Global Trends – Technology & Adoption

The promise of NFV - Are we there yet?

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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

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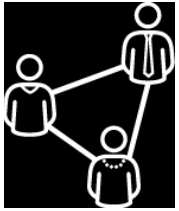
THE DIGITAL TRANSFORMATION JOURNEY

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

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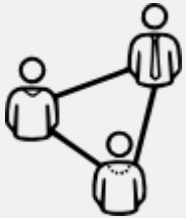
Digital Transformation

Requires an Evolution in...

APPLICATIONS

New ways of developing, delivering and integrating applications



PROCESS

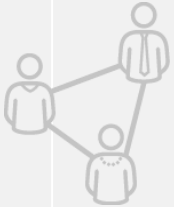
More agile processes across both IT and the business

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)

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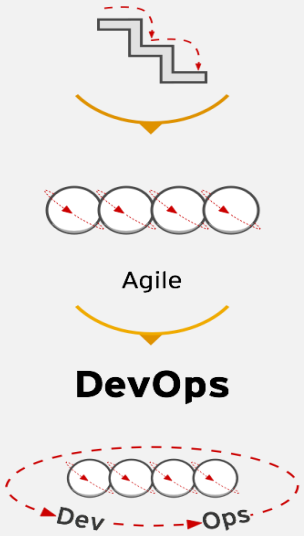
CLOUD & VIRTUALIZATION JOURNEY
DIGITAL TRANSFORMATION

Development Process	Application Architecture	Deployment & Packaging	Application Infrastructure
Waterfall	Monolithic	Physical Servers	Datacenter
Agile	N-Tier	Virtual Servers	Hosted
DevOps	**Microservices**	**Containers**	**Cloud**



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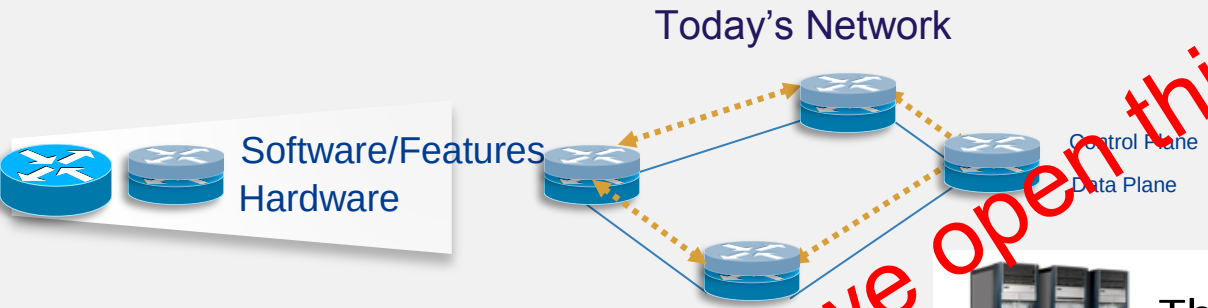
SDN – NFV Revolution

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



So why don't we open this up ?

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

The Networking Industry (2007)

Routing, management, mobility management, access control, VPNs, ...

Feature · · · · · · Feature

Operating System

Million of lines of source code | 5400 RFCs | Barrier to entry

Specialized Packet Forwarding Hardware

Billions of gates | Complex | Power Hungry

Many complex functions baked into the infrastructure

OSPF, BGP, multicast, differentiated services, Traffic Engineering, NAT, firewalls, MPLS, redundant layers

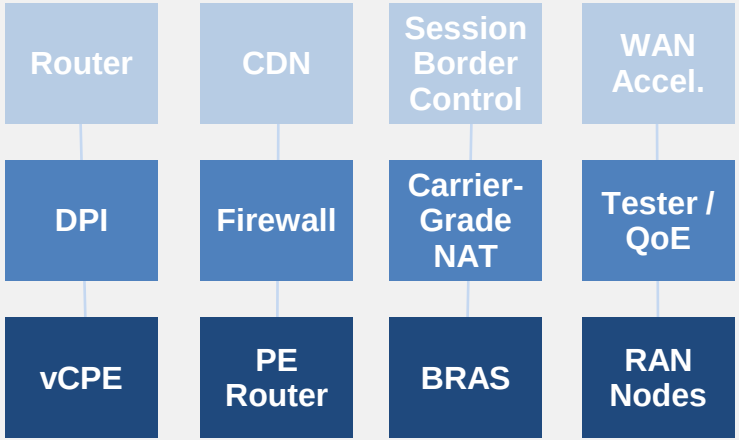
An industry with a "mainframe-mentality"

