RED HAT SUMMIT

ARE YOU BEING SERVED?

CONTAINERS, MICROSERVICES, CLOUD-NATIVE TELCO

Anita Tragler, Product Manager, Networking/NFV, Red Hat
Jim Logan, Director Of NFV, Affirmed Networks
Marc Curry, Product Manager, Openshift, Red Hat



4th May 2017

redhat.

“**Virtualized network functions (VNFs)** urgently need to be developed as **cloud-native** applications”

Doug Nassaur, Principal Technical Architect for AT&T's Domain 2.0, Composable Telco Panel, Light reading

“With **virtual machines (VMs)** you get a lumpy and **slow-to-respond** system, but with **containers** you could **adapt** more **quickly**”

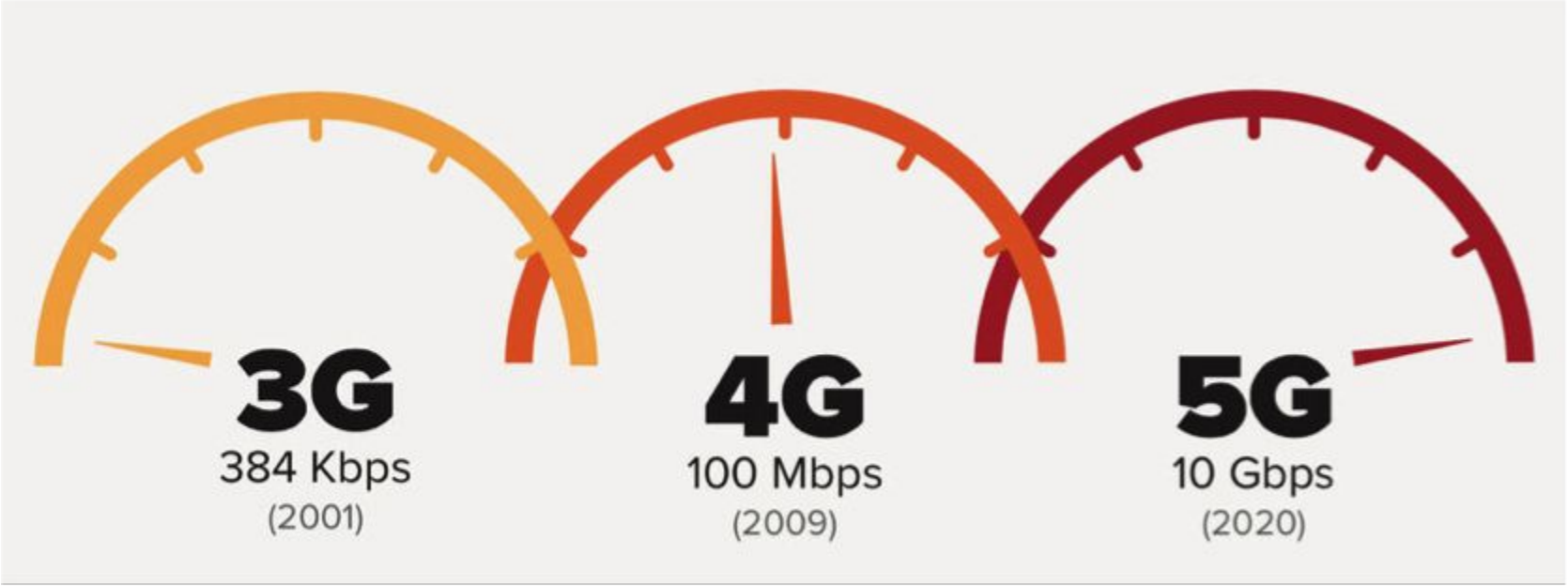
Peter Willis, Chief Researcher at BT, PARIS -- MPLS/SDN/NFV World Congress

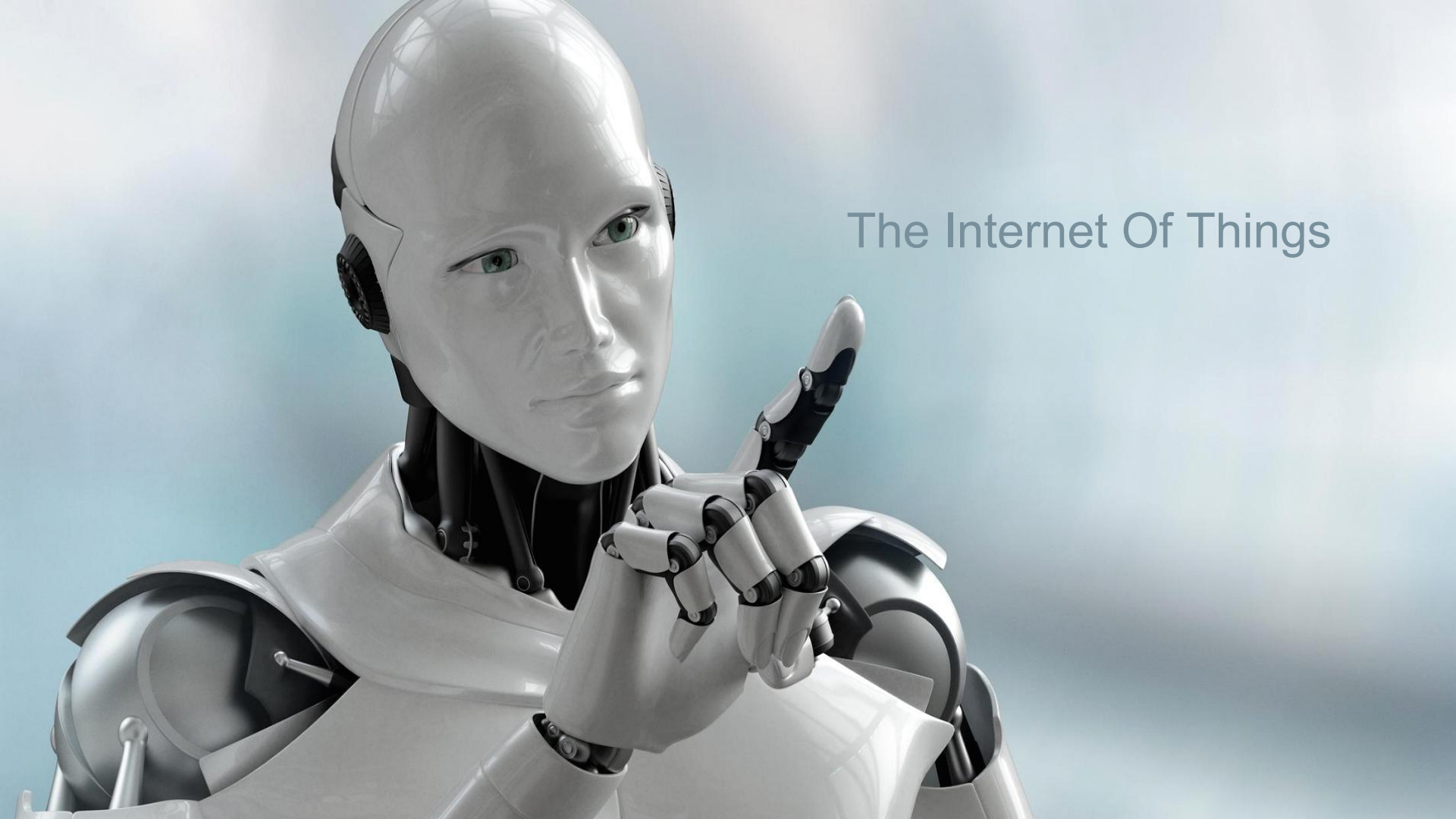
“Biggest **NFV** challenge involves **transformation** of an organizational and cultural nature; moving to **DevOps**”

