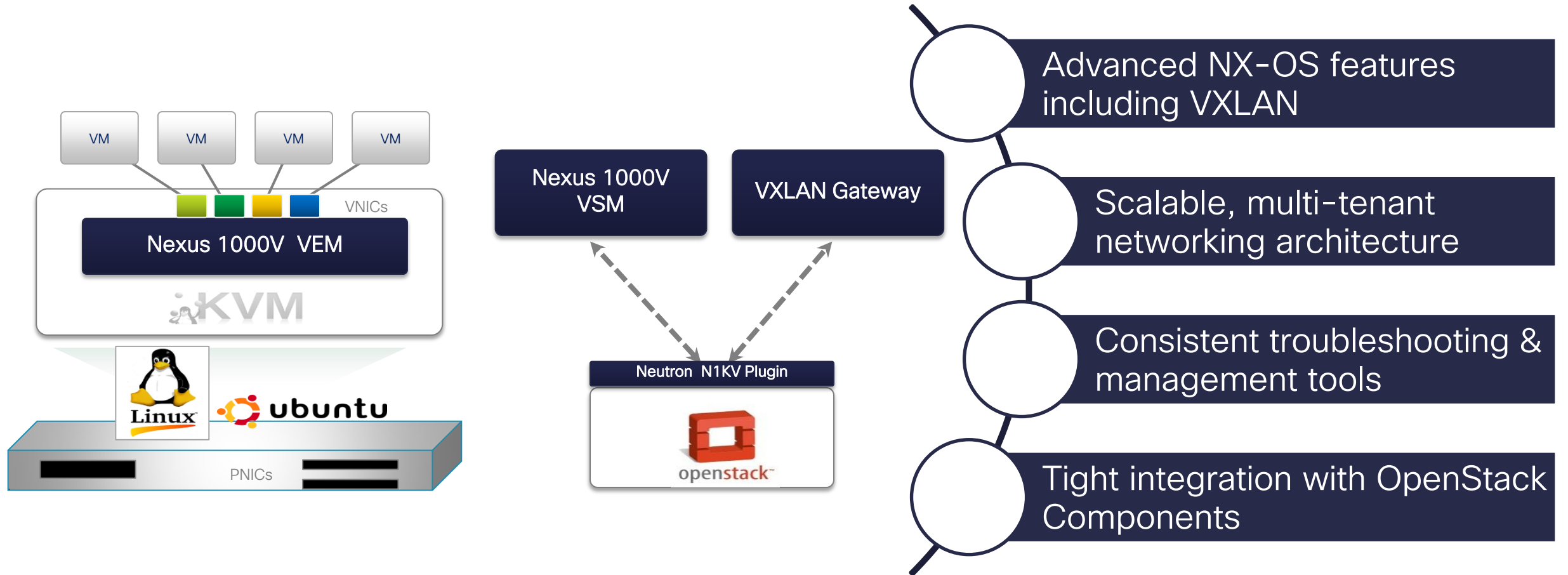
# Cisco Virtual Networking Solution Overview