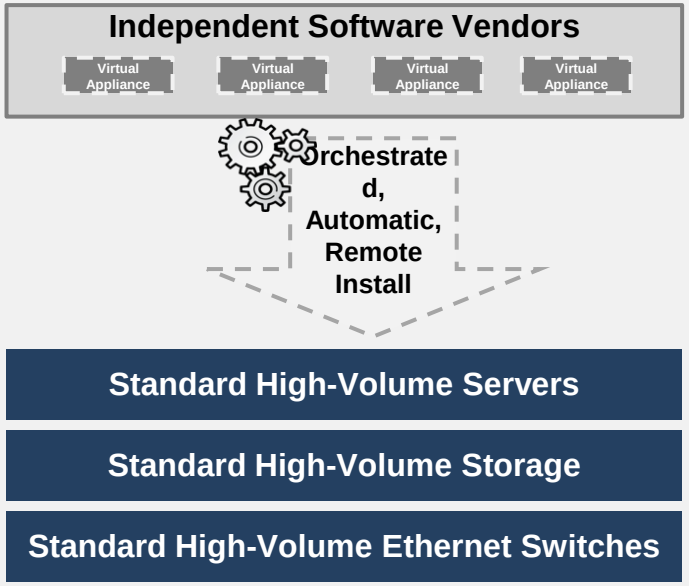
Little ability for non-telco network operators to get what they want

Functionality defined by standards, but implemented, deployed on nodes

Source:ONS Brendon Heller et-all

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.