Niklas Sonkin, Sweden’s Tele2's Chief operating officer, Light reading

The Evolving Network

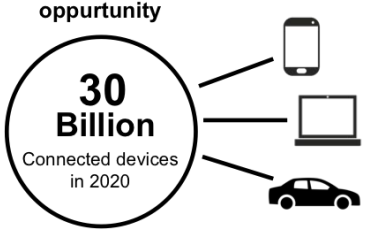
5G - Finally The Bandwidth You Need




The Internet Of Things

IOT - All Your Base Are Belong To Us

IoT is a huge oppurtunity



5G Driving IoT Growth

Connecting with Cellular

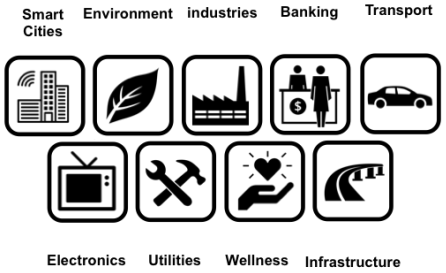
Secure

Service quality

Scalable

Global Coverage

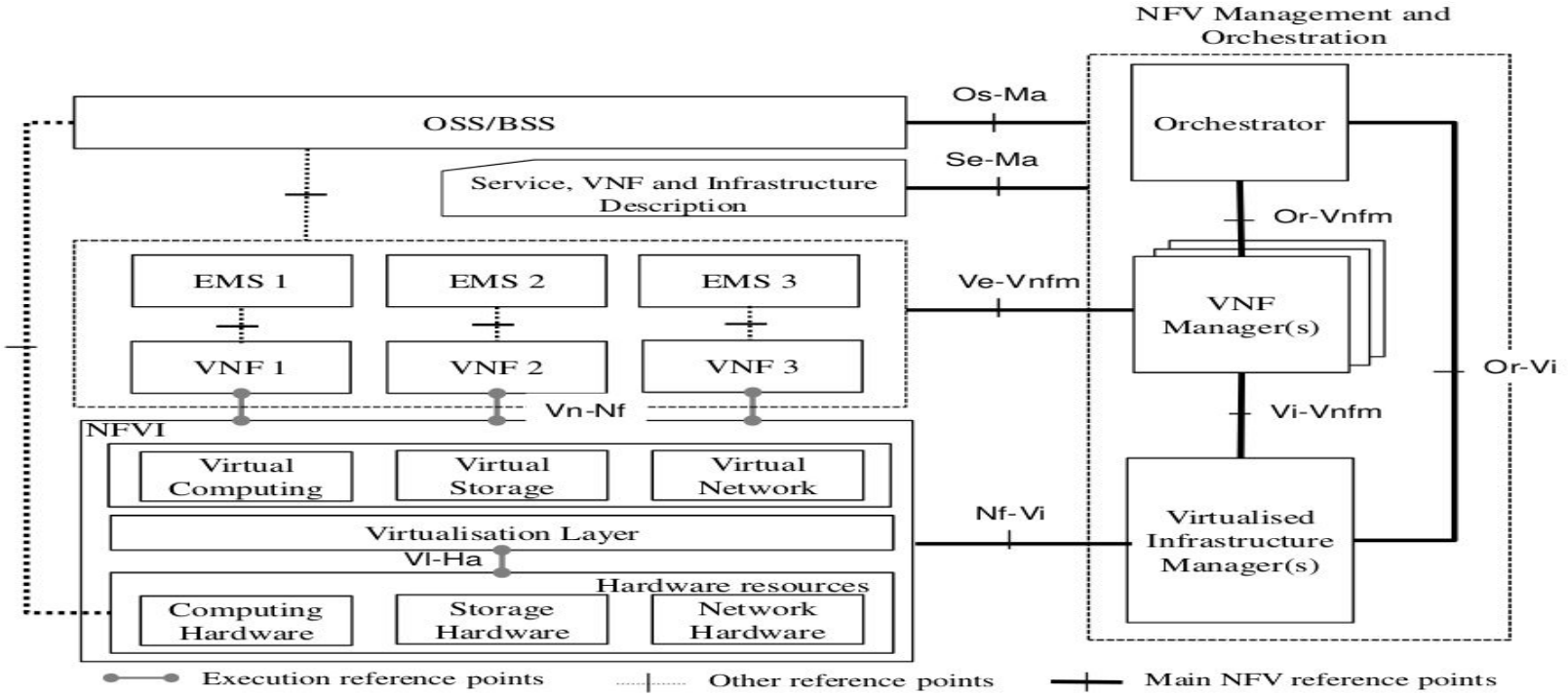
$2Trillion Market



Source: IDC

Need To Rethink Network Architectures

ETSI Network Function Virtualization Environment



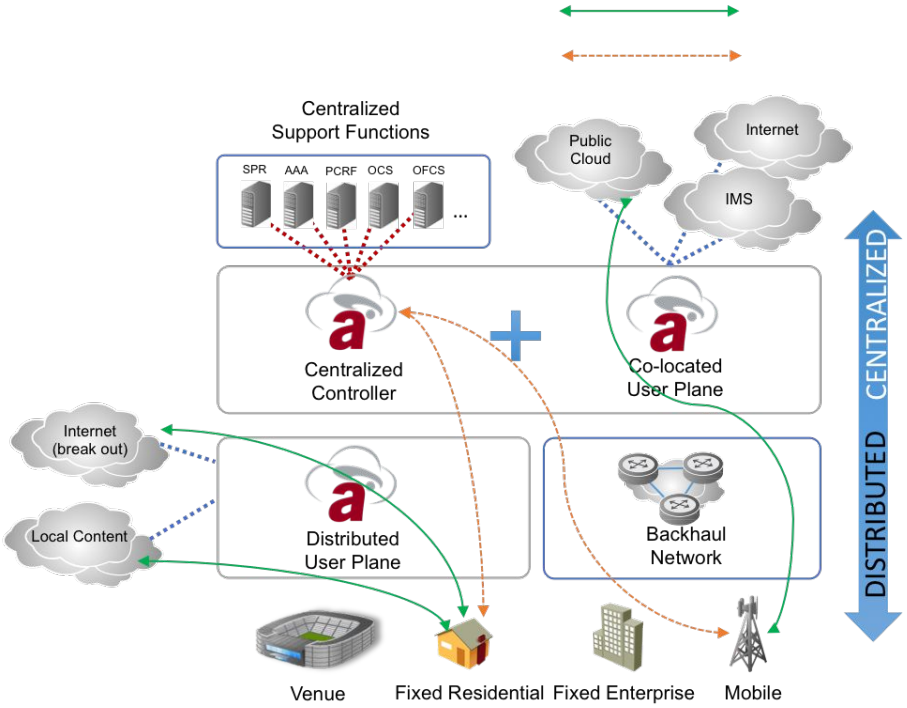
Source: ETSI

Centralize And Distribute

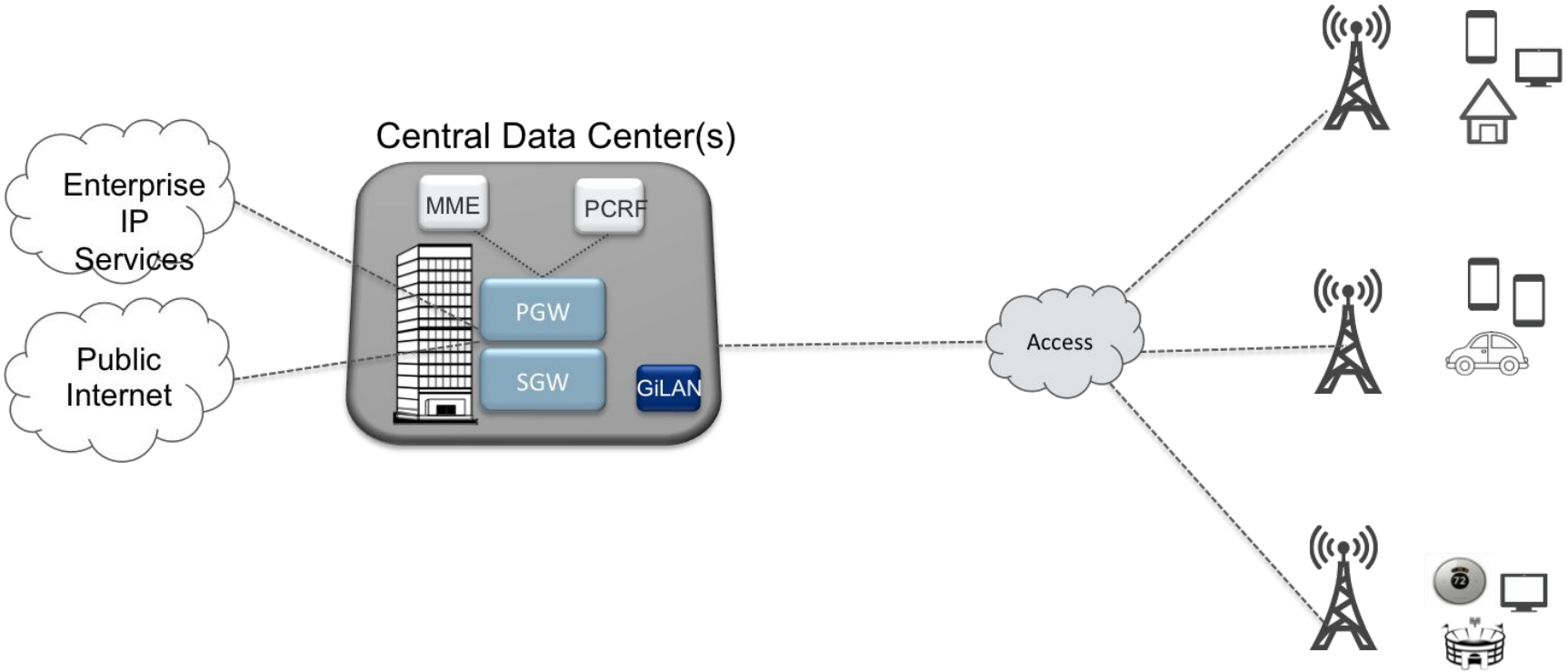
Centralized control and distributed user planes moving services and applications closer to the edge