# Cisco Virtual Networking Solution for OpenStack



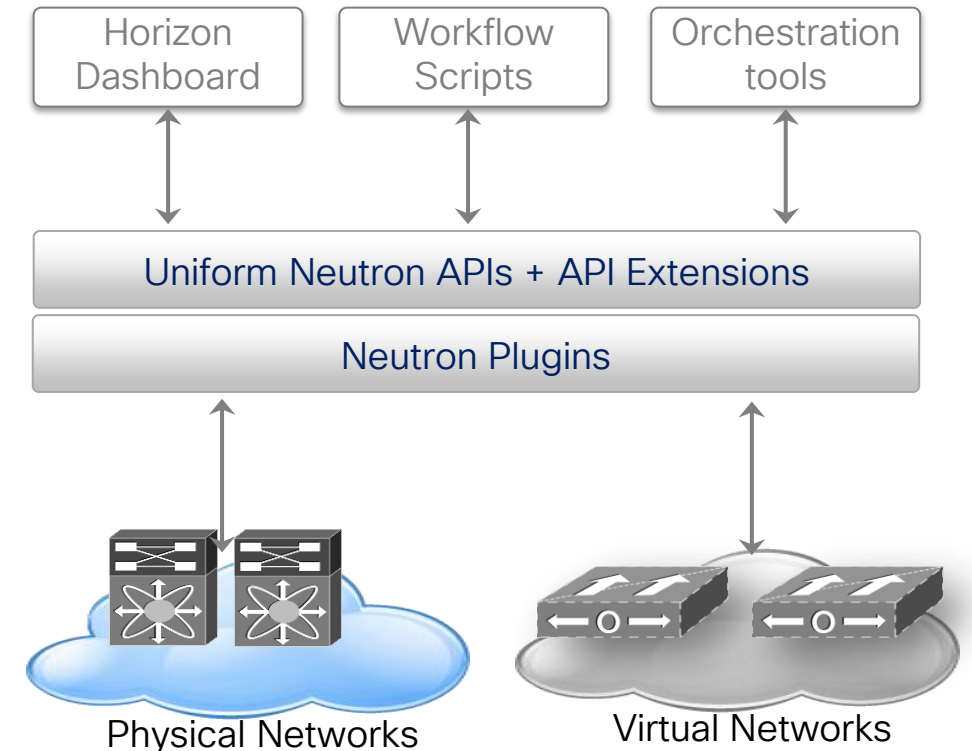


# Award Winning Virtual Networking Platform to OpenStack Solution



# OpenStack Neutron Service

- Framework for managing networks in OpenStack
- Uniform north-bound API
- Extensible through plugin infra
- Two types of API extensions
  - Resource extensions
  - Attribute extensions



# OpenStack Neutron Core Resources

## Network

- Isolated L2 network
- Can be backed by either a VLAN or a VXLAN

## Subnet

- IP-address range to be allocated for a set of VMs or physical hosts

## Port

- A connection point for attaching a single device, such as the NIC of a virtual server, to a virtual network

- CRUD Operations are supported for each of the above objects.
- These CRUD operations can be invoked either through CLI or Horizon Dashboard.
- Cisco specific resource extensions:
  - network-profile & policy-profile
- Cisco specific attribute extensions:
  - profile-id (for network & port objects)

# Network Profiles & Policy Profiles

- Network Profile: logical collection of network segments
  - 3 types of network profiles: VLAN, VXLAN & Trunk profiles
  - Tenants can use network profiles to create new networks

- Policy profiles: port-profiles created on VSM to capture policy information
  - Propagated to OpenStack through the neutron plugin

