



# Global Trends – Technology & Adoption

## The promise of NFV - Are we there yet?

**Azhar Sayeed**

Chief Architect Telecommunications

asayeed@redhat.com

July 2017 – India



# Agenda

## Global Trends – Technology, Market Drivers & Customer Adoption

- Cloud & Virtualization – The digital transformation story
- Technology – SDN & NFV Revolution
- Use Cases & Market Drivers
- Customer Adoption
- Road Ahead

# UNDERSTANDING THE DISRUPTIVE FORCE

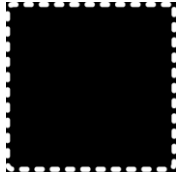
## OPEN SOURCE IS AT THE HEART OF THIS CHANGE

### FANG: Facebook, Amazon, Netflix and Google

- These four companies are years ahead in the use of open source technology, and a major threat to Telcos
- The Telco are forced to react based on threat from these new “Horizontal Business Models”
- They collectively realized the inherent advantages of self-development of open source technology
- Agile and DevOps transformation will allow Telcos to enjoy the same technology advantages, on an equal footing



# THE DIGITAL TRANSFORMATION JOURNEY



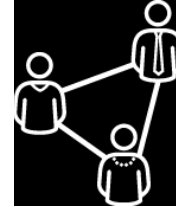
## NEXT-GENERATION ARCHITECTURE

New ways of developing,  
delivering, and integrating  
applications



## CLOUD-NATIVE PLATFORMS

Modernize existing and  
build new cloud-based  
infrastructure



## DEVOPS & CULTURAL CHANGES

More agile process  
across both IT and  
the business

*By 2018, 67% of Global 2000 CEO's will have Digital Transformation at the center of their corporate strategy – IDC 2016*

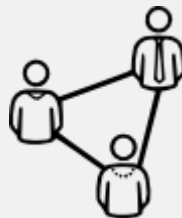
# Digital Transformation

Requires an Evolution in...



## APPLICATIONS

New ways of developing, delivering and integrating applications



## PROCESS

More agile processes across both IT and the business



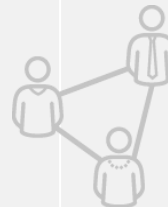
## INFRASTRUCTURE

Modernize existing and build new cloud based infrastructure

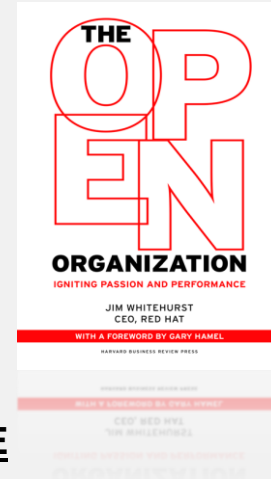
## CHANGE IN CULTURE & MINDSET



Working together creates necessary standardization



Transparency (both access and the ability to act)

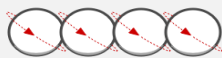


# CLOUD & VIRTUALIZATION JOURNEY

## DIGITAL TRANSFORMATION

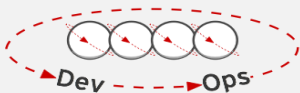
### Development Process

Waterfall



Agile

**DevOps**



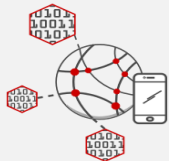
### Application Architecture

Monolithic



N-Tier

**Microservices**



### Deployment & Packaging

Physical Servers



Virtual Servers



**Containers**



### Application Infrastructure

Datacenter



Hosted

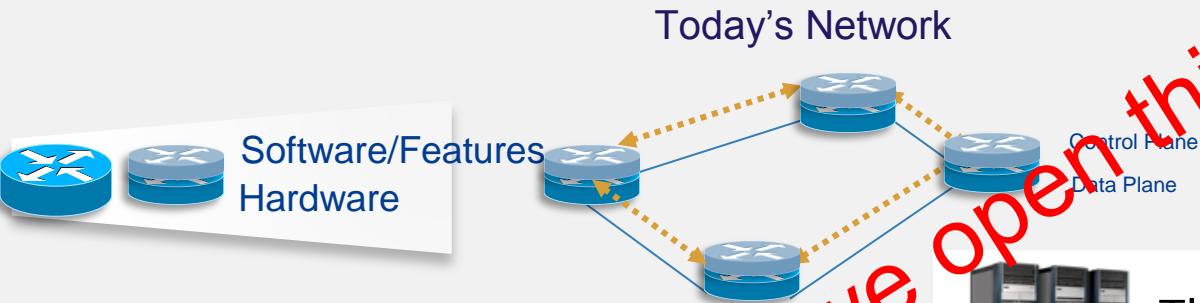


**Cloud**



# SDN – NFV Revolution

# SDN Revolution: Belief - Functionality is locked in the Network Element /device

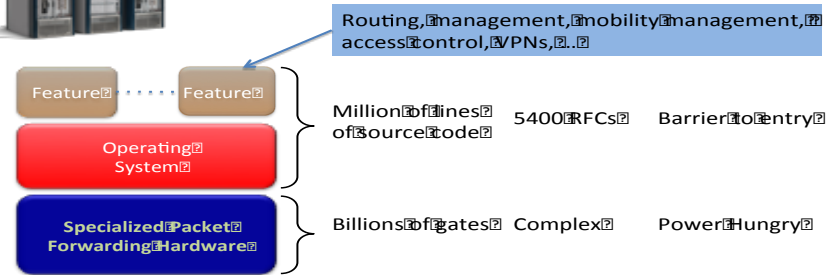


- Complex functions built into the architecture
- Vendors create value through tight coupling
- Closed interfaces
- Smaller players with little influence to change things

So why don't we open this up?



## The Networking Industry (2007)



Many complex functions baked into the infrastructure

OSPF, BGP, multicast, differentiated services, Traffic Engineering, NAT, firewalls, MPLS, redundancy, etc.