Meet high bandwidth/low latency requirements

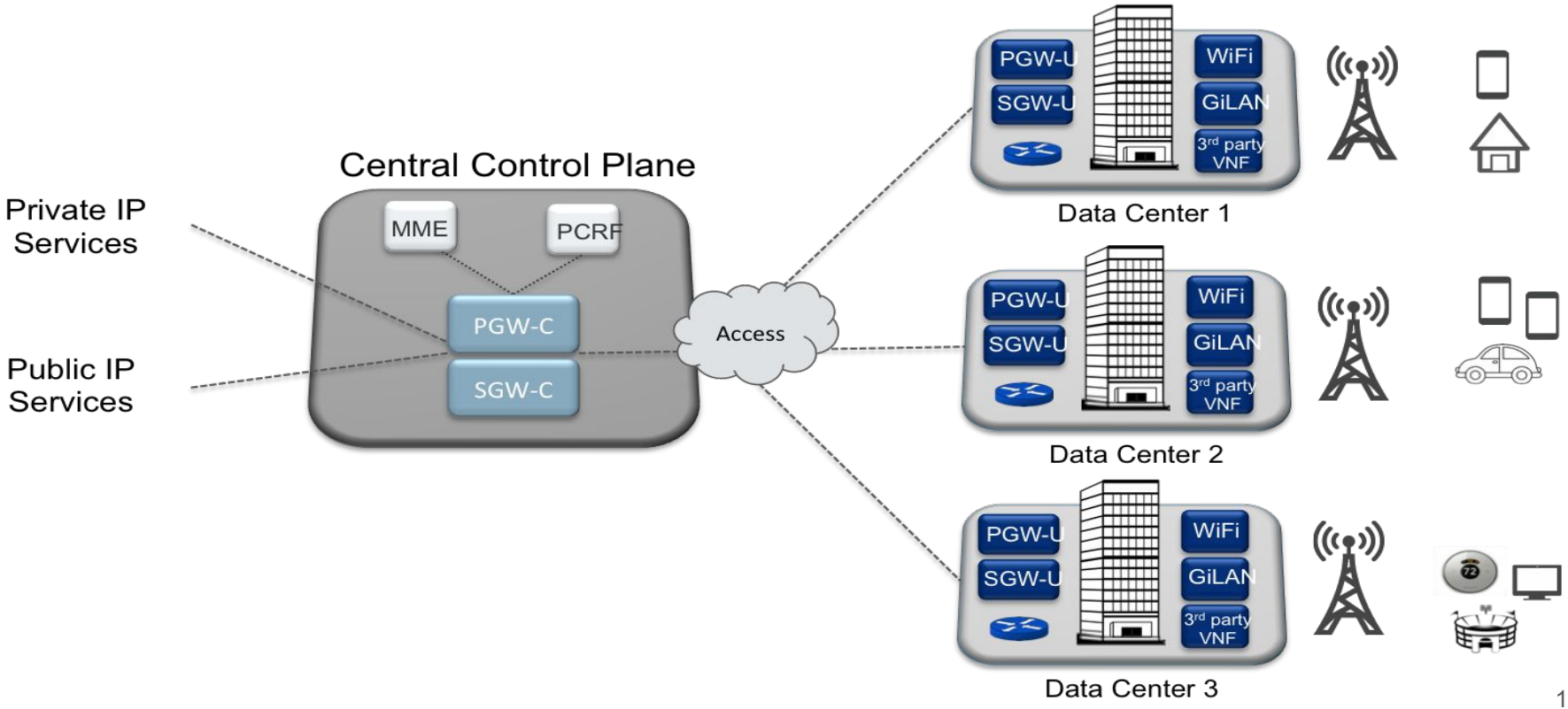
Unlimited scale and Flexibility



Existing Network Architecture

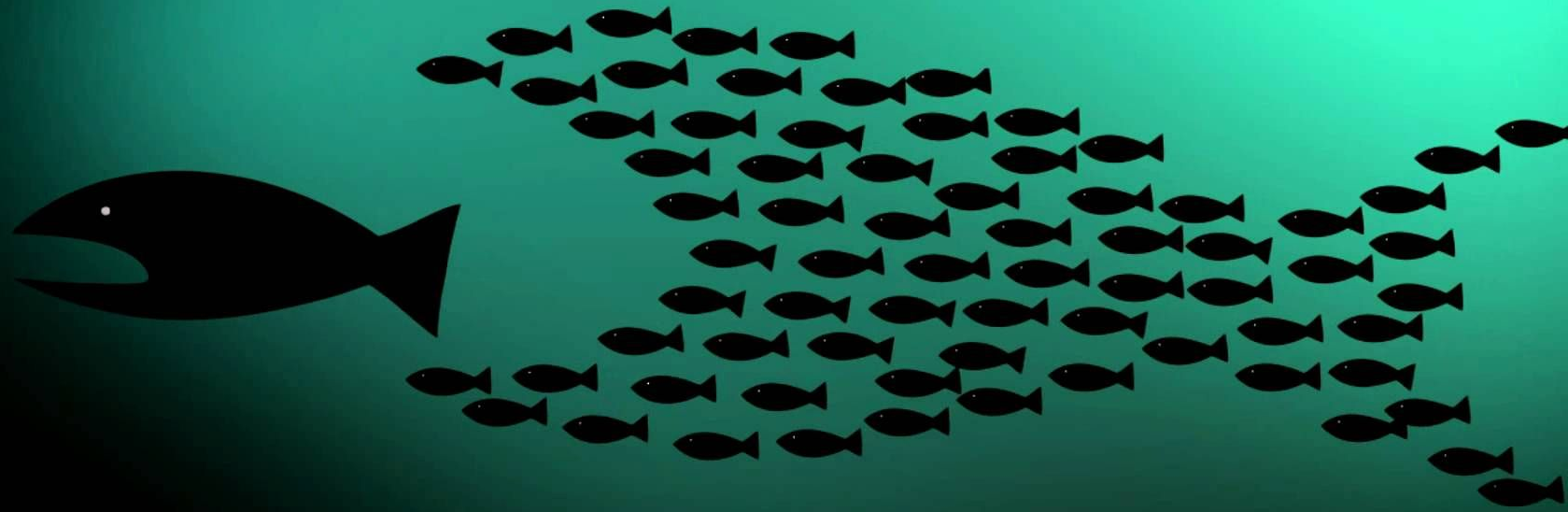


Evolving Network Architectures




Need To Rethink Network Element Software Architectures

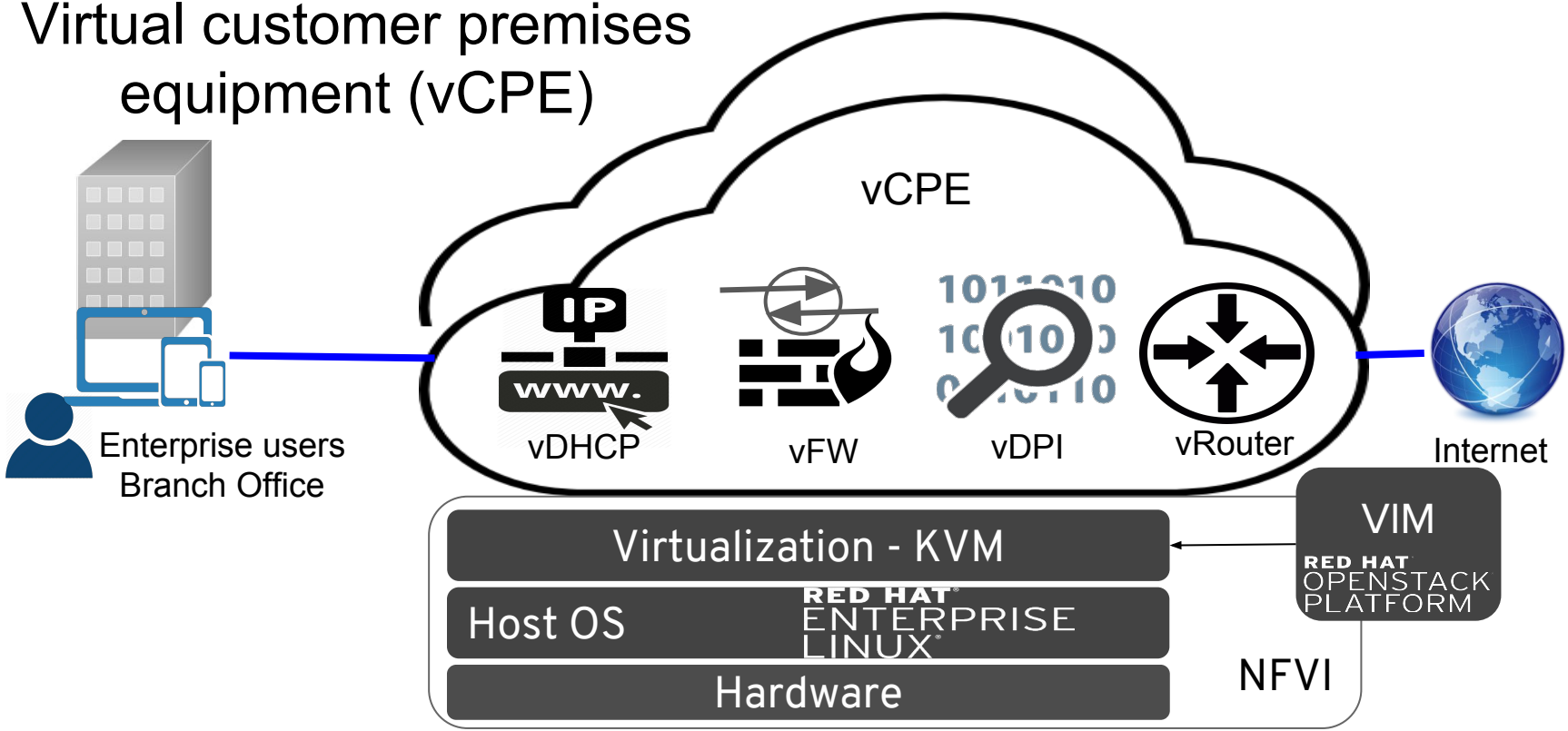
DON’T PANIC



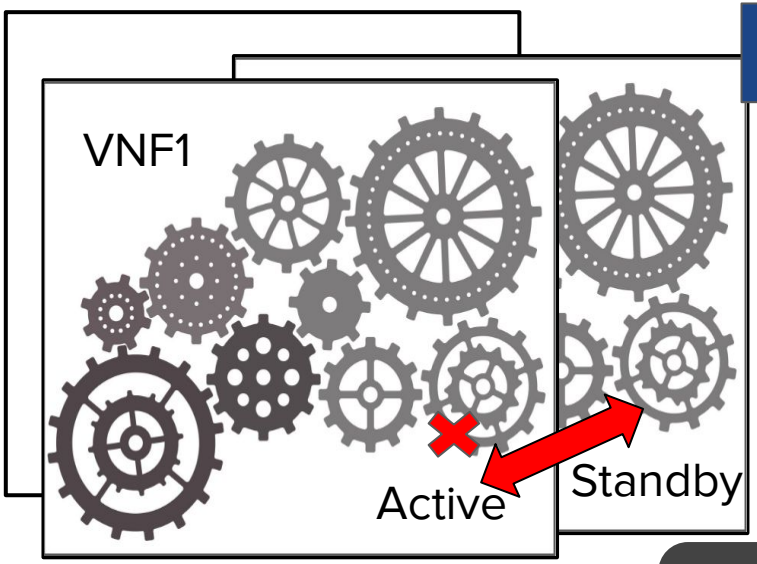
ReThink ReBuild!