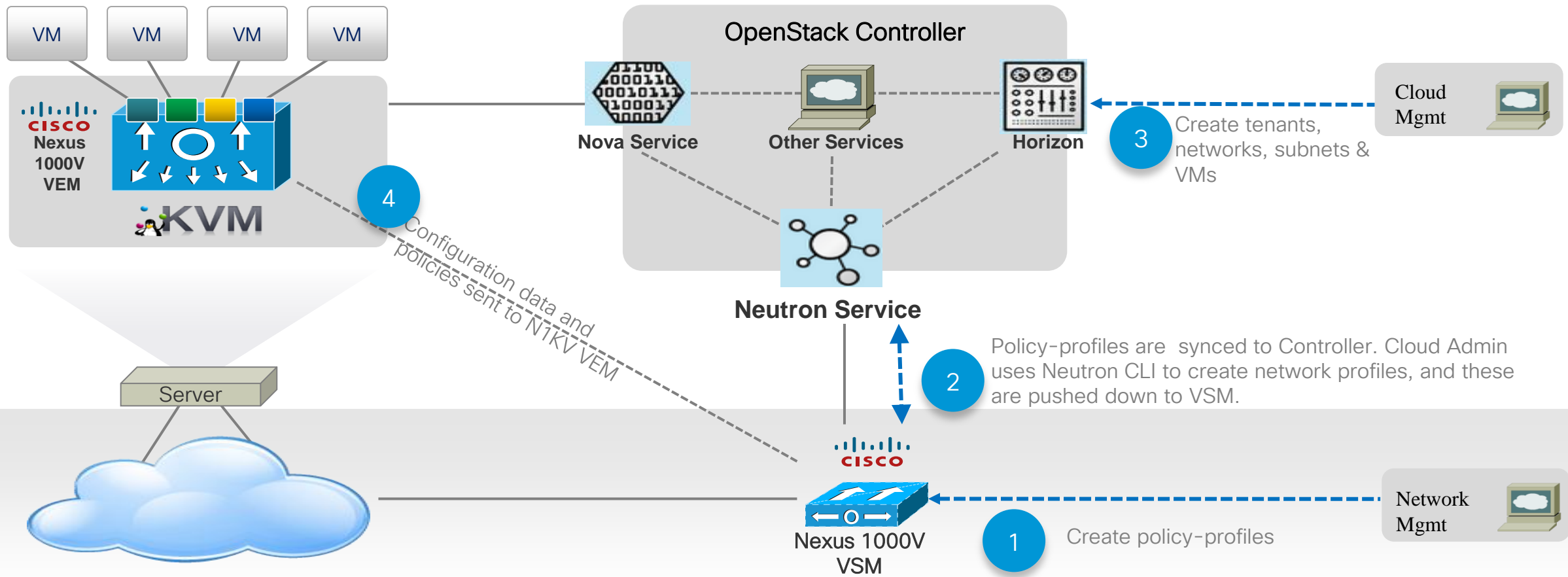
```
cisco@openstack-controller:~$ quantum cisco-network-profile-create vm-pool1 vlan --segment_range 50-60 --physical_network phyl
Created a new network_profile:
```

Field	Value
id	ee8f73e9-11b6-41dd-9014-ef4753fa90e2
multicast_ip_range	
name	vm-pool1
physical_network	phyl
segment_range	50-60
segment_type	vlan
sub_type	

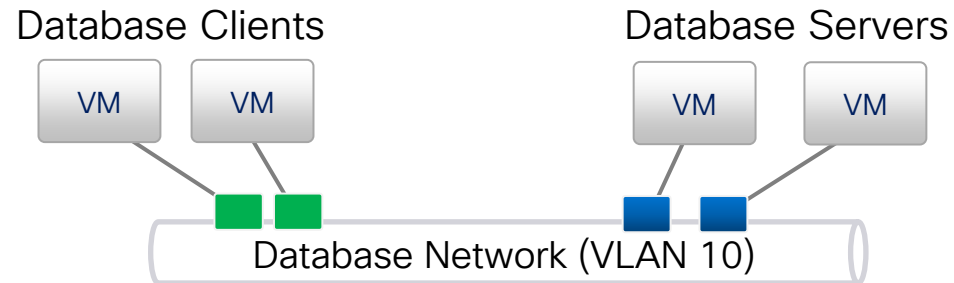
```
cisco@openstack-controller:~$ quantum cisco-policy-profile-list
```

id	name
08cca889-191b-4cec-8b23-6cb07c6bd637	dhcp_pp
3fe8b939-f6ed-477b-8b47-1b08a2f08aff	vm_policy

# Operational workflow



# Network segments are created from network profiles.



## Nexus 1000V for VMware vSphere

```
# port-profile db-client
switchport mode access
switchport access vlan 10
ip port access-group dbclient in
no shut
state enabled
```

```
# port-profile db-server
switchport mode access
switchport access vlan 10
ip port access-group dbserver in
no shut
state enabled
```

## Nexus 1000V for KVM

Create a DB network-profile using Neutron CLI. Use this to create a DB Network segment (vlan 10).

```
# port-profile db-client
ip port access-group dbclient in
no shut
state enabled
```

```
# port-profile db-server
ip port access-group dbserver in
no shut
state enabled
```

# Automation through REST APIs

## Support for Neutron API v2.0

Neutron URI: `http://<VSM-IP-address:port>/v2.0/<resource-name>`  
N1KV URI: `http://<VSM-IP-address:port>/api/<resource-name>`