An industry with "mainframe-mentality"

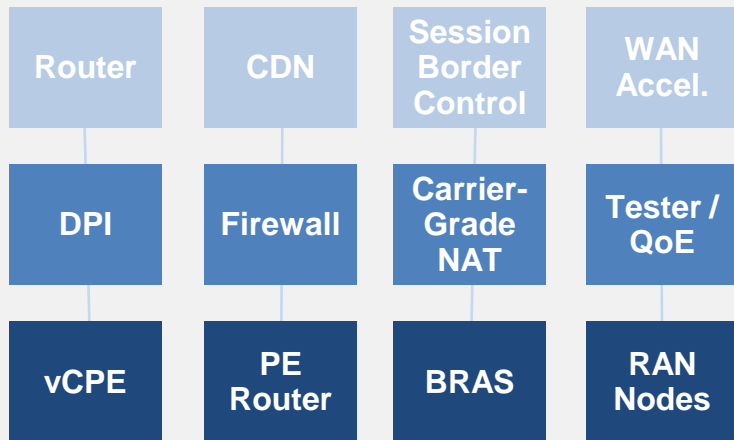
Little ability for non-telco network operators to get what they want

Functionally defined standards but hardware deployed on nodes

Source: ONS Brendon Heller et al



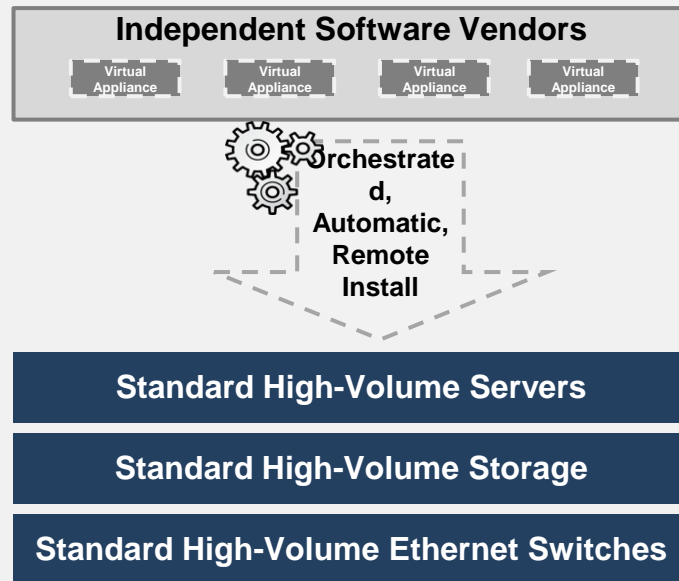
# Why NFV?



- Fragmented non-commodity hardware
- Vertical design
- Physical install (per appliance, per site)

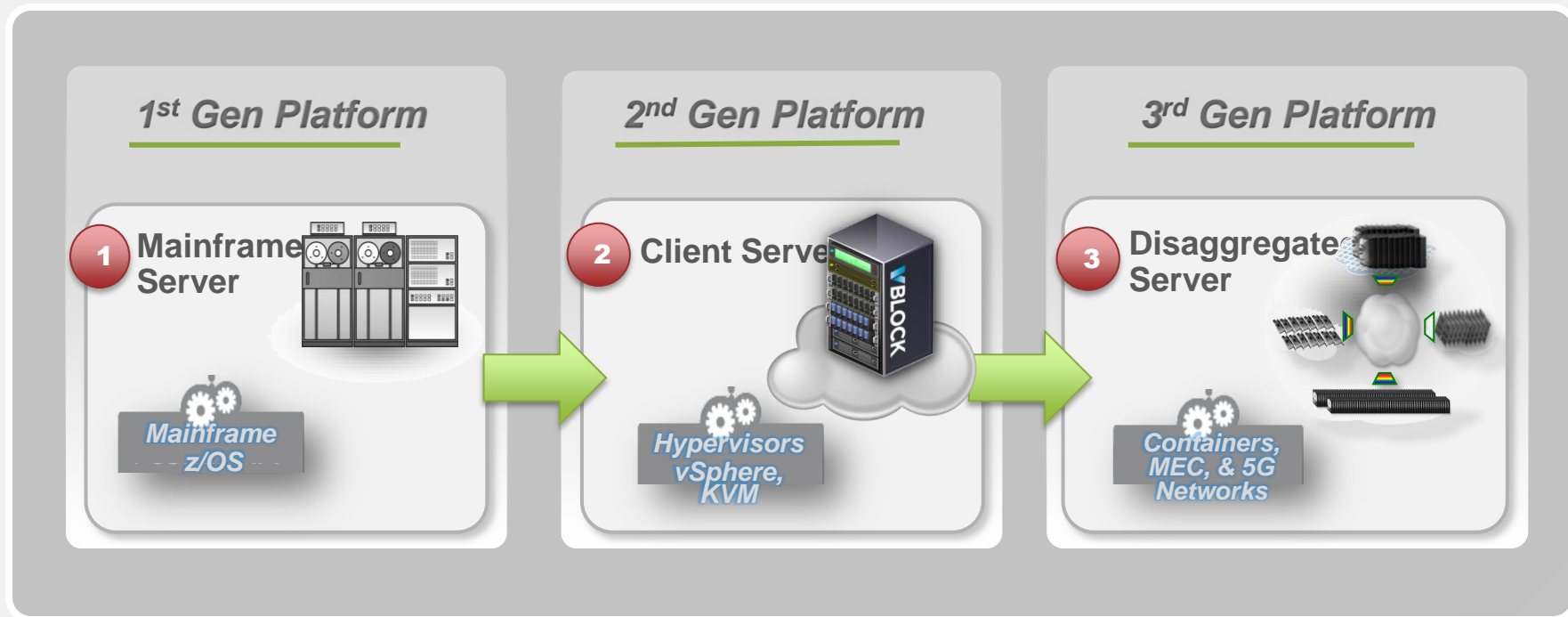
Network Function Virtualization (NFV) allows

- Scale services up and down as demand changes
- To provide a single platform for a variety of applications, tenants and users
- provide new SLA models with assurance and availability of services
- Create and deploy new services while reducing Opex and Capex.