VNF Architectures - Where we are today? Monolithic

Virtual customer premises equipment (vCPE)



Today : VNFs and VNF Orchestration



VNFs are pets

Monolithic VMs

Tightly Coupled

Stateful Persistent

Virtual Infrastructure Manager (VIM)

Hardware dependent

Centralized

Performance tuning

Tedious updates

Scale Expensive

Redundancy Failover

VIM

RED HAT OPENSTACK PLATFORM

Virtualization - KVM

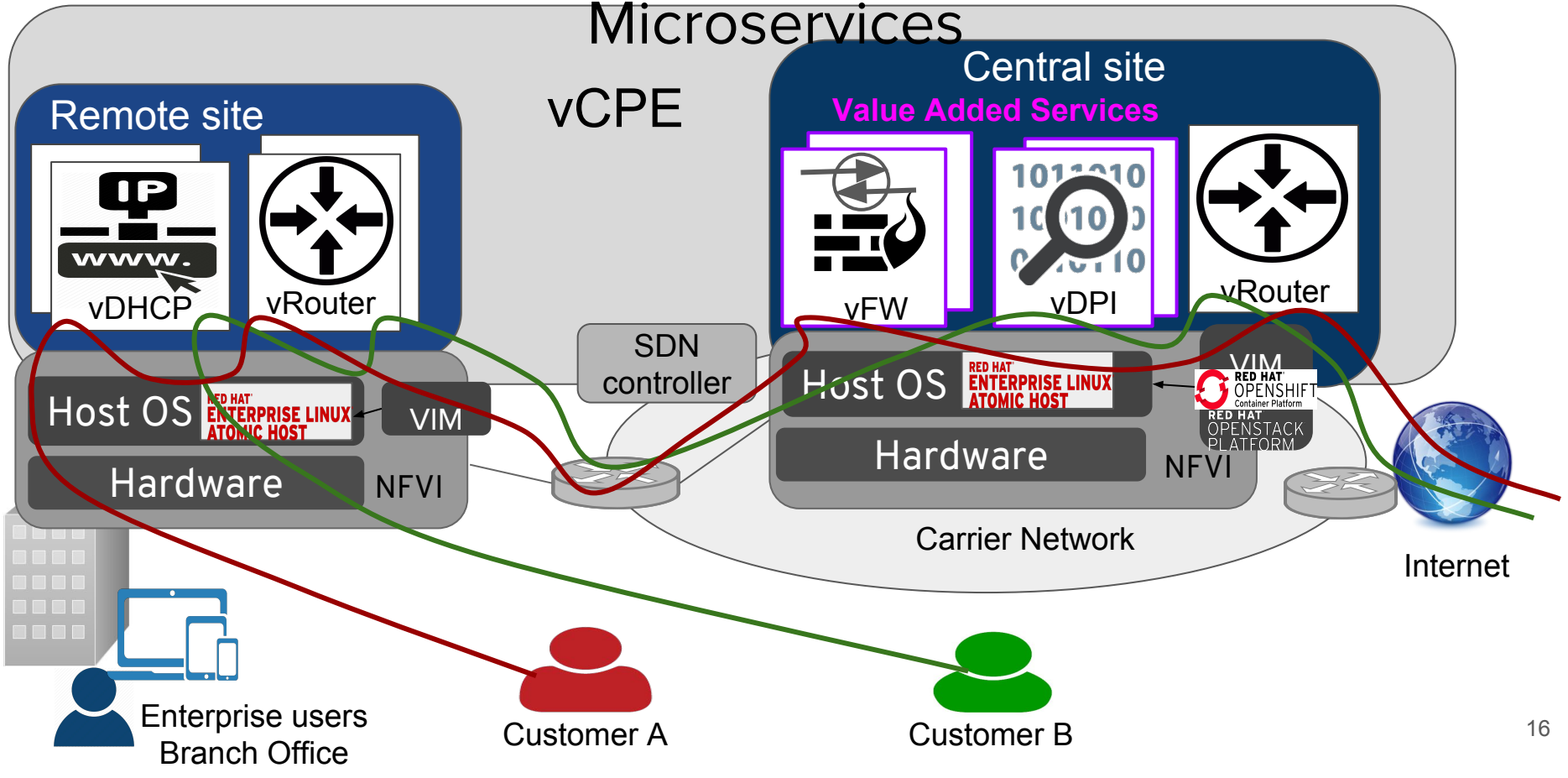
Host OS

RED HAT ENTERPRISE LINUX

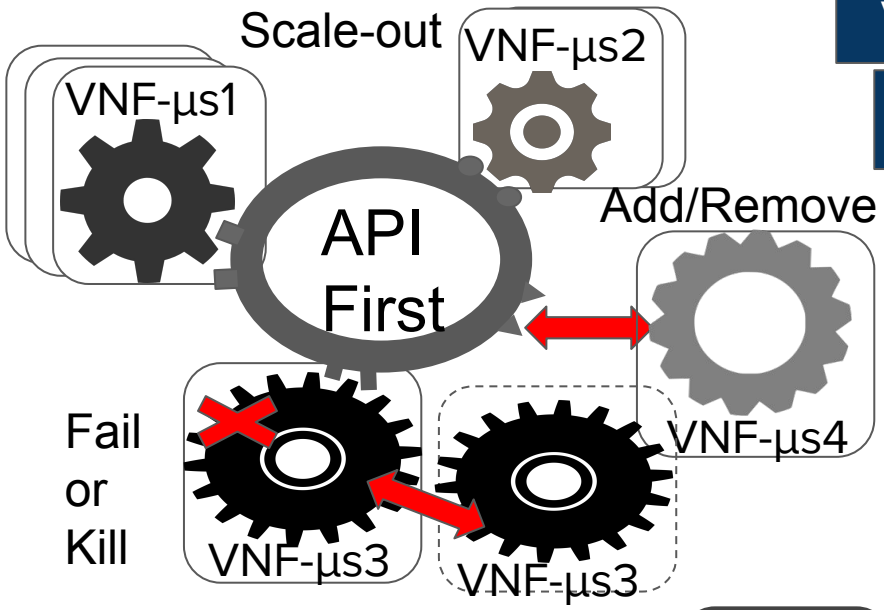
Hardware

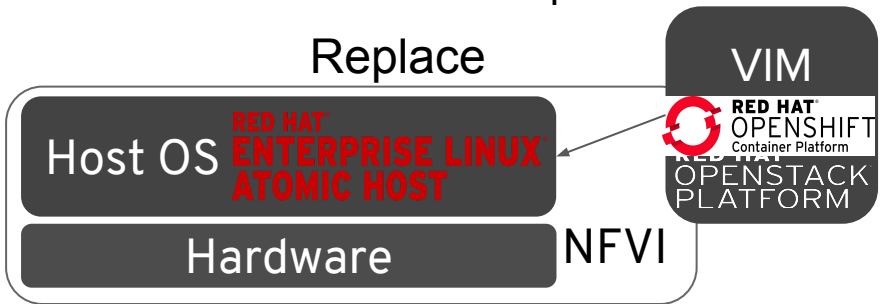
NFVI

VNF Architectures - Where we want to be?



Rethink VNFs and VNF Orchestration





VNFs are Cattle

Microservice oriented containers

Loosely Coupled

Temporal Stateless

Virtual Infrastructure Manager (VIM)

Portable

Distributed

Composable

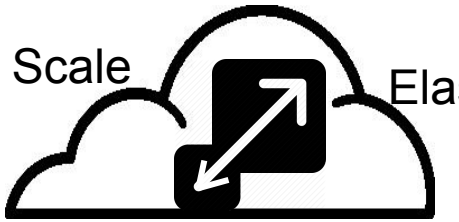
Update & Reuse

Elastic Scale

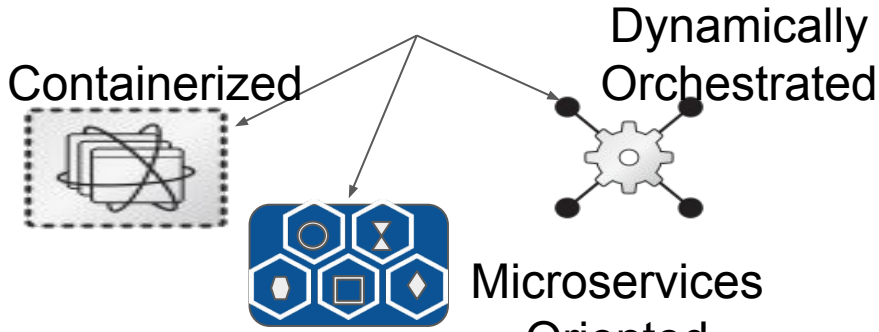
Fault-Tolerant Recoverable

What is the Cloud-Native Telco?

Cloud

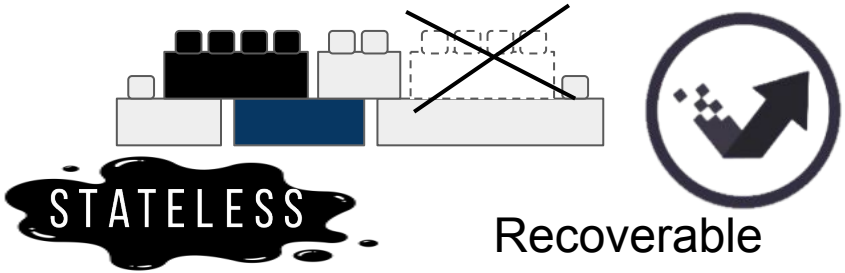


Cloud-Native Architecture

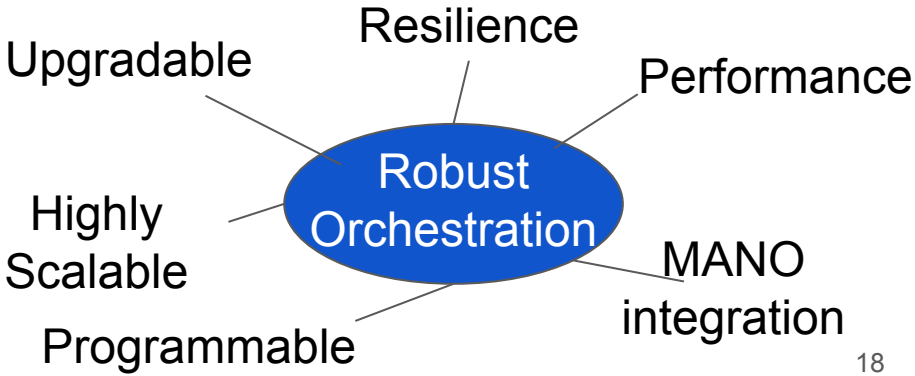


VNF "Cloud-Native" Attributes

Composable & Disposable

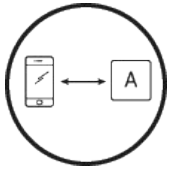


Cloud Native Telco

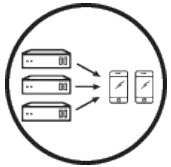



Why Containers?