### CRUD Operations through VSM REST-ful APIs

Create an object*	HTTP POST
Read an object	HTTP GET
Update an object	HTTP POST
Delete an object	HTTP DELETE

\*Objects can be networks, subnets, and port-profiles  
Write/Update Operations are only supported on limited set of objects

Construct the URI using  
the above template

Arguments are  
passed to APIs  
in JSON format

Use a browser  
or CURL to  
query VSM

Parse JSON  
response to get  
the required  
information

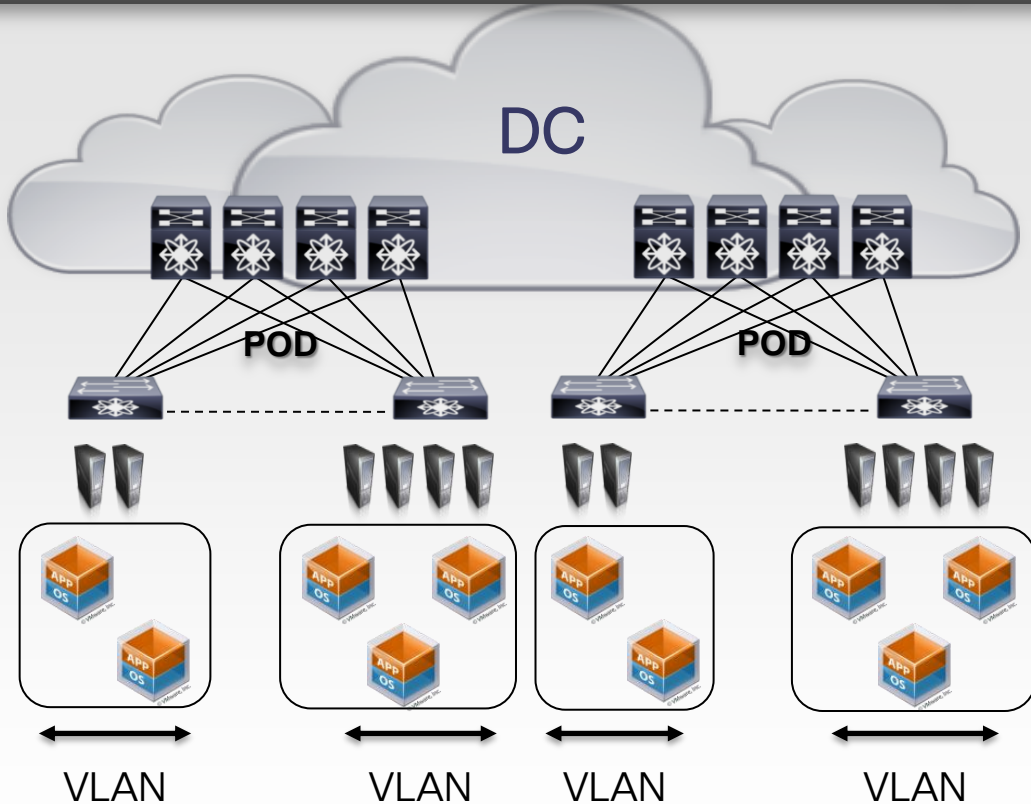
