Secure Networking with Kubernetes, OpenStack, and Bare Metal

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Agenda

- Brief Overview of Tungsten Fabric and Community
- New Security Model for TF 5.x
- TF OpenStack Integration
- TF Kube Integration
- Bare Metal Support

Tungsten Fabric Overview

MISSION

Build the world's most ubiquitous, easy-to-use, scalable, secure, and cloud-grade SDN stack, providing a secure network fabric connecting all environments, all clouds, all people.

https://tungsten.io/

CODE

- 2013-Today: >300 years of work
- 200-300 developer contributions
- ~100 active developers
- Languages: C++, Python, Node, Go
- Apache 2.0 license
- Part of the Linux Foundation Networking
- GitHub repositories
- Gerrit review processes
- Launchpad bug tracking and blueprints
- Other OSS used: Cassandra, Kafka, HAproxy, Docker, Keystone

COMMUNITY

CAVIUM
Lenovo
codilime CREATING VALUE
NTT INNOVATION INSTITUTE, INC.
RIOT GAMES
CloudOps
TELUS
workday
cloud dynamics
intel
Aricent
CLOUDSEEDS
ubuntu Supported by Canonical
IBM
ebay classifieds group
AT&T
JUNIPER NETWORKS
redhat
CertusNet
SERO
inmarsat
Symantec
SCALR
SDN Essentials
Mellanox TECHNOLOGIES
MIRANTIS
NETRONOME
深圳证券交易所 SHENZHEN STOCK EXCHANGE
Bell
Yandex
orange Business Services
IPnett
Semihalf
techtrueup
Atos
STC الاتصالات السعودية SOLUTIONS حلول
Jio RELIANCE Communications
CENGN
CERN
FUGA CLOUD
wingu
your logo here

Features

Routing & Switching
(IPv4, v6)

Network Services
(IPAM, DNS, DHCP SNAT, FIP, QoS, BGPaaS)

Load Balancing
(customizable ECMP, LBaaS)

Security & Policies
(Policy Enf.,Distributed FW, Sec Grp, XMPP Encryp.)

Perf & Scale
(DPDK / SRIOV, Smart NIC, Infra scale)

Gateway Services
(L2, L3, Software GW)

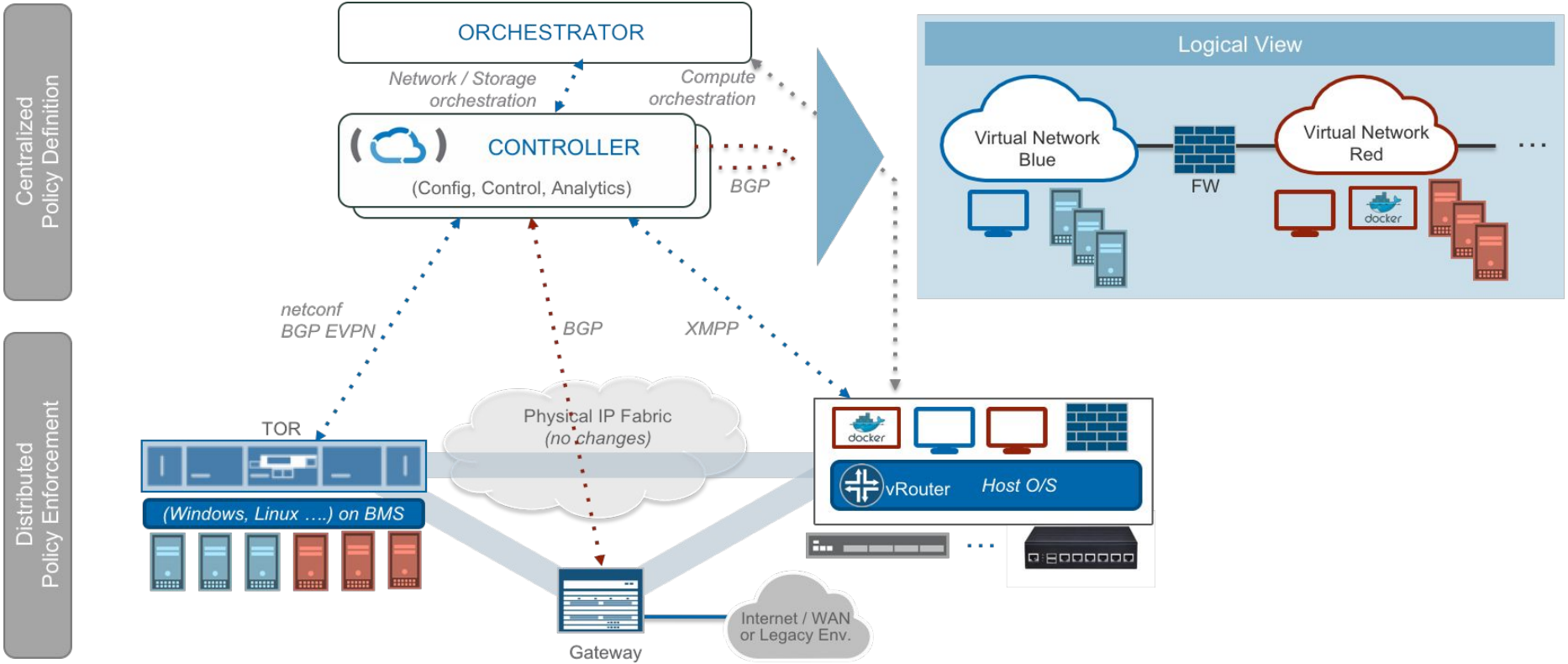
Rich Analytics,
(Alerts, Overlay-Underlay Correlation, multi-region)