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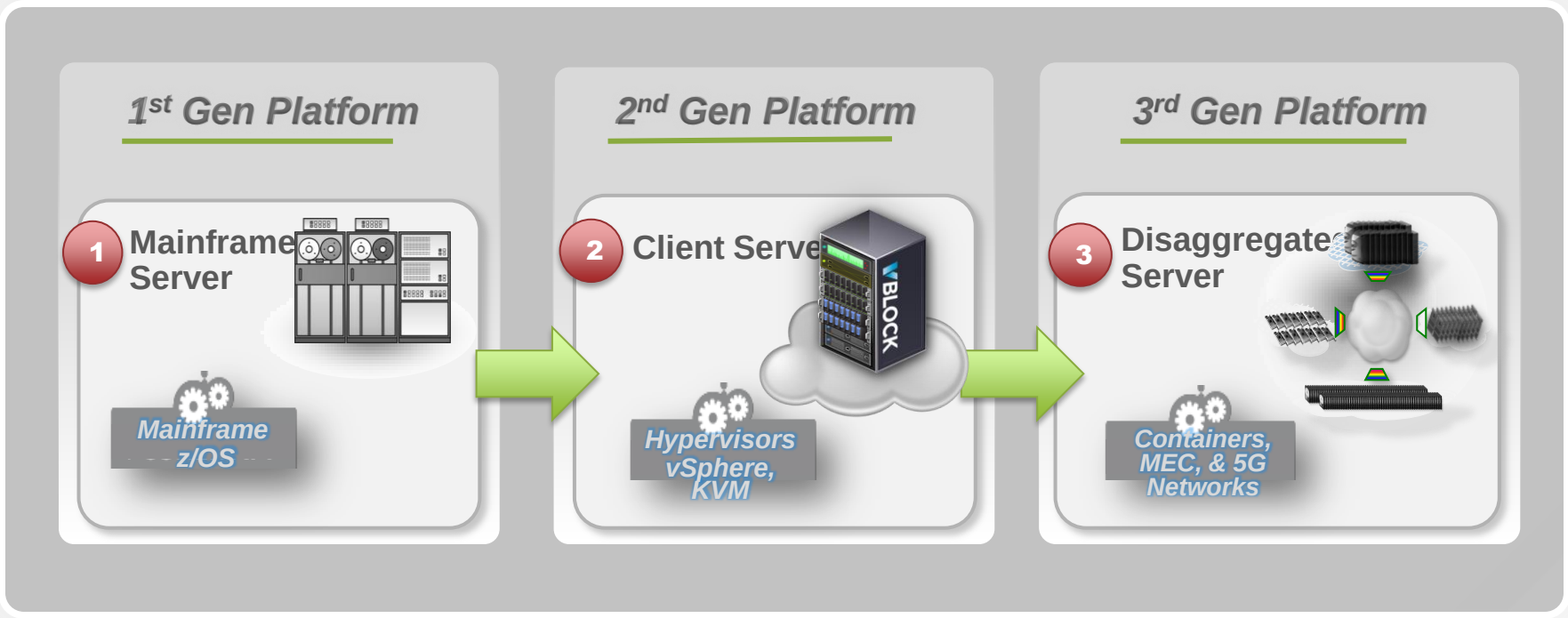
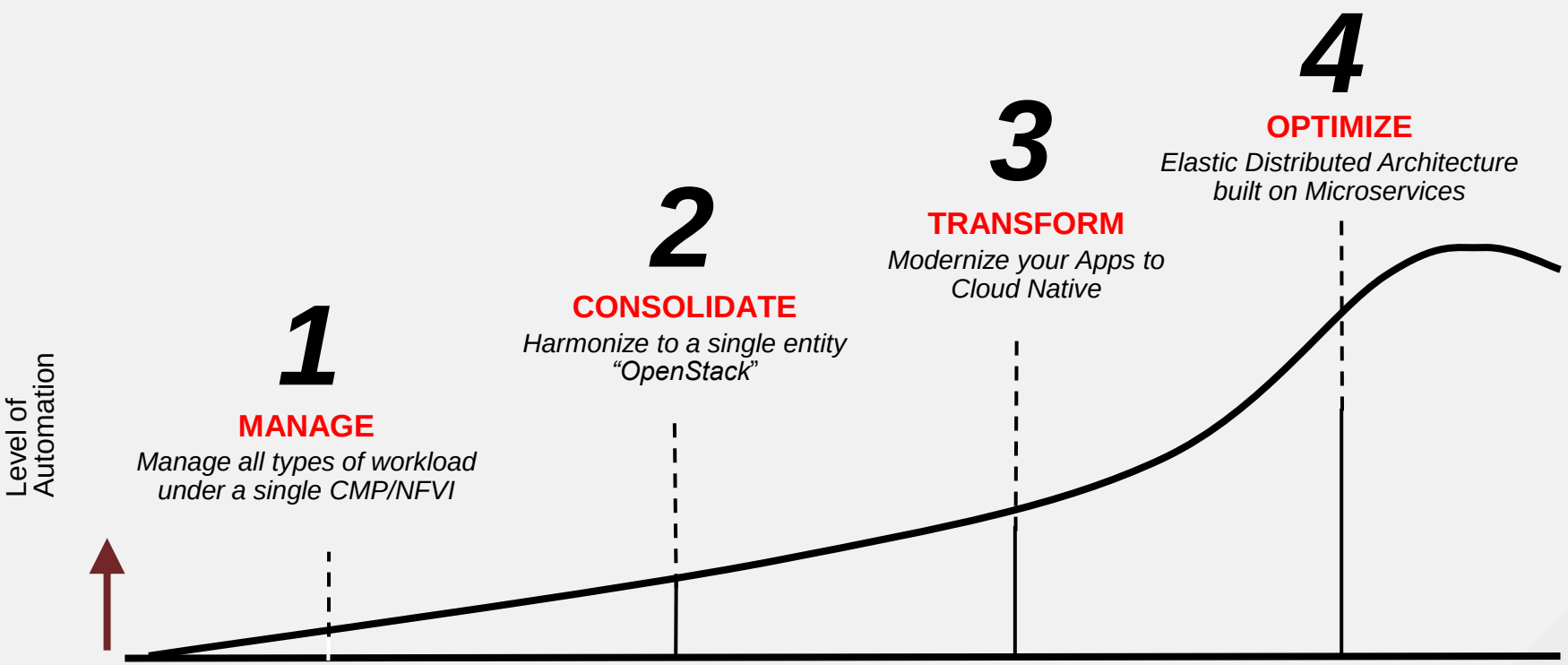
DISAGGREGATION & DE-COUPLING