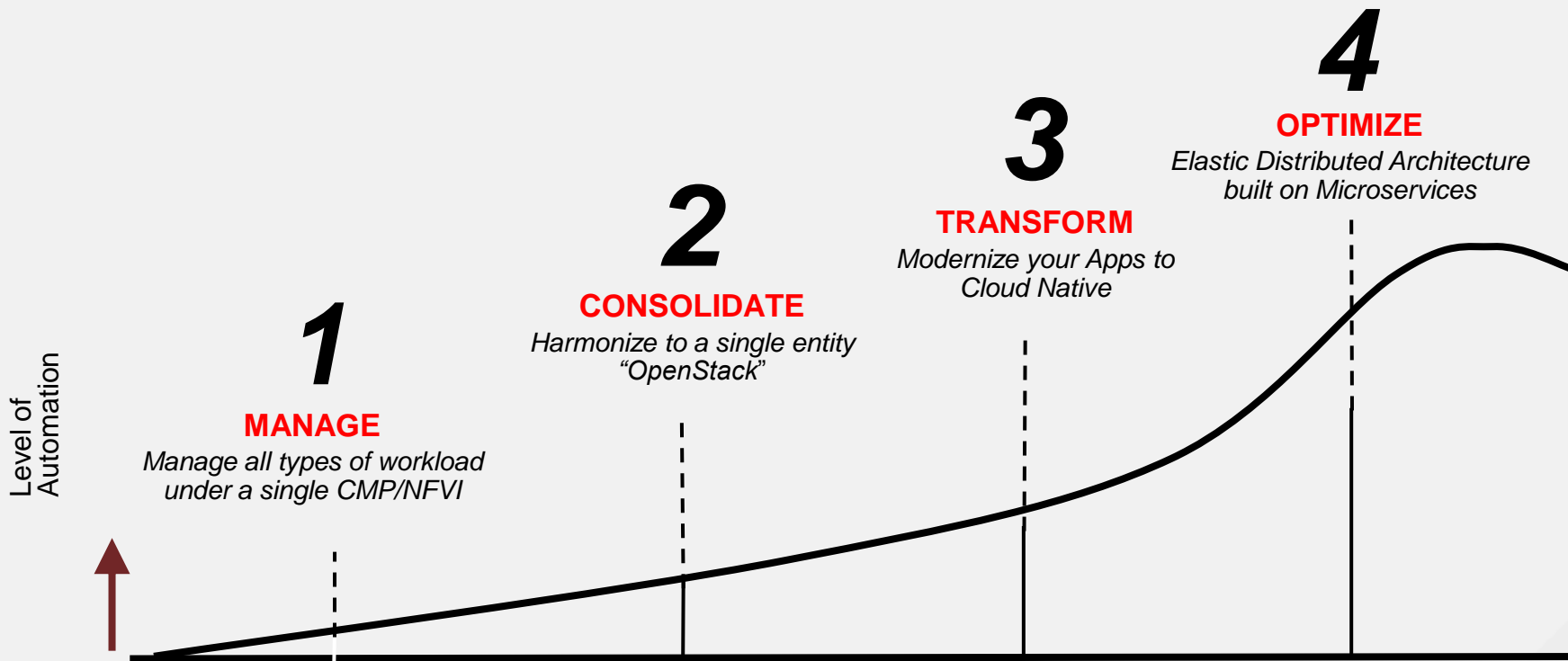
# DISAGGREGATION & DE-COUPLING

## NEXT EVOLUTION - DECOUPLE EVERYTHING



EXPANSION OF OCP, WHITE LABEL & OPEN SOURCE

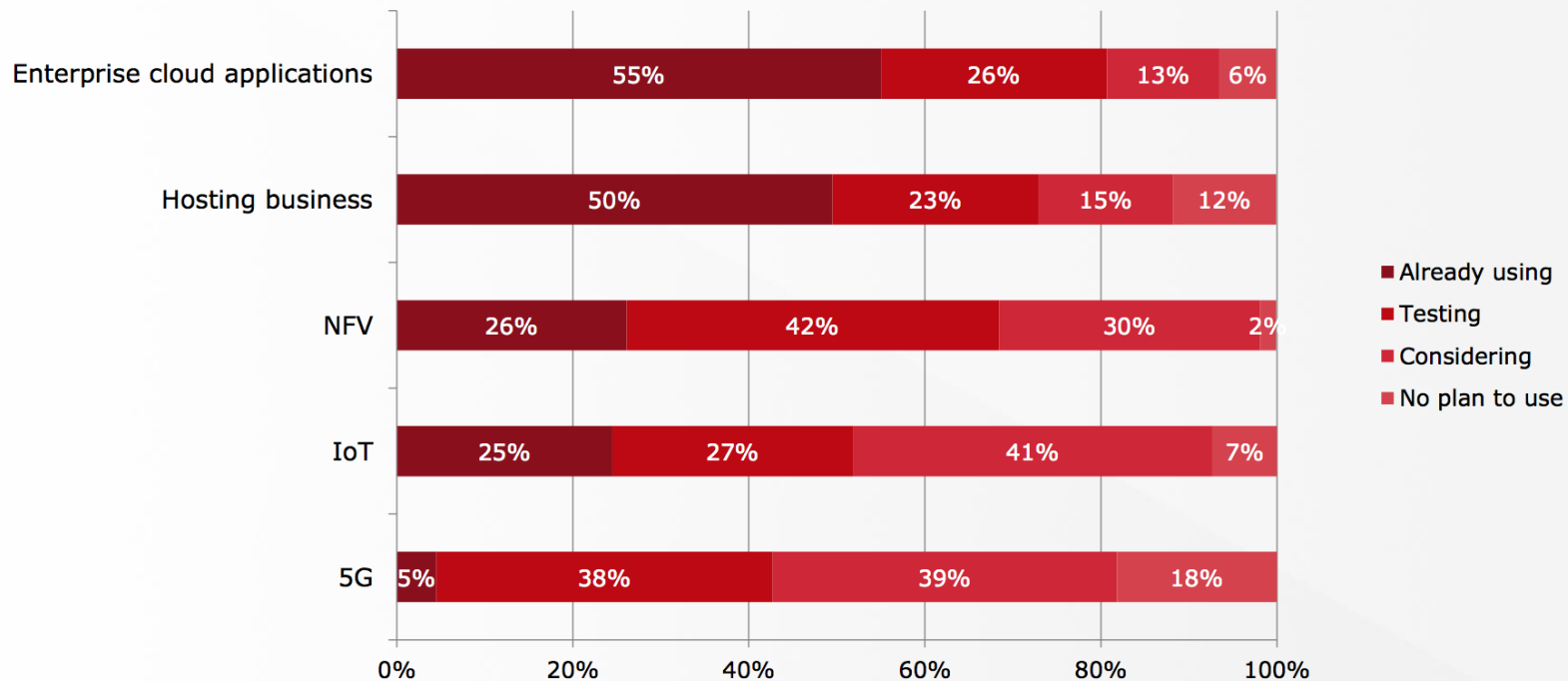
# JOURNEY TO A MICROSERVICES ARCHITECTURE