Service Chaining
(PNF, VNF, v6, 3rd party / TAP, Health-check, policy-based, SFC Failover)

HA, Upgrades, Prov.
(Infra Failover, ISSU)

APIs & Orchestration
(multi-vendor Orch., SDN-U, OpenStack, K8s, vCenter)

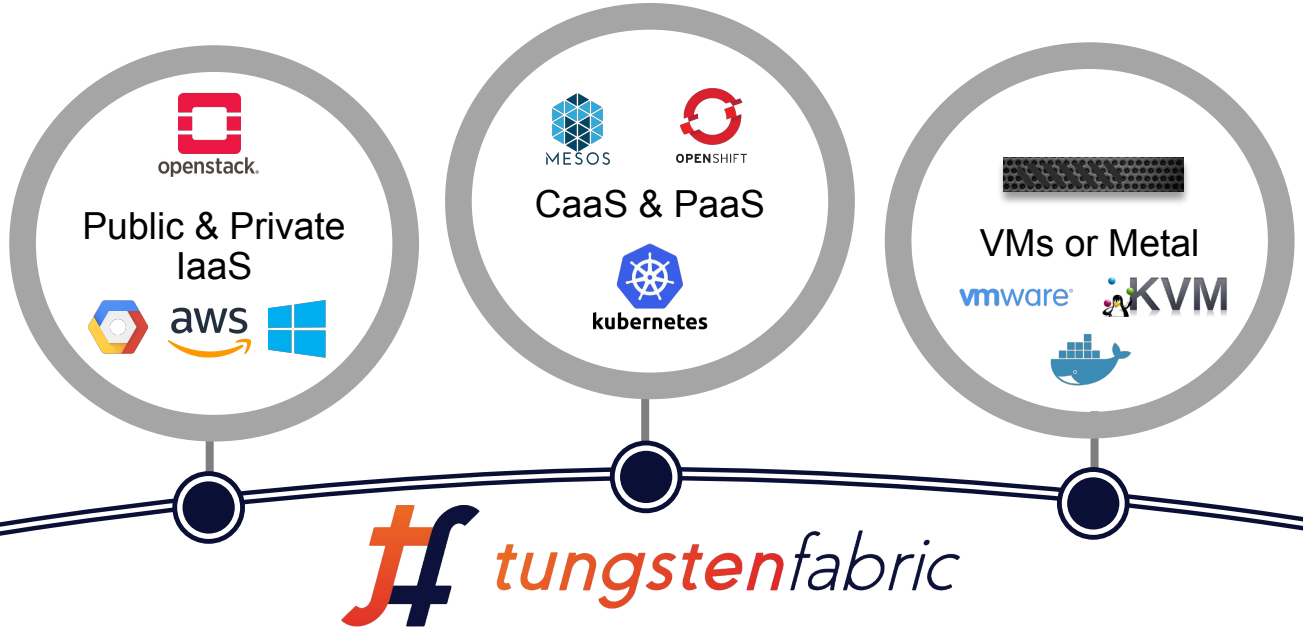
Architecture Overview



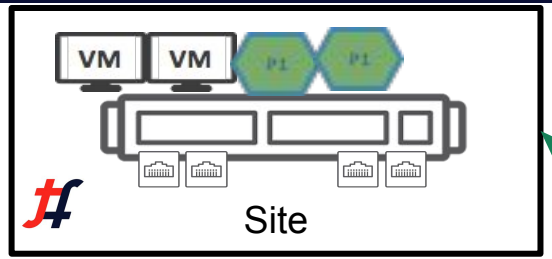
Tungsten Fabric as SDN Controller

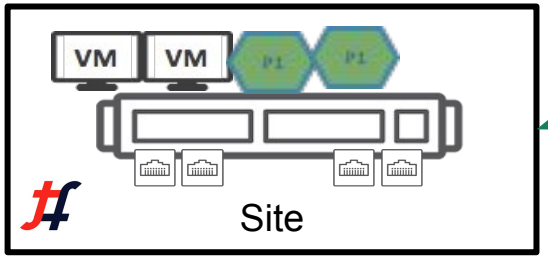
RULE THEM ALL WITH ONE

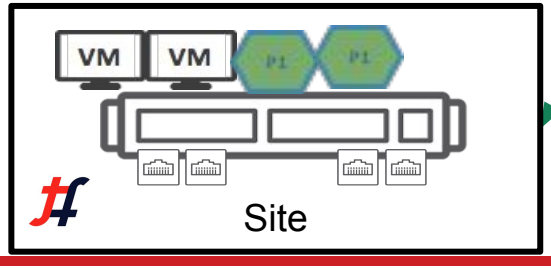
automated secure open SDN Controller



Tungsten Fabric Single SDN for VMs & PODs







Neutron/CNI
SDN Controller

Basic Networking:
L2/L3 or L2/L3 Network
IPAM/DHCP, DNS, Multi-Tenancy

Advance Networking:
VLAN-ID, VRRP, VIP, LB, Routes Advertisement,
GW Function, Service Chaining,
Traffic Steering, Flow awareness,
QoS, SR-IOV/DPDK, BGP-VPN,
Inter Site Federation, Health Checks,
FW, IPSec/TLS Support