The Cloud Native Telco Transformation



Monolith



N-Tier

Microservices

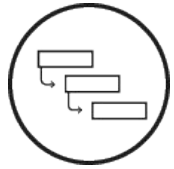
Applications

Datacenter

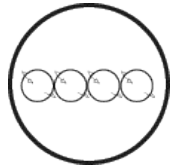
Hosted

Hybrid

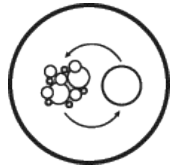
Infrastructures



Waterfall



Agile



DevOps

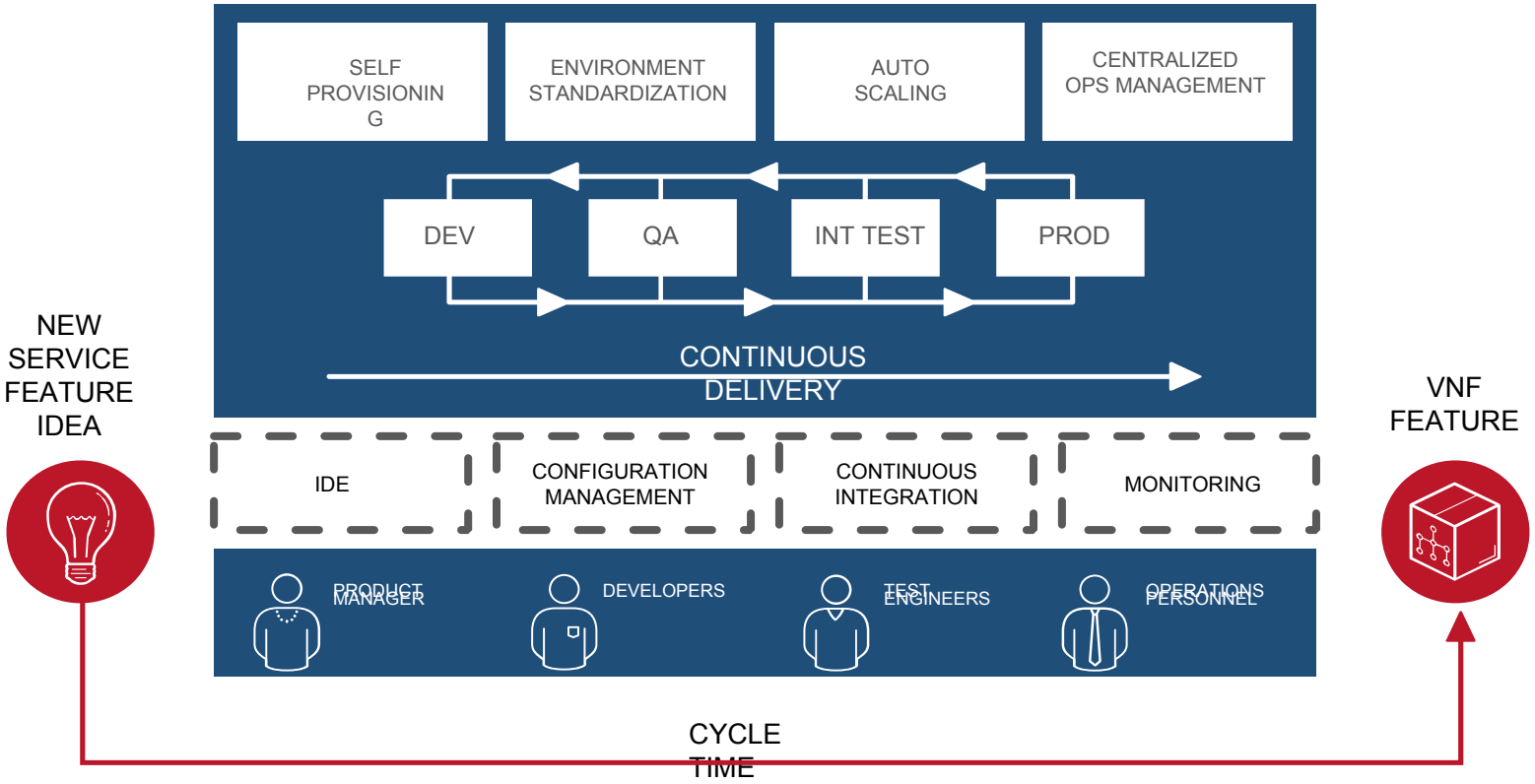
Processes

Containers Evolve VNF Development & Deployment

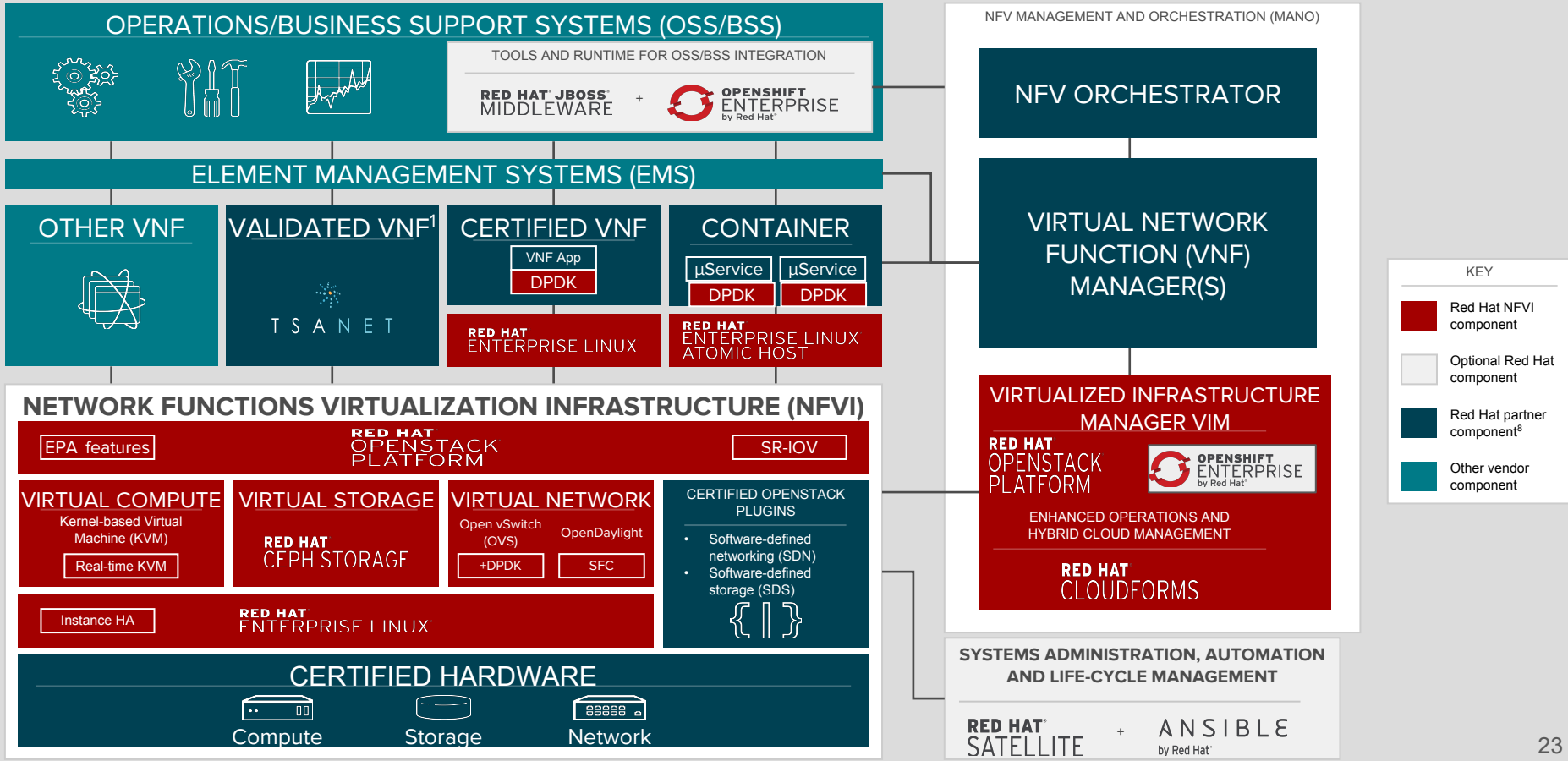
Applications - VNFs	Infrastructure - VNF Orchestration	Process - VNF Deployment
● Apps+libraries-OS ● Package Microservices ● Build quickly ● Faster time to market ● Programmable API	● Containers are Linux ● Portable ● Fast instantiation ● Scale-out ● Higher Density ● Multi-tenancy ● Updates and rollbacks ● Secure reliable OS ● Signed image repos	● Immutable images pushed to any platform ● Smooth transition from Dev to Test to Ops ● Efficient Automation ● Drives Continuous Integration and Continuous Deployment CI/CD

Examples of each:
apps) customer example...deployed much faster, etc.