# VXLAN Support



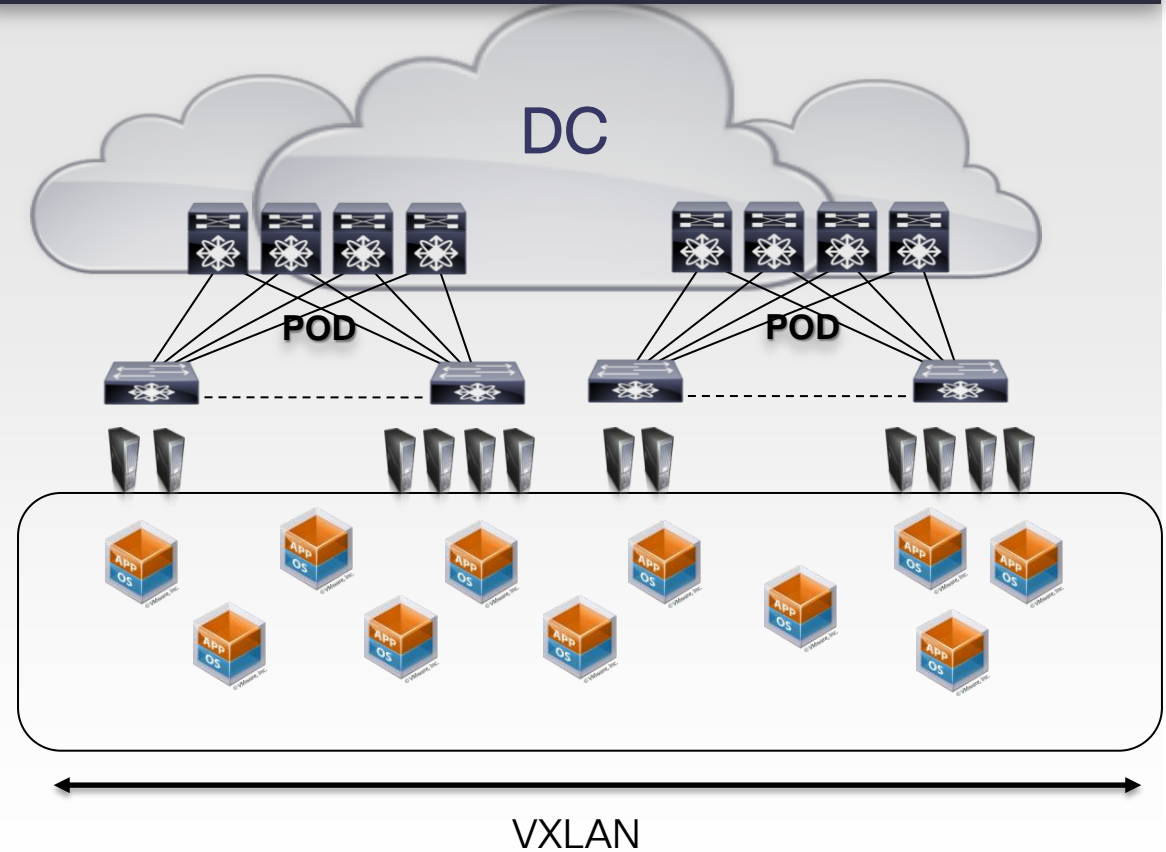
# Broader Mobility Diameter with VXLAN

## Infrastructure Flexibility & Better Resource Utilization

### Limited Rack-wide VM Mobility



### Virtual/Cloud Data Center



# Virtual Extensible Local Area Network (VXLAN)

- Ethernet in IP overlay network
  - Entire Layer 2 frame encapsulated in User Datagram Protocol (UDP)
  - 50 bytes of overhead

- Include 24-bit VXLAN identifier
  - 16 M logical networks
  - Mapped into local bridge domains