Kubernetes
CNI

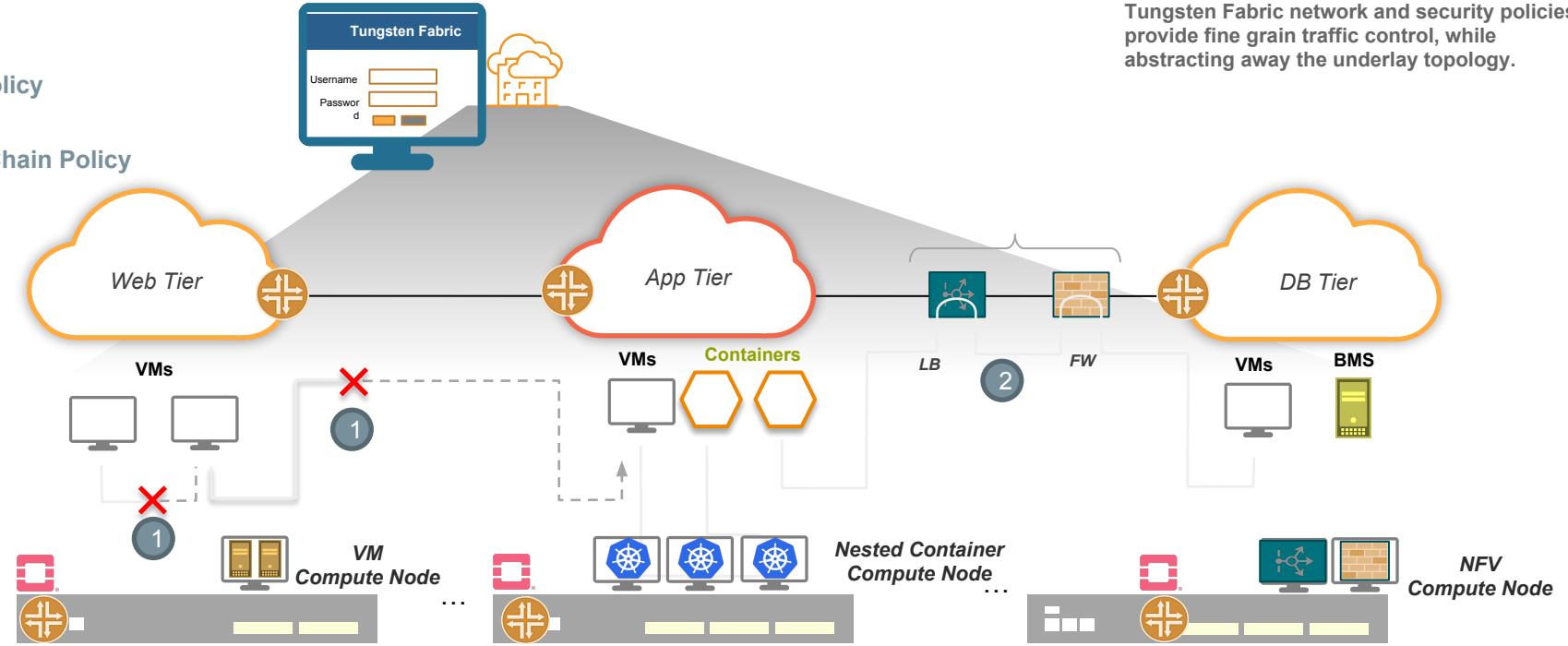
Neutron
Plugin or ML2
Driver

Uniform Network and Security Policy

Consistent security and network functionality between VMs, containers, or bare metal.

Tungsten Fabric network and security policies provide fine grain traffic control, while abstracting away the underlay topology.

1. L4 Policy
2. Svc Chain Policy

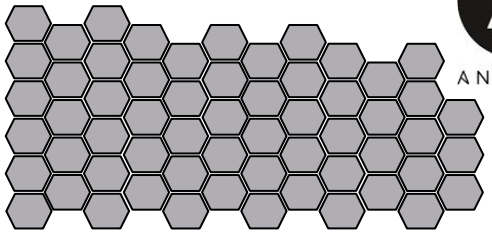


Tungsten Fabric Deployment Model

- Delivered as MicroServices
  - Docker Containers
  - Host dependencies in Privileged Installer Containers
- Common Installers
  - Helm
  - Ansible
  - Kolla
  - OpenStack Platform Director/TrippleO
  - Mirantis MCP
  - Juju/Charms
  - OpenShift
- Latest Release on DockerHub
  - **https://hub.docker.com/u/tungstenfabric/**

DaemonSet, Ingress Services with Host Networking
with choice of run single or multiple containers per PODs

27-30 Containers Images



Contrail 5.X (Containers) Microservices (SDN Controller)

Tungsten Fabric Security

Intent Based Security Policy

Policy Example:

```
allow  web-traffic-group  tier=web  >  tier=app  match  deployment && site
```