DevOps for Accelerated VNF Development: CI / CD



Orchestration of VNF Containers



Challenges

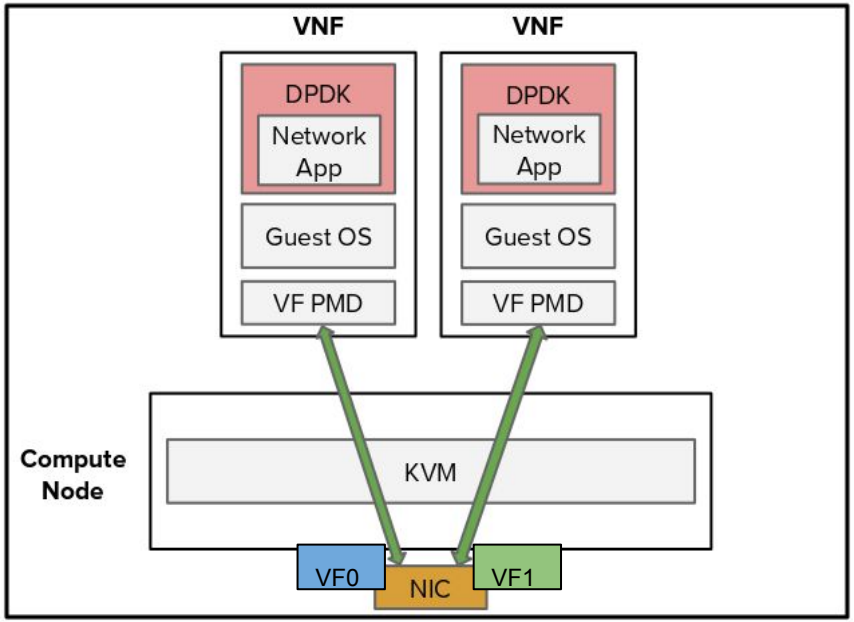
Key Challenges for Cloud-Native VNFs

- Datapath Performance
- Container Network Provisioning
- Orchestration and integration with ETSI Architecture
  - VNF Orchestration
  - Multi-site Orchestration
- Adopting the DevOps Mindset

Datapath Performance

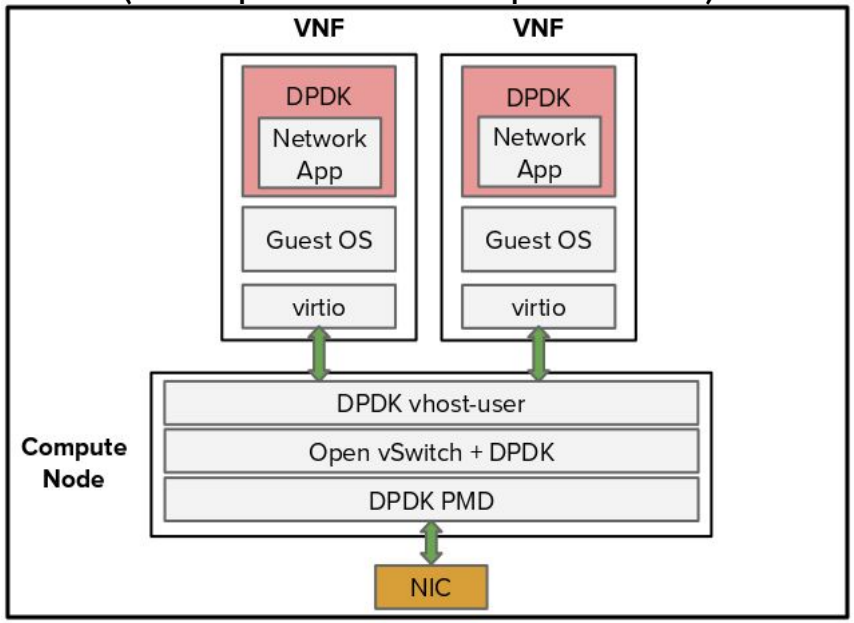
Datapath Acceleration Today

DPDK VNF with SR-IOV
Single-Root IO Virtualization



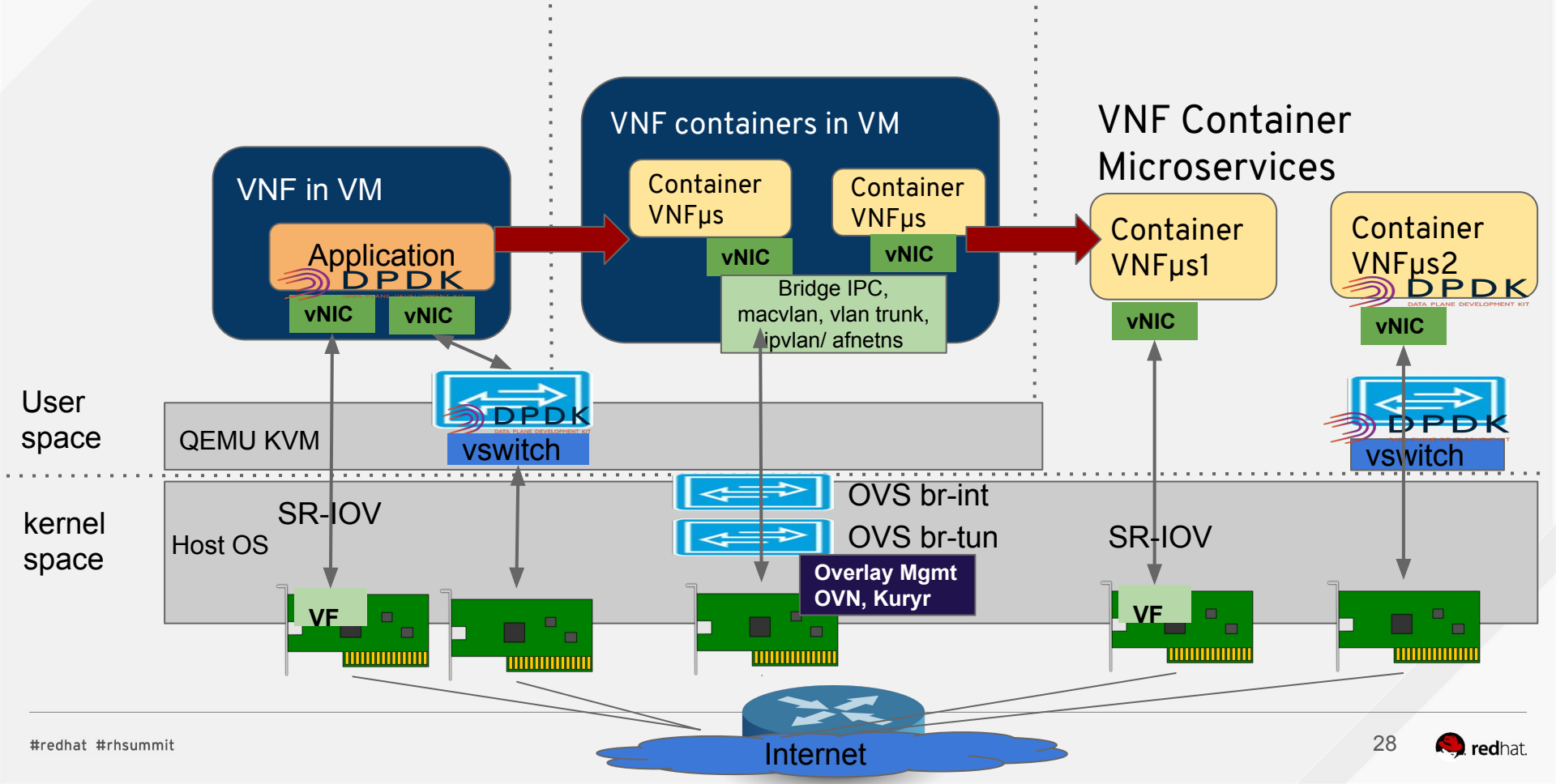
Hardware Dependencies to the NIC
minimum CPU overhead
ToR for switching

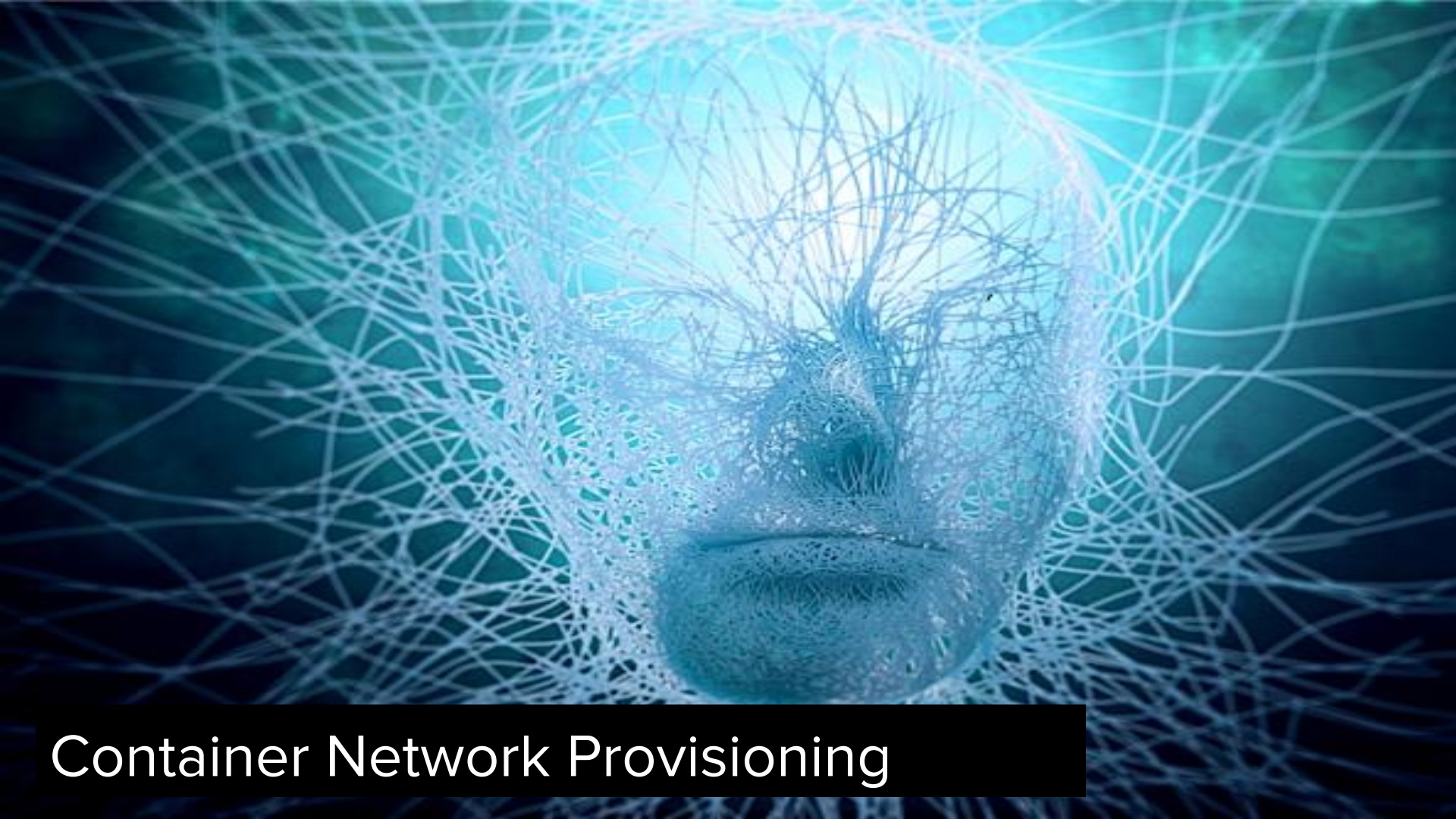
DPDK VNF with
Open vSwitch + DPDK
(data plane development kit)