NEXT EVOLUTION - DECOUPLE EVERYTHING



EXPANSION OF OCP, WHITE LABEL & OPEN SOURCE

JOURNEY TO A MICROSERVICES ARCHITECTURE



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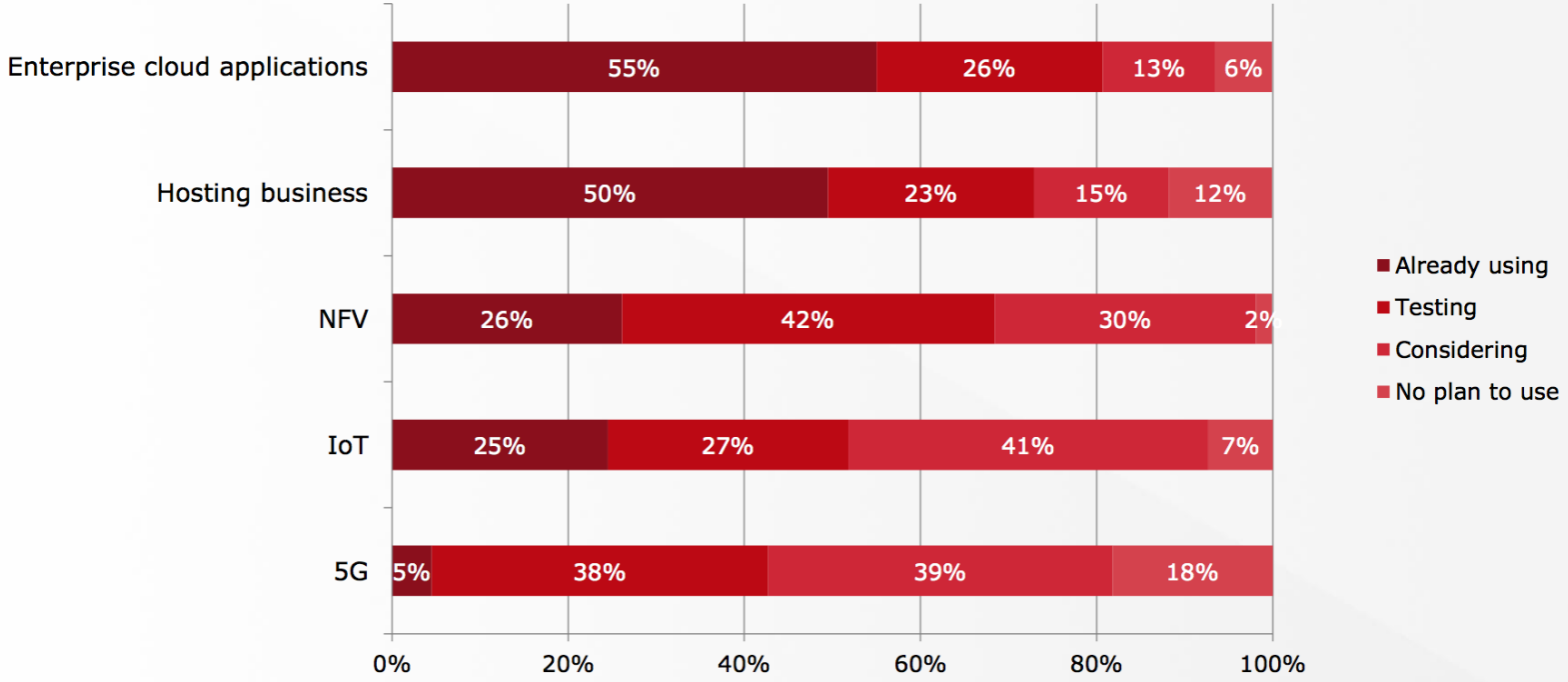
USE CASES
Market Drivers