Tag expression *Tag expression* *Tag expression*

Policy Tags

Objects at different levels can be tagged

Tags / Labels

Tags can be defined at different levels

- Global
- Project
- Network
- VM / Container / BMS
- Interface

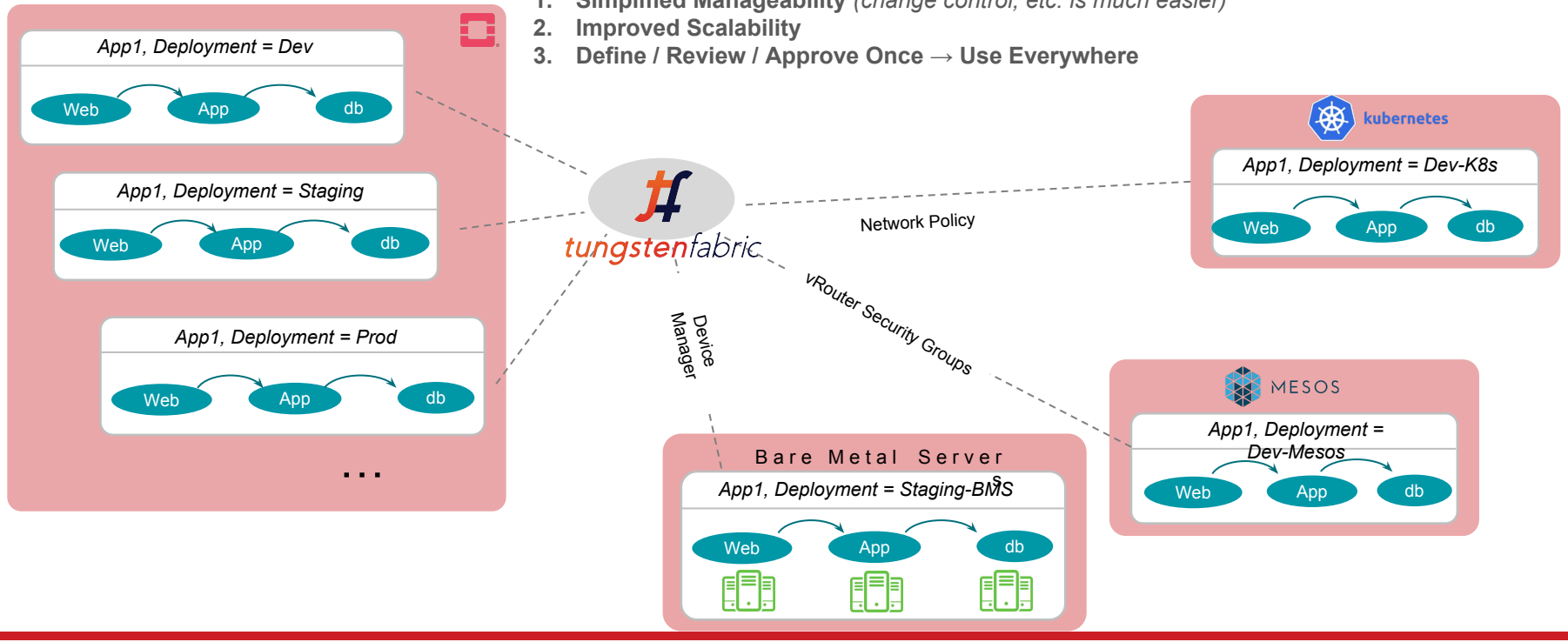