DPDK - Direct IO to NIC or vNIC
Performance tuning
vSwitch features

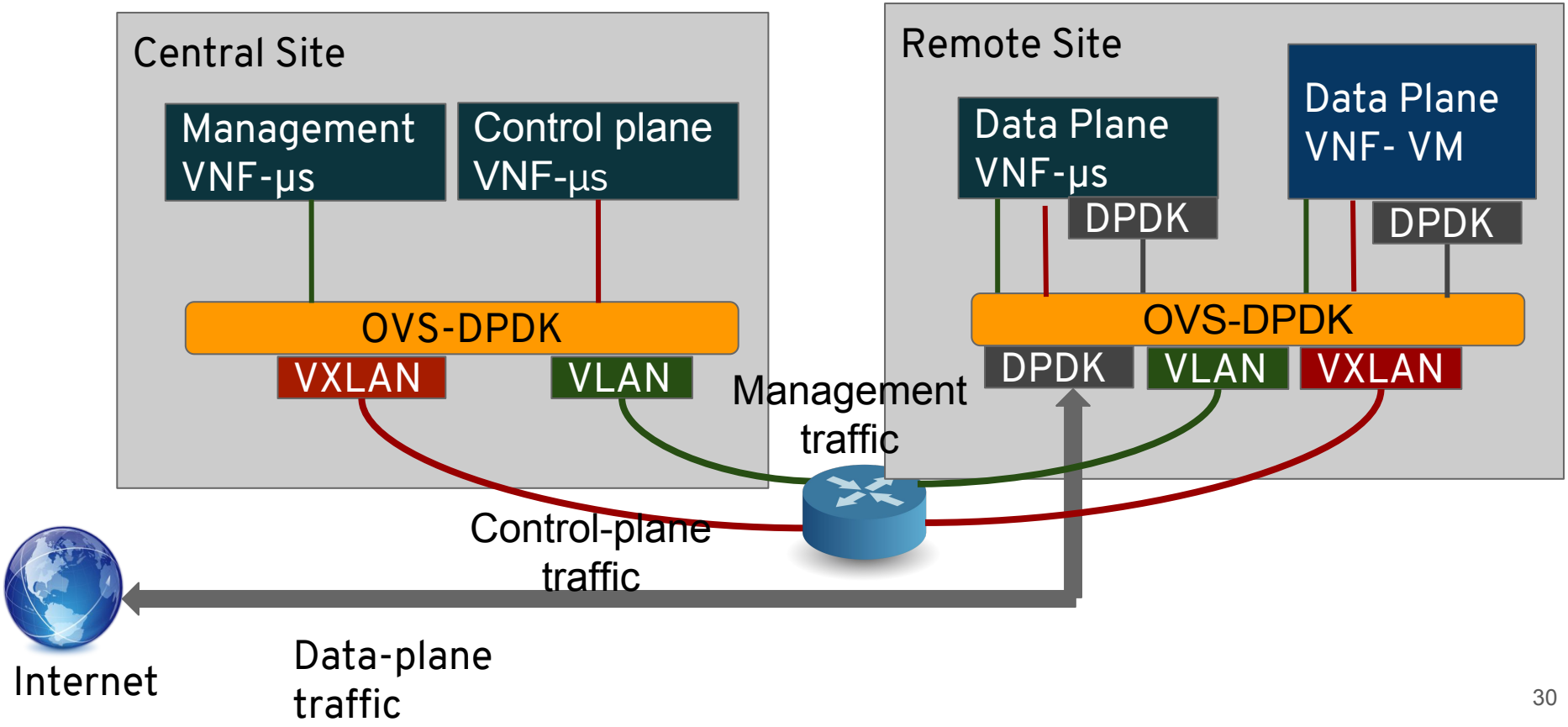
Evolution of Datapath for Containers





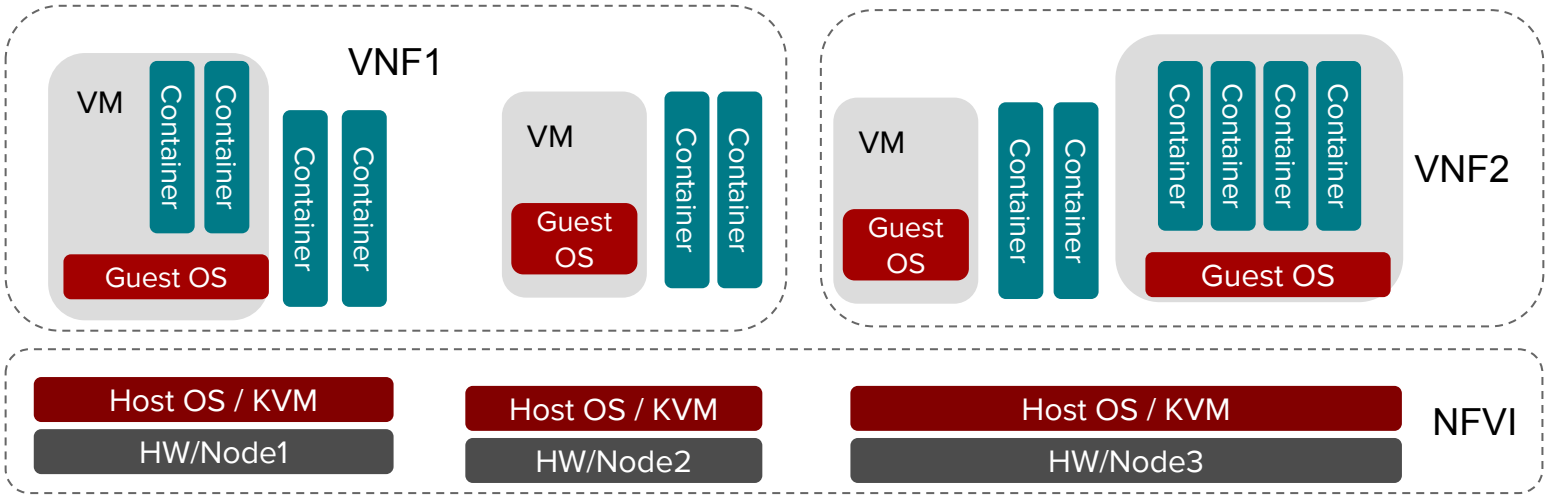
Container Network Provisioning

Container Network Provisioning



VNF Orchestration

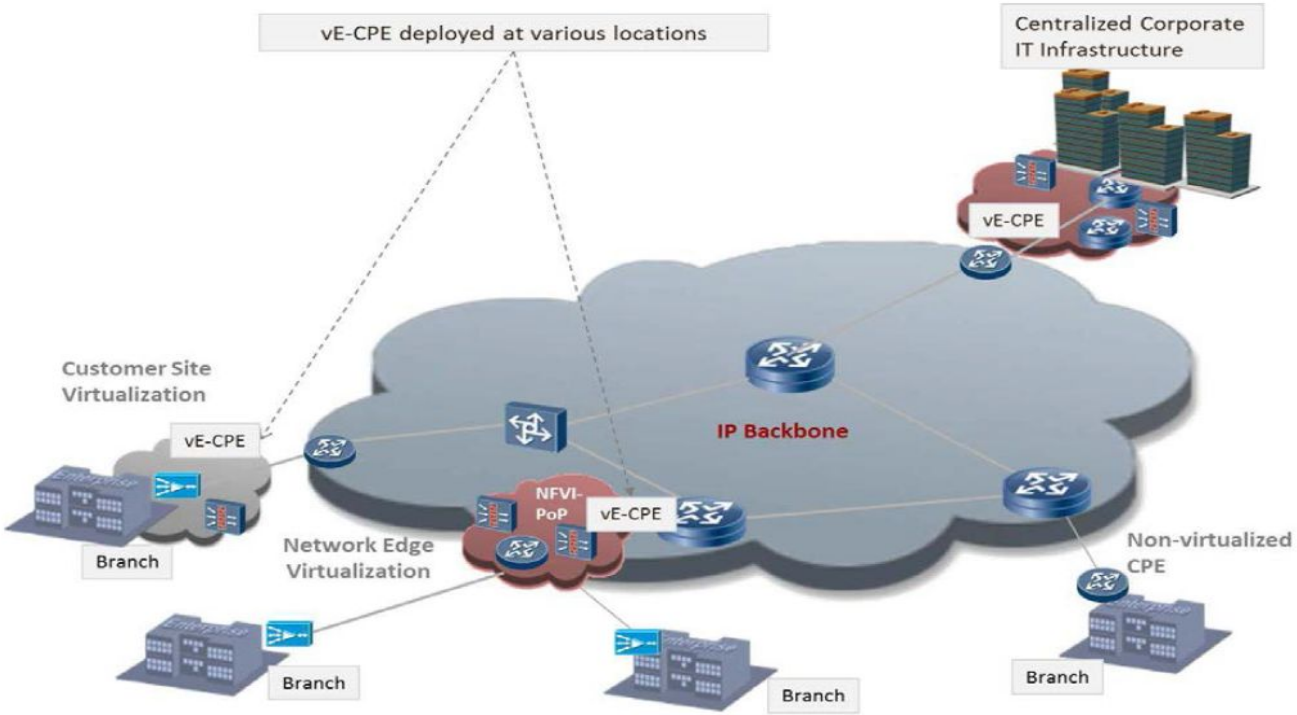
Hybrid VNFs - VMs And Containers Will Co-exist