# USE CASES

## Market Drivers

# Cloud strategy execution status



Source: Heavy Reading service provider survey, August 2016, n=109-111

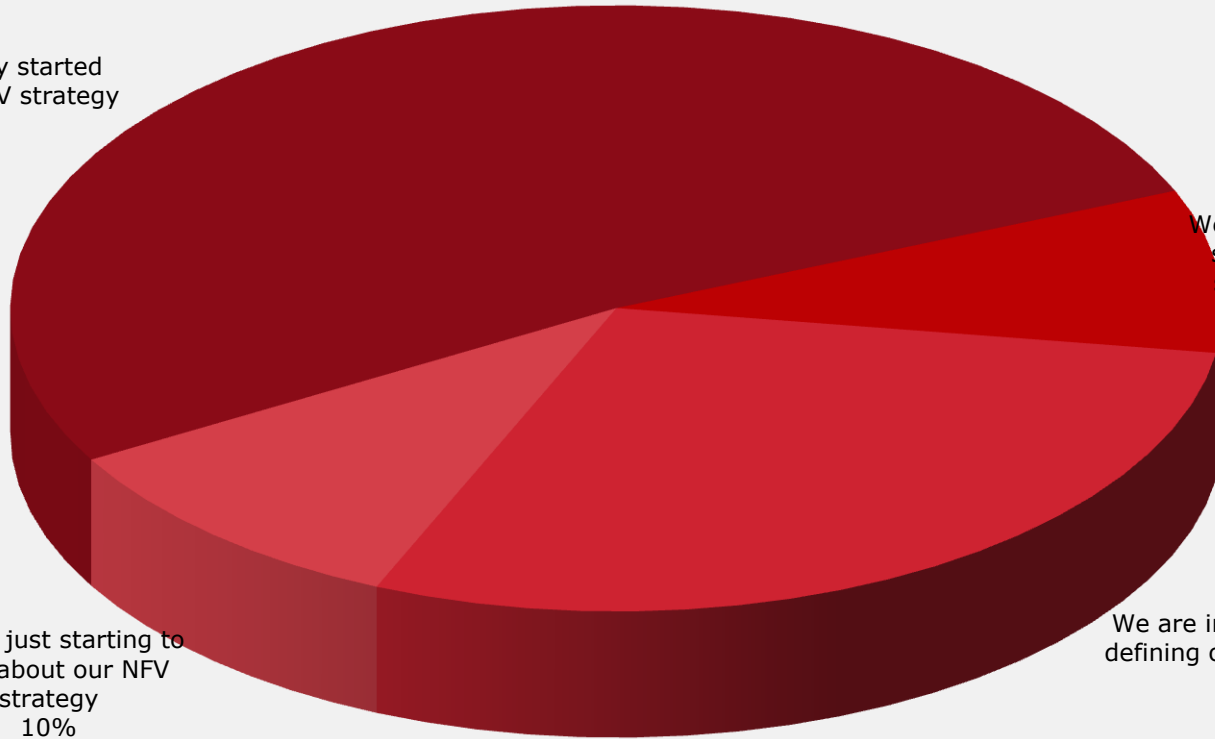
# Status of NFV Strategy

We have already started  
executing our NFV strategy  
52%

We have defined our NFV  
strategy but have not  
started executing yet  
9%

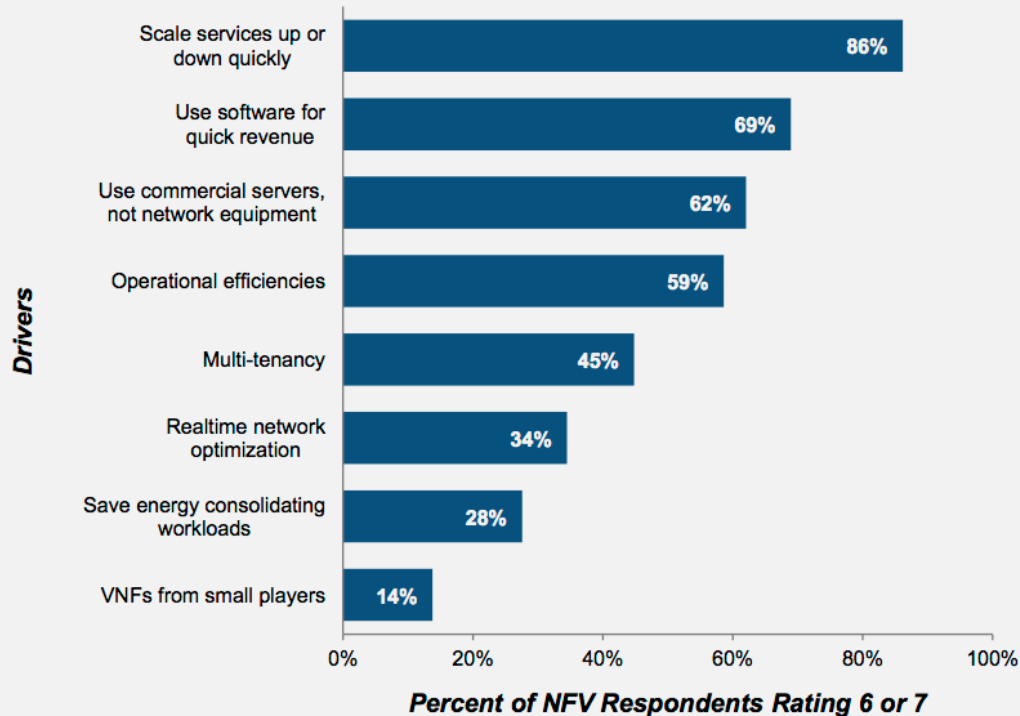
We are just starting to  
think about our NFV  
strategy  
10%

We are in the process of  
defining our NFV strategy  
29%



Source: Heavy Reading Service Provider Survey, October 2016, n=127

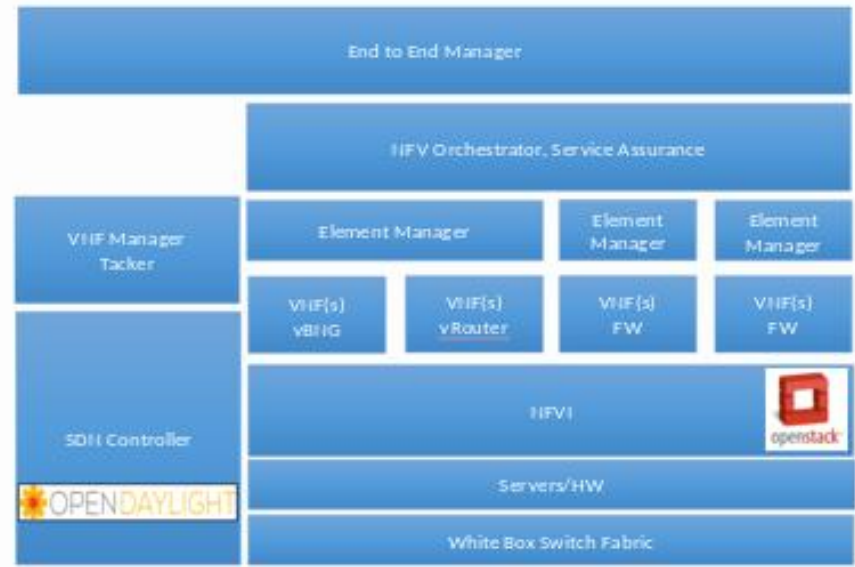
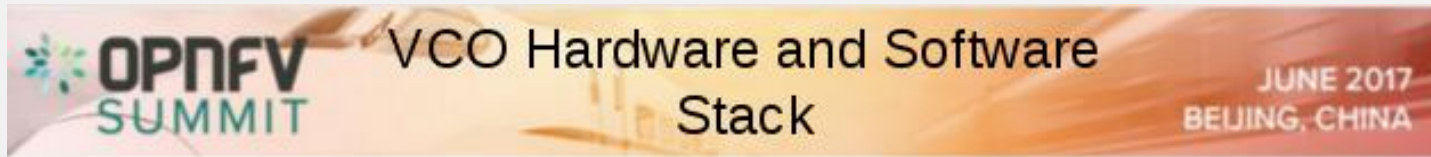
# NFV Deployment Drivers