Policy Enforcement

Policies will finally be enforced at the interface level

CONSISTENT POLICY ENFORCEMENT

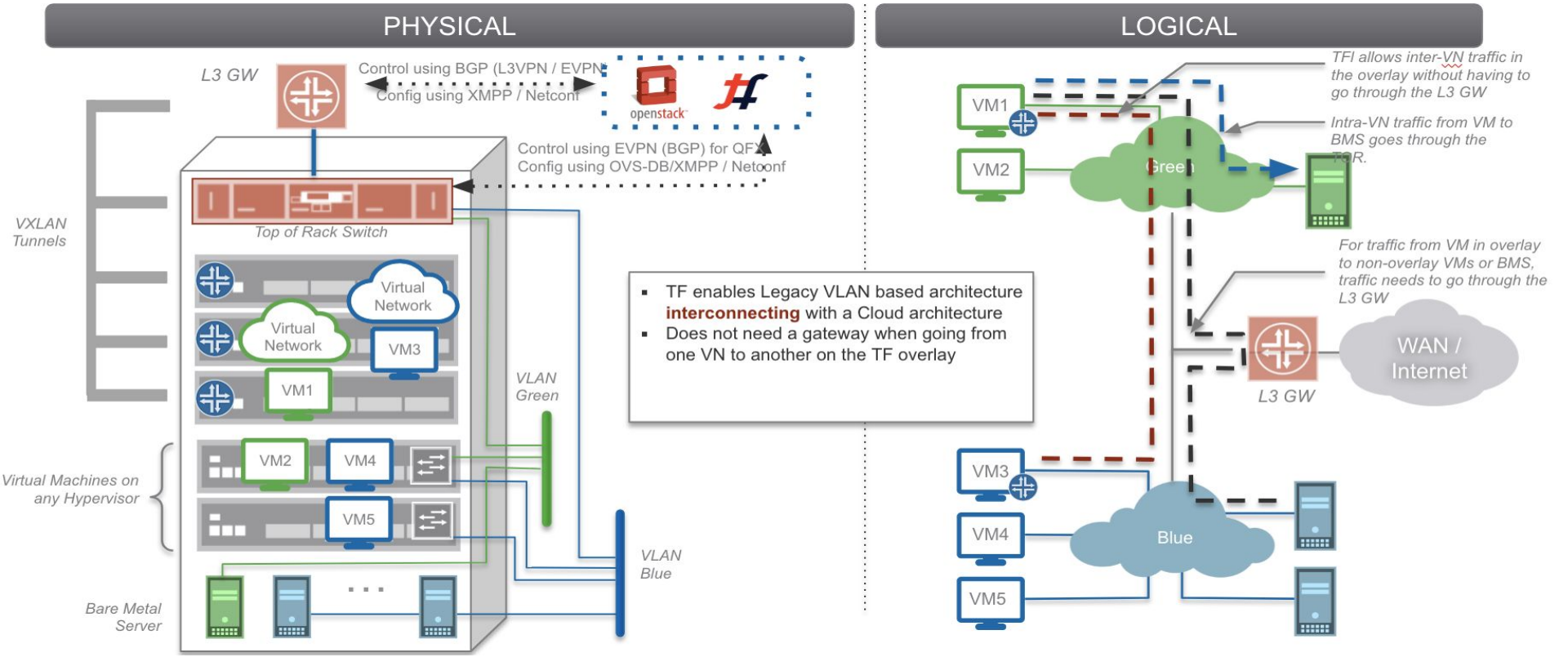
Tungsten fabric provides a rich, consistent set of security policy capabilities across multiple platforms.