- Optimum resource usage
- Robust orchestration - Needs coordination between VM and Container schedulers/orchestrators
- Reuse networking services Firewall, Router, Load Balancer


Distributed Multi-Site Orchestration

Distributed NFV vCPE

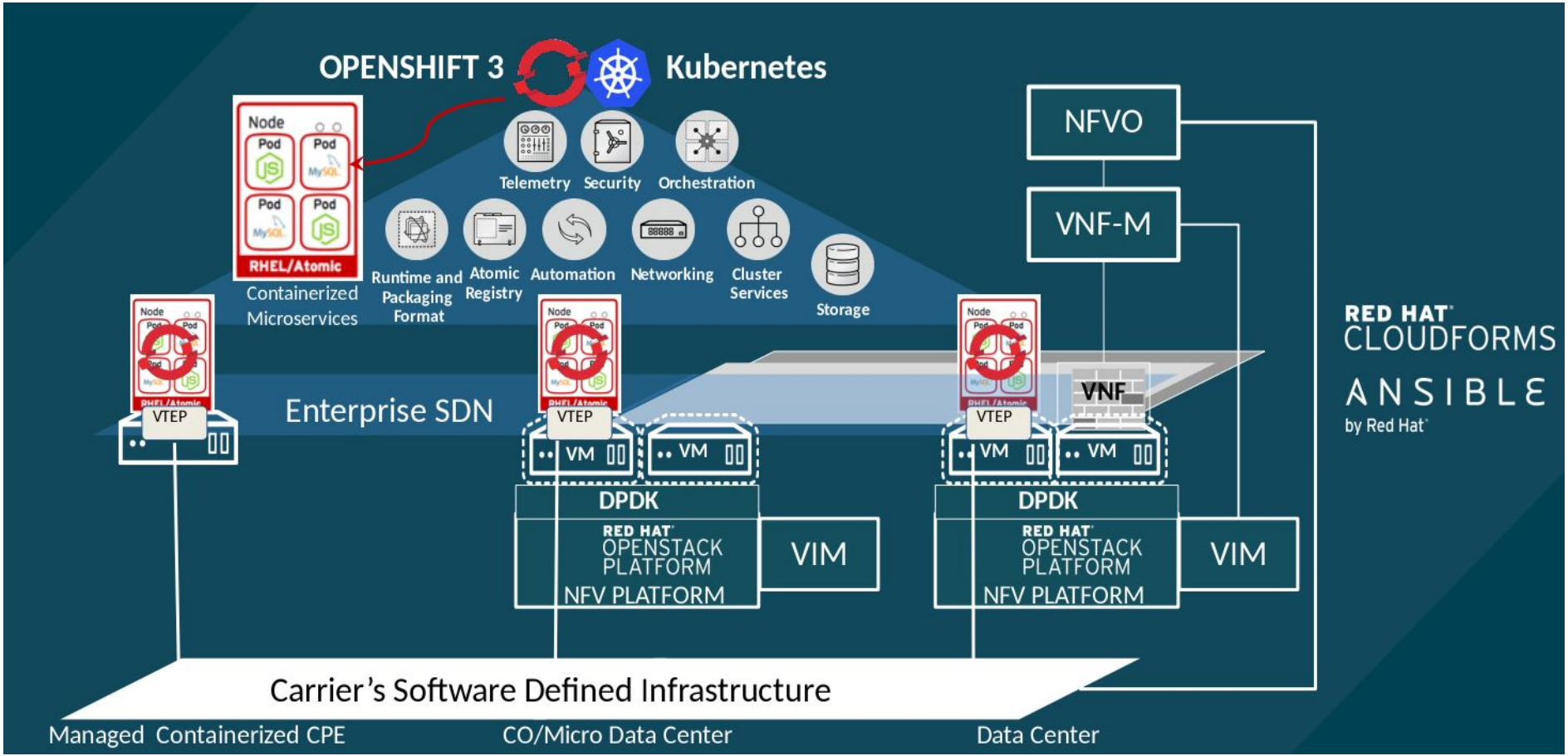


Branch Office and Central office distributed VNFs

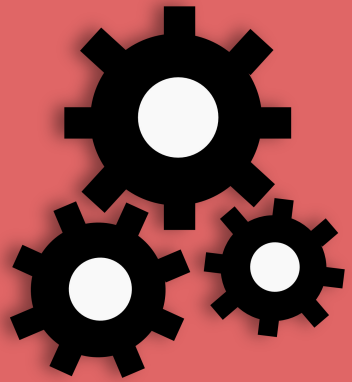
VNF Orchestration needed at all sites

Source: ETSI Use case
http://www.etsi.org/deliver/etsi_gs/nfv/001_099/001/01.01.01_60/gs_nfv001v010101p.pdf

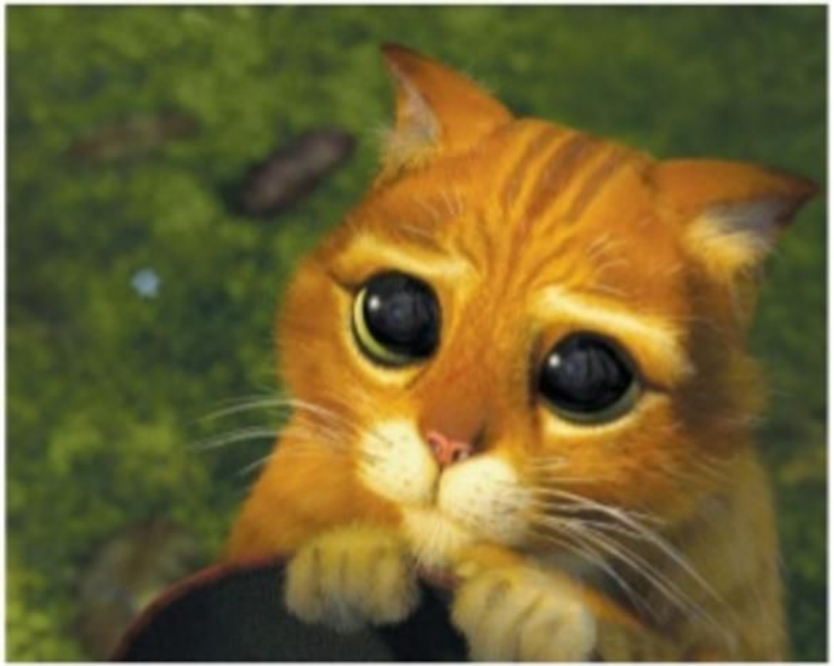
Putting It Together- Managed Containerized CPE



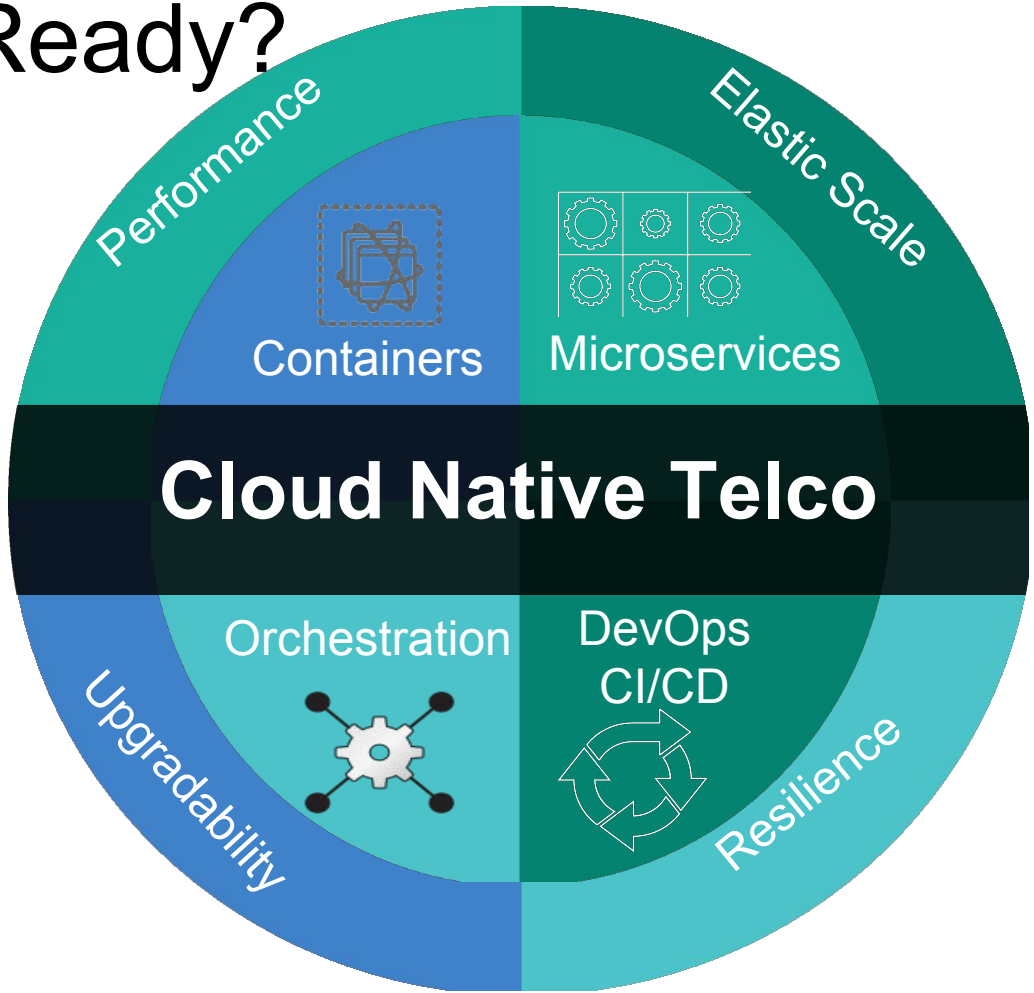
Adopting the DevOps Process



Pets versus Cattle



Are you Ready?




Demo Time!

Thank-you