Infonetics survey indicated reasons why SPs are deploying NFV

- Scaling is cited as single largest reason for deployment
- Costs and Operational Efficiencies
- New Revenue opportunities
- Optimization
- Energy and environmental attributes

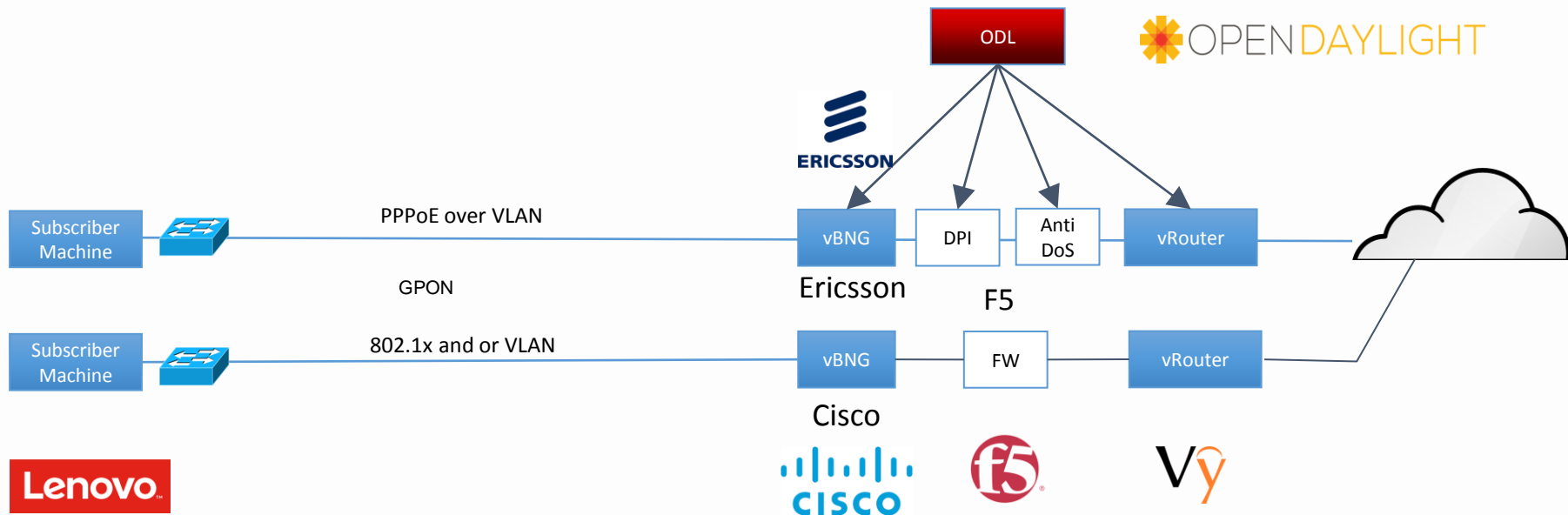
# Virtual Central Office demo@OPNFV summit