1. **Simplified Manageability** *(change control, etc. is much easier)*
2. **Improved Scalability**
3. **Define / Review / Approve Once → Use Everywhere**



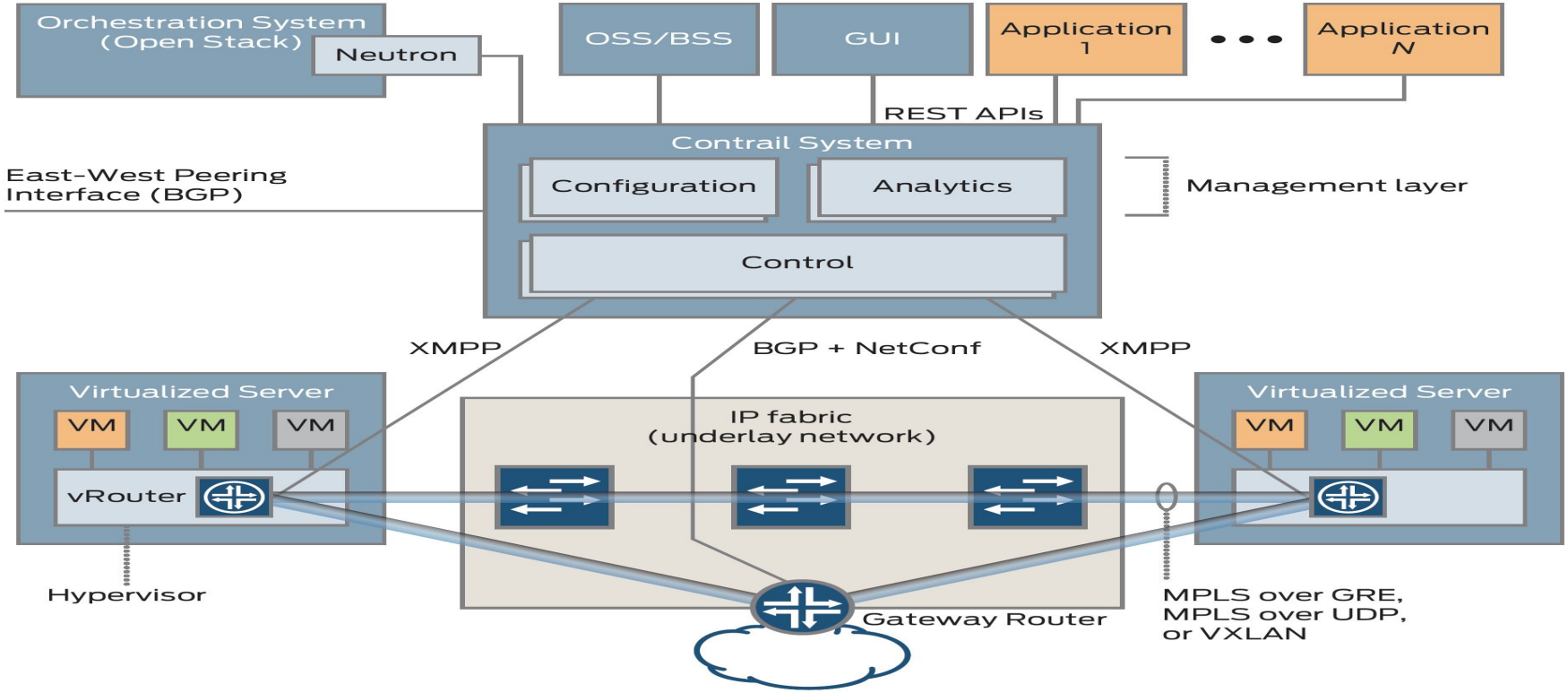
Tungsten Fabric Bare Metal Support

Bare Metal Integration



Tungsten Fabric and OpenStack