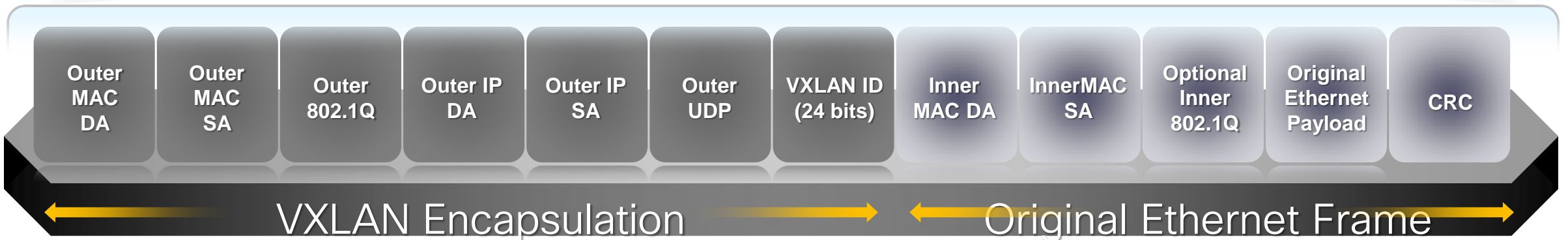
- VXLAN can cross Layer 3



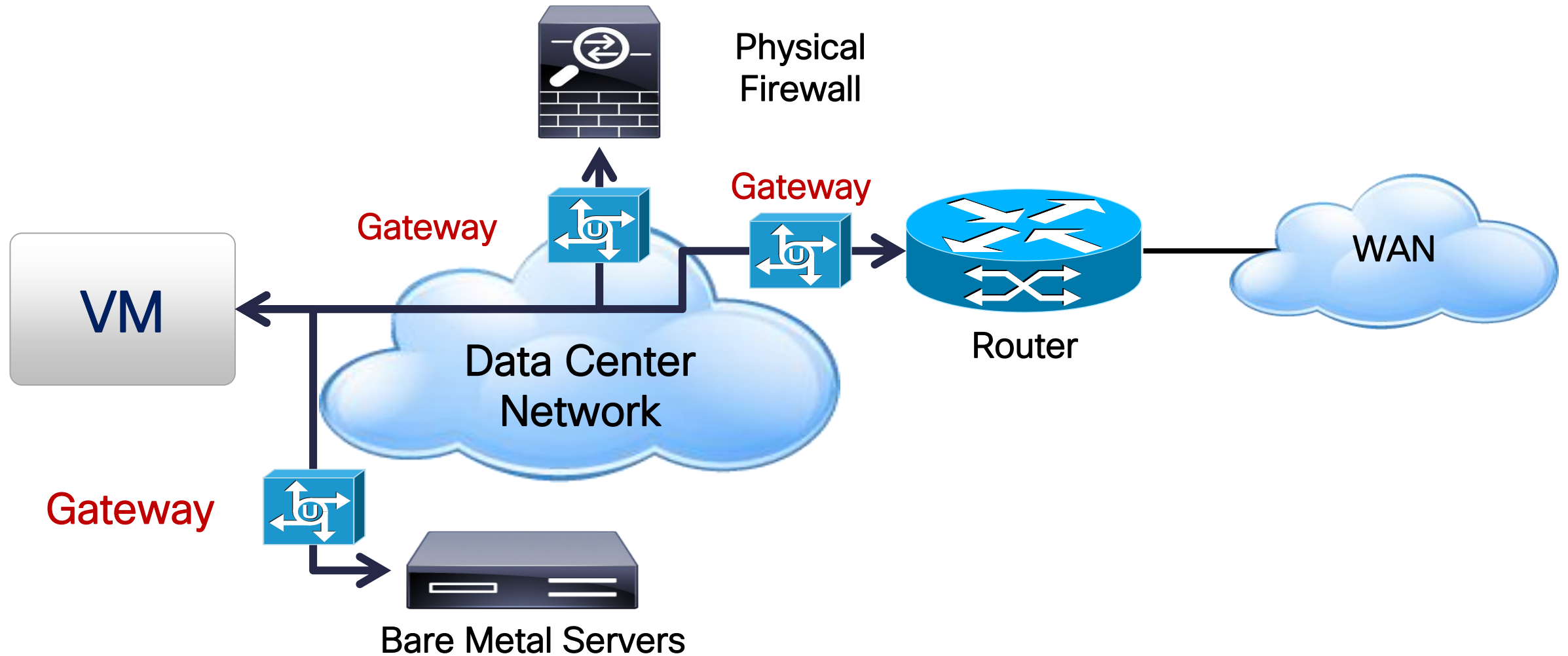
- Tunnel Between VEMs
  - VMs do not see VXLAN ID