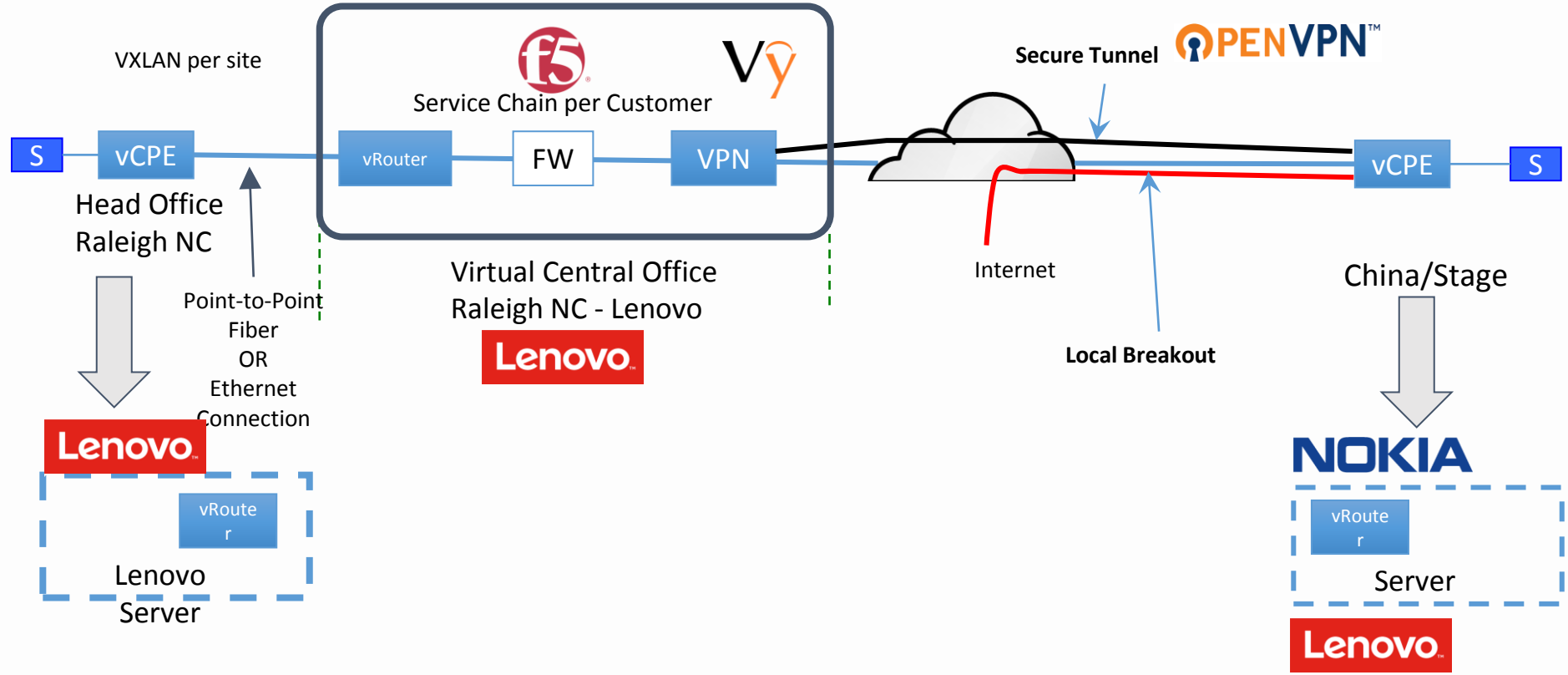
9

RHOSP 10, OPEN DAYLIGHT - Carbon w/ Patch

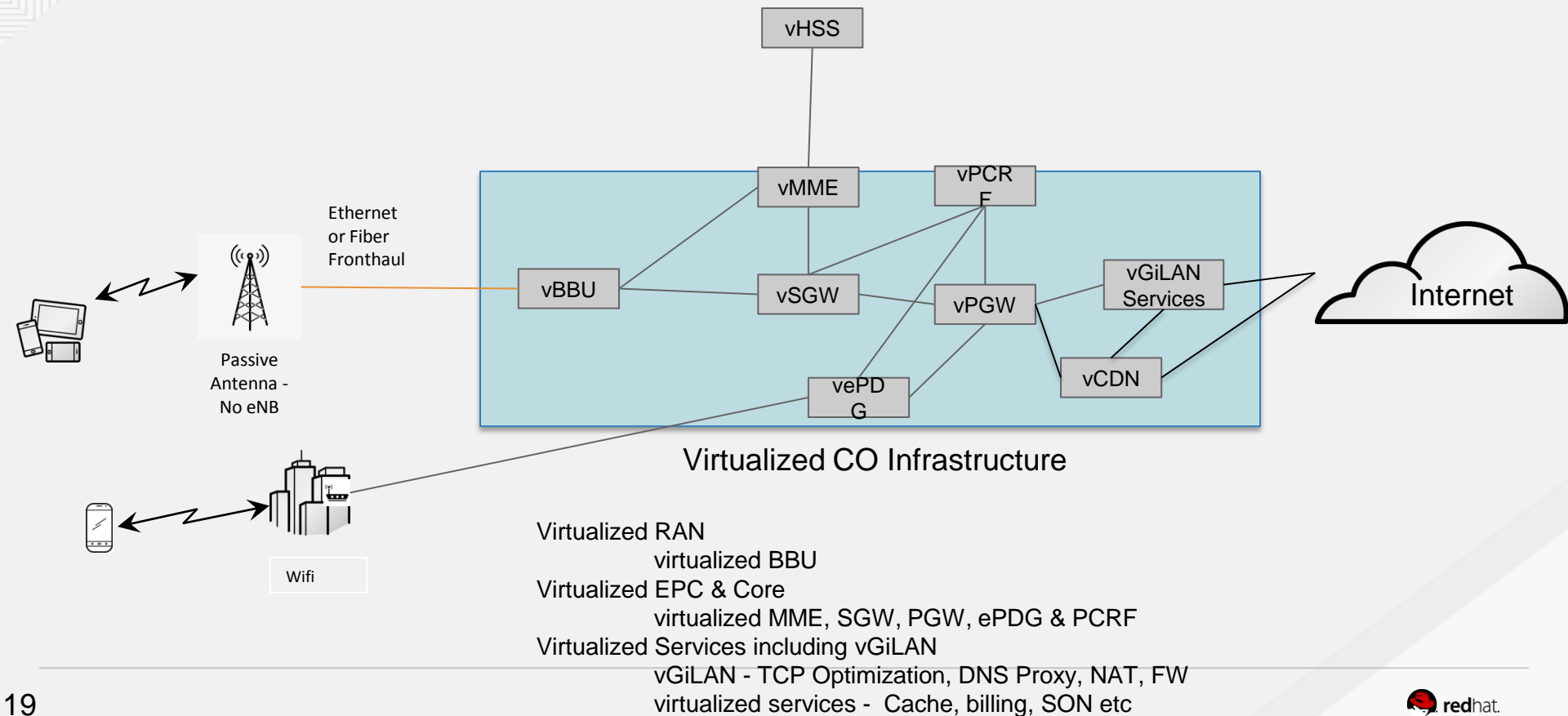




vBNG - Model



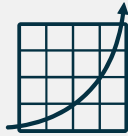
# Mobile Services



# NFV - Use cases

- Security Services
  - vFW - Firewall
  - vALF - Application Level Firewall
  - vIPS - Intrusion Protection
- WAN Access Services
  - WAN Optimization
  - SDWAN
- Virtual VPN concentrator
- Virtualized Central Office
- Residential Services
  - vCPE
  - vEmail Scrubber
  - vIDS - Intrusion Detection - Perimeter Services
  - vQuota Management
  - vPersonal Firewall
- Mobile Services
  - IoT M2M
  - vCPE
  - vBBU/CRAN
  - DAS
- Managed/Business Services
- IPAM - IP Address Management
  - vDNS -
  - vDHCP
  - vNAT
- Data Services
  - vLB - Load Balancer
  - vDPI - Deep Packet Inspection
- Virtual Content Cache Node
  - Video Cache
  - Video Optimization
- Manage Storage Solutions

# Technology Readiness



PERFORMANC  
E

Infrastructure  
Virtual Machine  
VNF  
Networking



AVAILABILITY

System  
VNF  
Networking  
HA – Carrier Grade?



SECURITY

End-to-End



MANAGEABILITY

Multivendor  
End-to-End  
FCAPS



LIFE CYCLE

Telco industry  
life cycle support

# Customer Adoption

# Most common use cases

## NFV

1. vIMS
2. vEPC
3. vCPE – SD-WAN
4. Residential Services
5. Video Storage and Content Management

## IT

1. Back End Virtualization
2. Moving OSS/BSS

# Verizon: NFV Cloud on OpenStack/SDN



Red Hat  
OpenStack  
Platform

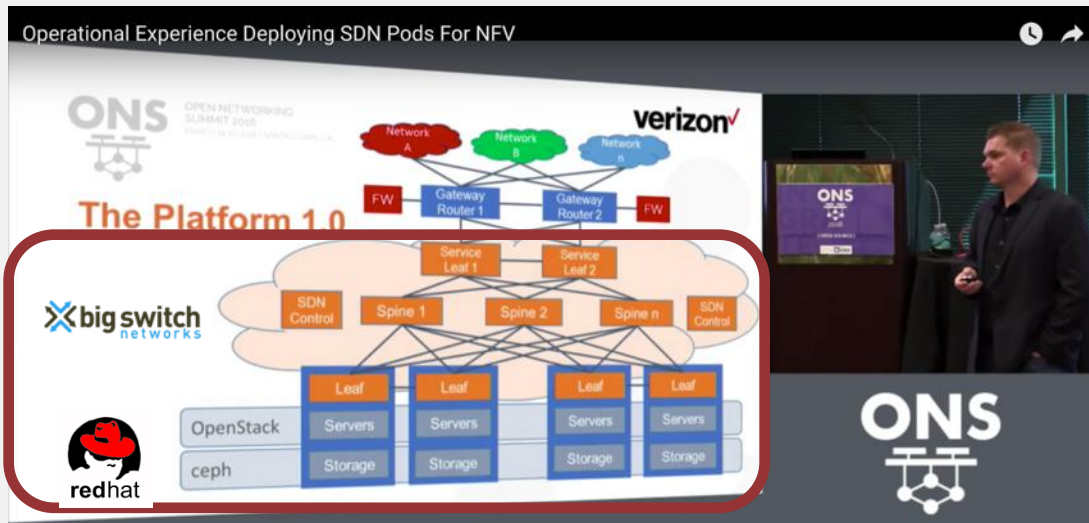


Big  
Cloud  
Fabric



Open  
Networking  
Switches

Open, Vendor-choice



Open  
NFV Cloud  
Advantages

[ACG Research, 2017](#)



47%

Lower overall TCO  
over 5 years



3x

Service agility advantage  
for new service  
enablement



65%

Lower cost to new  
service enablement



<https://youtu.be/d3NrRnDry1M>

Stack Summit Austin: <https://www.youtube.com/v/BHEplutVinw>





# Cloud Infrastructure



## CHALLENGE:

Swisscom wanted to adopt a cloud strategy that would help the company win new corporate and residential customers and compete globally.