TF and OpenStack Integration

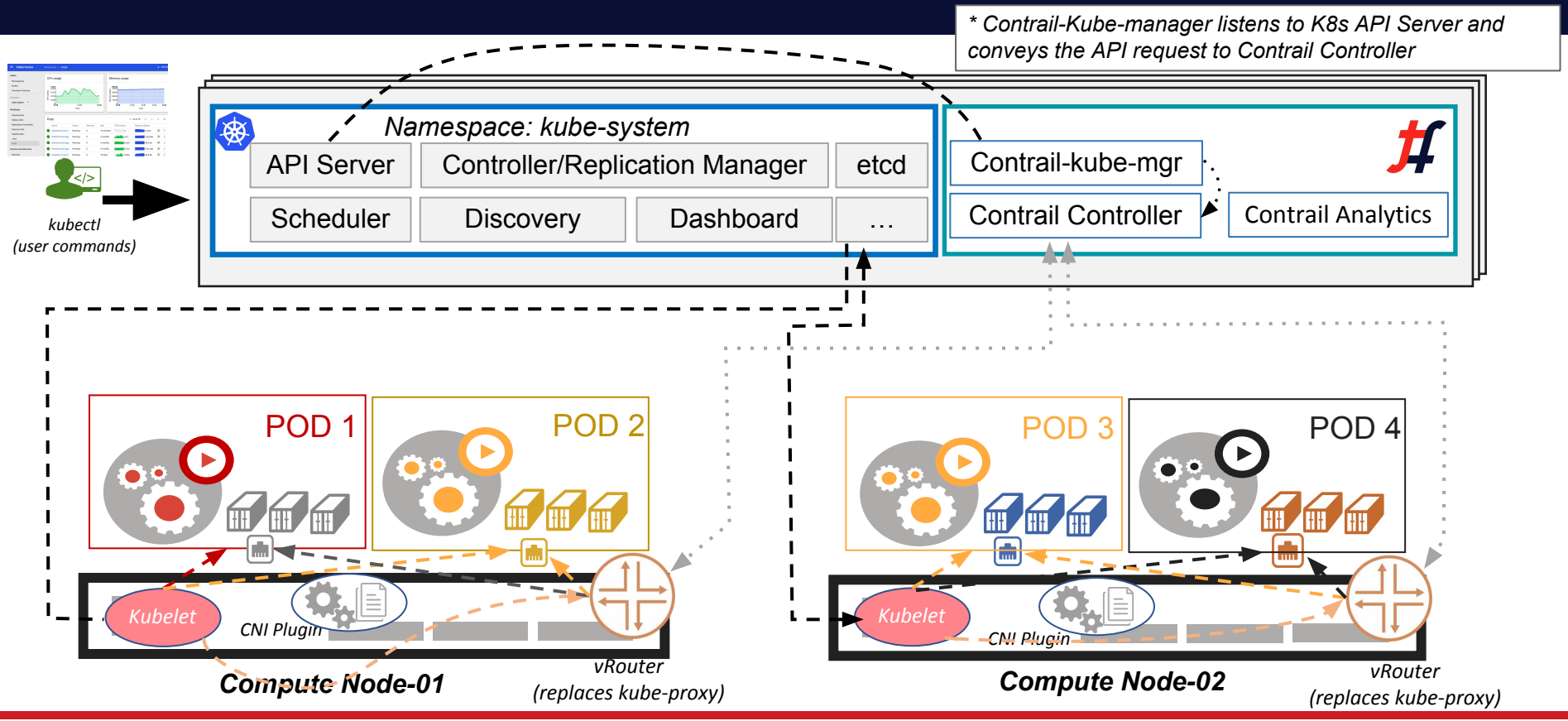


Integration Details

- Neutron Plugin
  - Production Stable
  - New for TF 5.0 - Direct Connect non-overlay mode
- ML2 Driver
  - Supports multi-SDN in OpenStack
  - Code is stable but not production tested
  - Lacks feature parity