- IP multicast used for Layer 2 broadcast or multicast, and unknown unicast

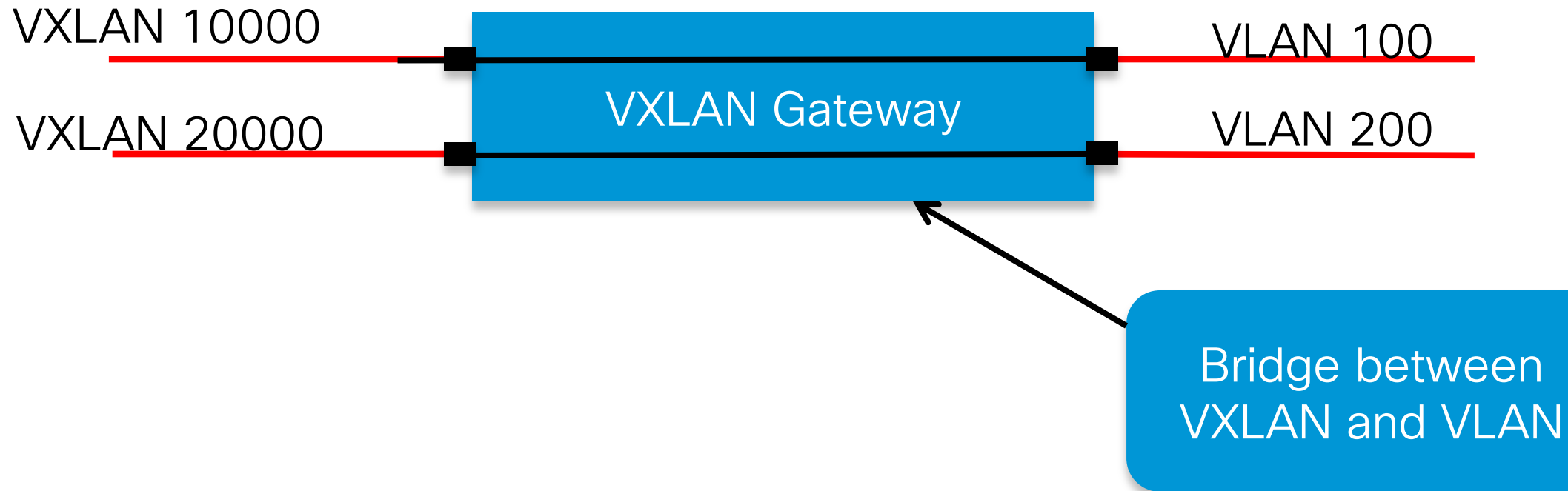
- Technology submitted to IETF for standardization
  - With VMware, Citrix, Red Hat, and Others