## PRODUCTS & SERVICES USED:

RED HAT®  
OPENSTACK®  
PLATFORM

RED HAT®  
VIRTUALIZATION

RED HAT®  
ENTERPRISE LINUX®

RED HAT®  
CONSULTING

## RESULTS:

- Increased scalability, flexibility, and agility to better meet customer needs
- Gained support and resources to embrace a DevOps philosophy
- Created new revenue opportunities in residential and corporate business

*Swisscom is committed to guiding our customers into the digital age. Being a partner for us really means that you're engaged in the way we build our solutions, how we offer them to our customers, and how we develop them in the future. Red Hat is a pivotal partner in this mission.*

**- STEPHAN MASSALT**  
Vice President of Cloud, Swisscom

The video thumbnail shows a 3D architectural diagram of a cloud stack. At the base is a grey layer labeled "Hardware". Above it is a blue layer labeled "OpenStack®". On top of the OpenStack layer is a red layer representing the application or service layer. A play button icon is centered over the diagram.

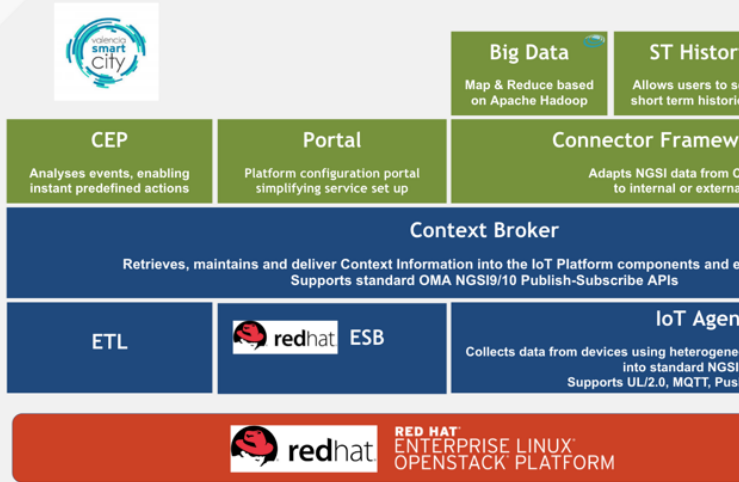
**Swisscom builds modern cloud solution with Red Hat**

Telecom provider Swisscom built a secure, unified, and flexible cloud platform with Red Hat OpenStack Platform and Red Hat Virtualization to help guide customers into the digital age.

# IoT Smart City



## SMART CITY PLATFORM COMPONENTS



#redhat #rhsummit

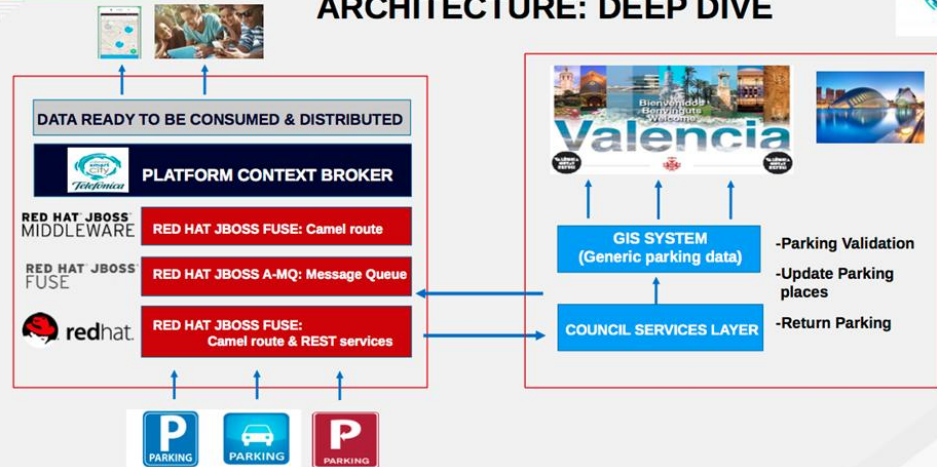
- Valencia has selected Telefonica's Global Internet of Things (IoT) platform
- Allowing citizens to consume real-time



ities



## ARCHITECTURE: DEEP DIVE



# Road Ahead

# TELCO CLOUDS ARE **MULTIMODAL** INFRASTRUCTURES

## UNIQUE MULTIMODAL ENABLEMENT

ANSIBLE  
by Red Hat<sup>®</sup>



RED HAT<sup>®</sup>  
CLOUDFORMS<sup>™</sup>



RED HAT<sup>®</sup> JBOSS<sup>™</sup>  
MIDDLEWARE<sup>™</sup>



PHYSICAL

RED HAT<sup>®</sup>  
ENTERPRISE LINUX<sup>™</sup>



VIRTUAL

RED HAT<sup>®</sup>  
ENTERPRISE  
VIRTUALIZATION



PRIVATE CLOUD

RED HAT<sup>®</sup>  
ENTERPRISE LINUX<sup>™</sup>  
OPENSTACK<sup>™</sup> PLATFORM