Tungsten Fabric Kubernetes Support

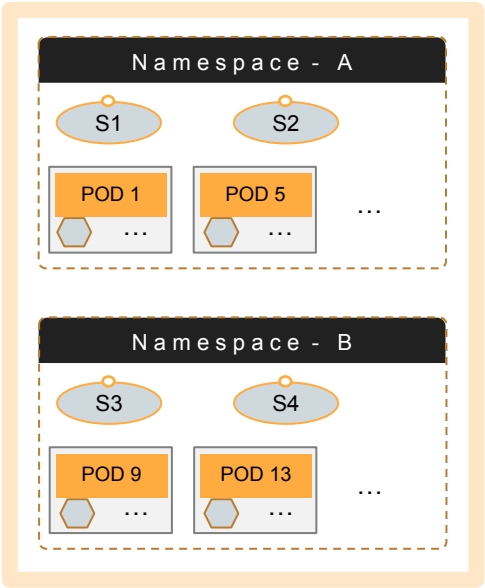
Tungsten Fabric Integration with k8s



DIFFERENT LEVELS OF ISOLATION

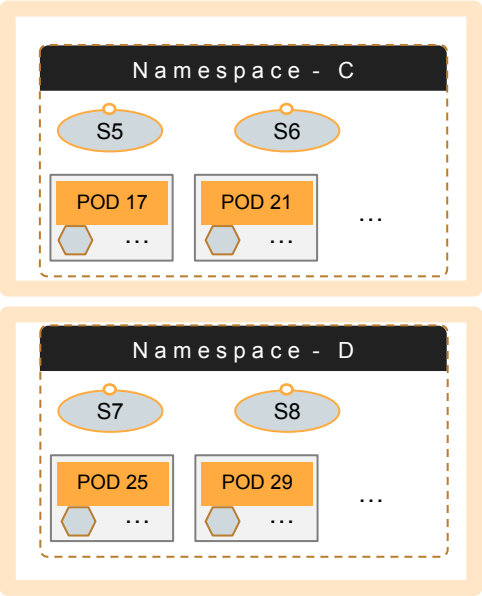
DEFAULT CLUSTER MODE

- This is how Kubernetes networking works today
- Flat subnet where -- Any workload can talk to any other workload



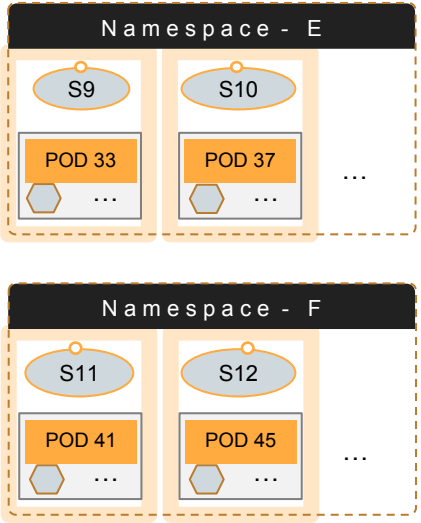
NAMESPACE ISOLATION

- In addition to default cluster, operator can add isolation to different namespaces transparent to the developer



POD / SERVICE ISOLATION

- In this mode, each POD is isolated from one another
- Note that all three modes can co-exist



Getting Started with Tungsten Fabric

Getting Started

https://tungsten.io/start/

Carbide SandBox for Amazon AWS

- https://tungstenfabric.github.io/website/Tungsten-Fabric-15-minute-deployment-with-k8s-on-AWS.html
- Quick Kube Testbed for public clouds

Onprem with OpenStack

- https://github.com/Juniper/contrail-ansible-deployer/blob/master/README.md
- Easy TF/OpenStack Deployment and Integration

Join the Community

Help Drive the Future