# Accessing the physical network from VXLAN



# VXLAN Gateway – Logical View



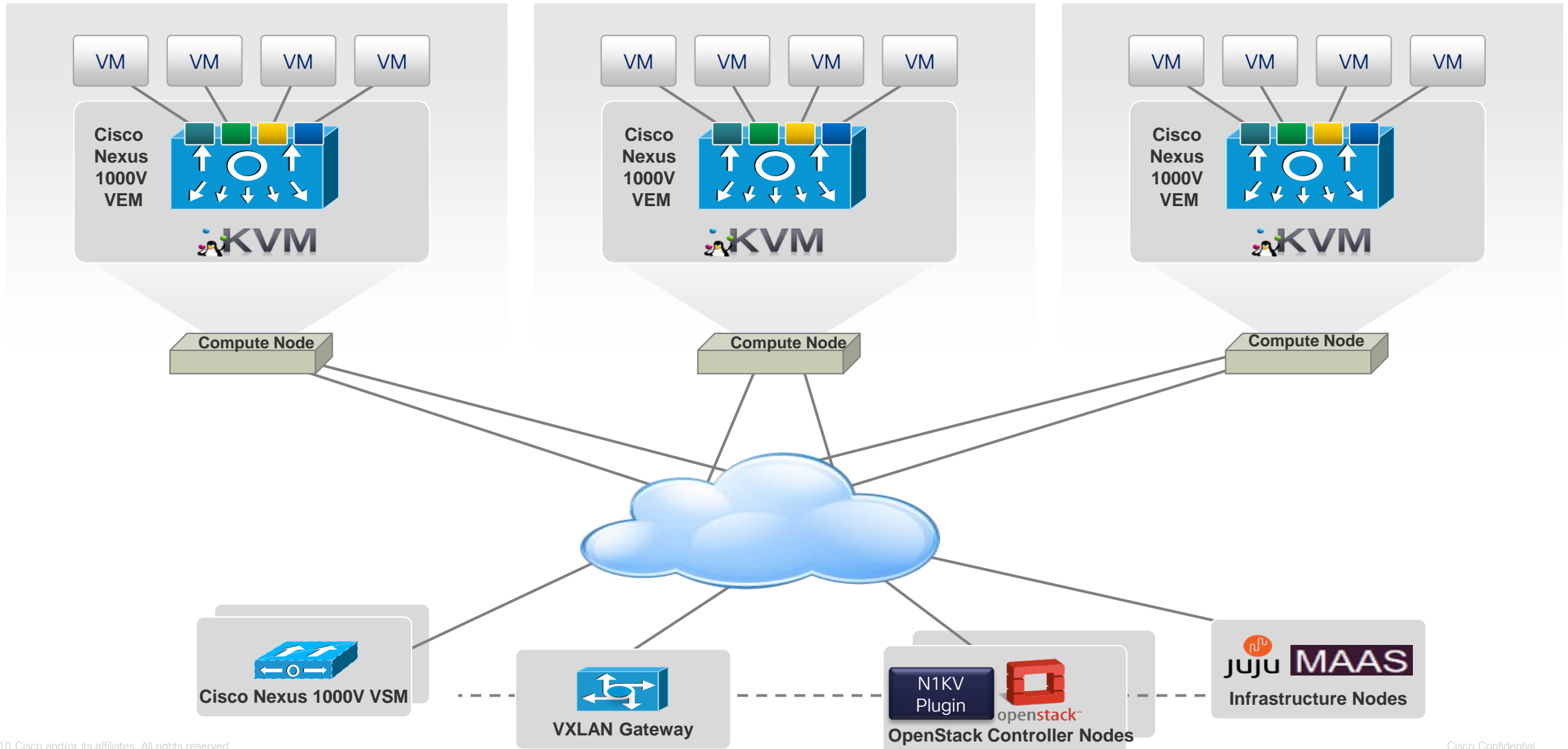
# Deployment Workflow

# Cisco Virtual Networking Components

Nexus 1000V Image Components	
VSM VM Image	All of these are hosted on private canonical archive
VXLAN VM Image	
VEM Executable	
Neutron Plugin	
Horizon Tab	
Charms Scripts for VSM	
Charm Scripts for VEM	
Charm Scripts for VXLAN G/w	

Deployment is automated through juju charms, and end-users need access to the private canonical archive.

# OpenStack Deployment with Cisco Virtual Networking



# OpenStack Deployment with Cisco Virtual Networking

## Install & Configure MAAS

- Install the Maas Packages (region & cluster controllers, dhcp)
- Import boot images for the services
- Configure DHCP

## Install & Configure Juju

- Install juju-core
- Customize juju configuration file in MAAS mode
- Create a MAAS bootstrap node

## Install & Configure OpenStack Services

- Use juju charms to deploy all OS services
- Includes N1KV Plugin & N1KV dashboard tab

## Install & Configure Cisco Nexus 1000V

- Use juju charms to deploy VSMS
- Use juju charms to deploy VEMs
- Use juju charms to deploy VXLAN Gateway



# Customer Benefits

## Reduced Operational & Technology risk

- Hardened Nexus Operating System
- Advanced networking feature-set
- Reliable support

## Simplified Operational process

- Leverage existing monitoring & management tools
- No staff retraining required

## Highly available and secure cloud environment

- Strong ecosystem of network services
- Strong security feature-set

# Additional Resources

- Cisco Resources
  - Cisco Nexus 1000V for KVM: <http://www.cisco.com/go/1000v/kvm>
  - Cisco Nexus 1000V Portfolio: <http://www.cisco.com/go/1000v>
  - Cisco OpenStack initiative: <http://www.cisco.com/go/openstack>
  - N1KV Community Site: <http://www.cisco.com/go/1000vcommunity>
- Canonical Resources
  - <http://www.canonical.com/>
  - <http://www.ubuntu.com/cloud>

Thank you.