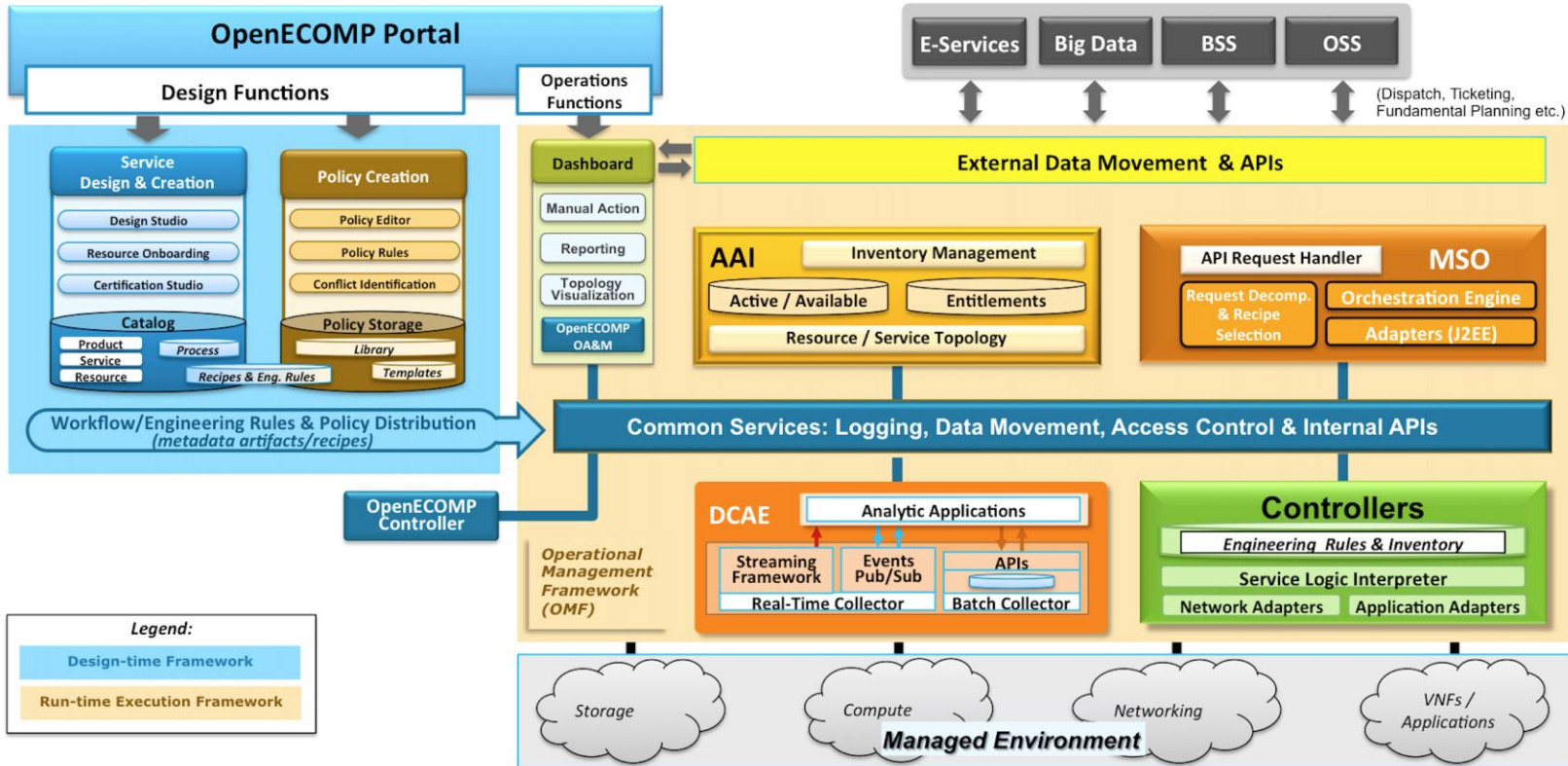


PUBLIC CLOUD

OPENSIFT<sup>™</sup>  
by Red Hat

RED HAT<sup>®</sup>  
STORAGE

# ONAP – E-COMP + Open-O



# Road Ahead

SDI for Telco & IT



Big Data



Hybrid Cloud



Operational Tools



Software Defined  
Storage



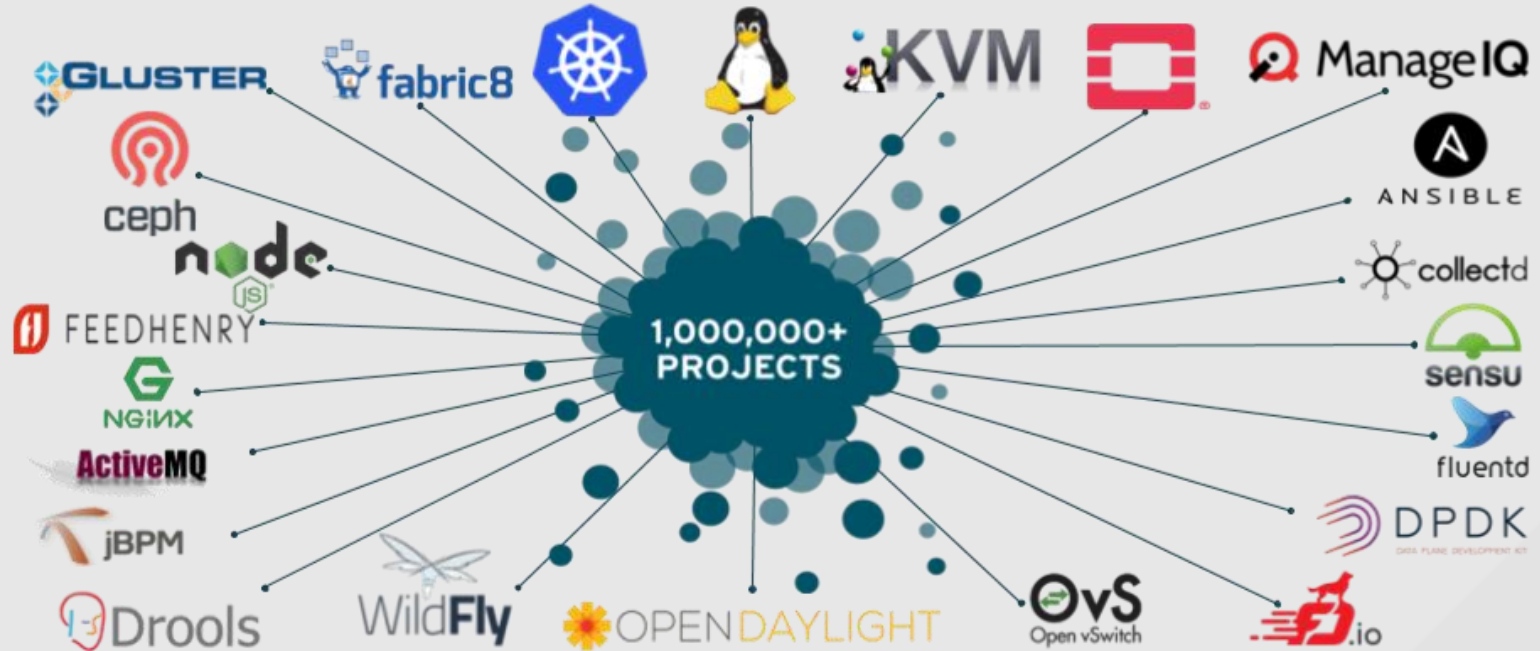
IoT Infrastructure



**IT'S NOT JUST SCALE - BUT IT'S THE SPEED OF SCALE**

# Open Source Innovation

Key to Digital Transformation





# THANK YOU



[plus.google.com/+RedHat](https://plus.google.com/+RedHat)



[facebook.com/redhatinc](https://facebook.com/redhatinc)



[linkedin.com/company/red-hat](https://linkedin.com/company/red-hat)



[twitter.com/RedHatNews](https://twitter.com/RedHatNews)



[youtube.com/user/RedHatVideos](https://youtube.com/user/RedHatVideos)