Cloud strategy execution status



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

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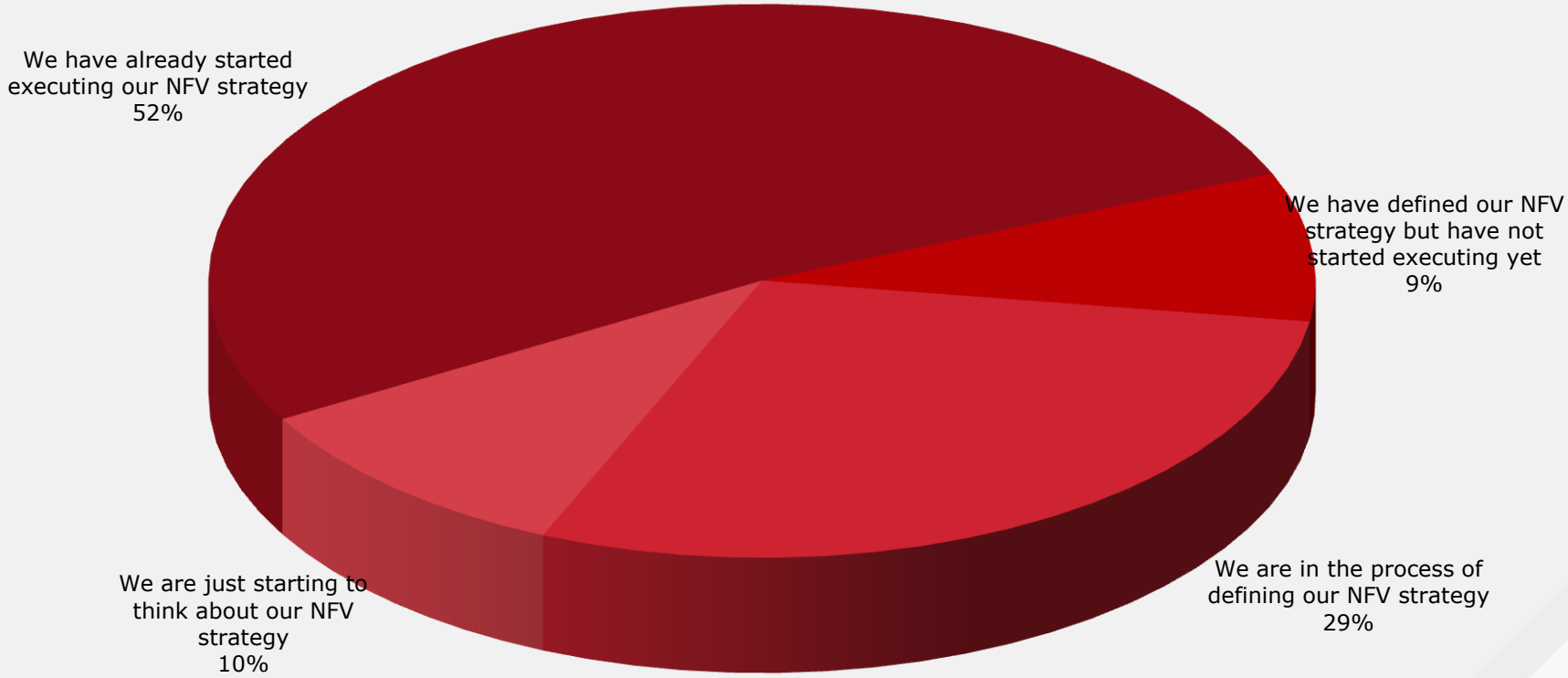
Status of NFV Strategy



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

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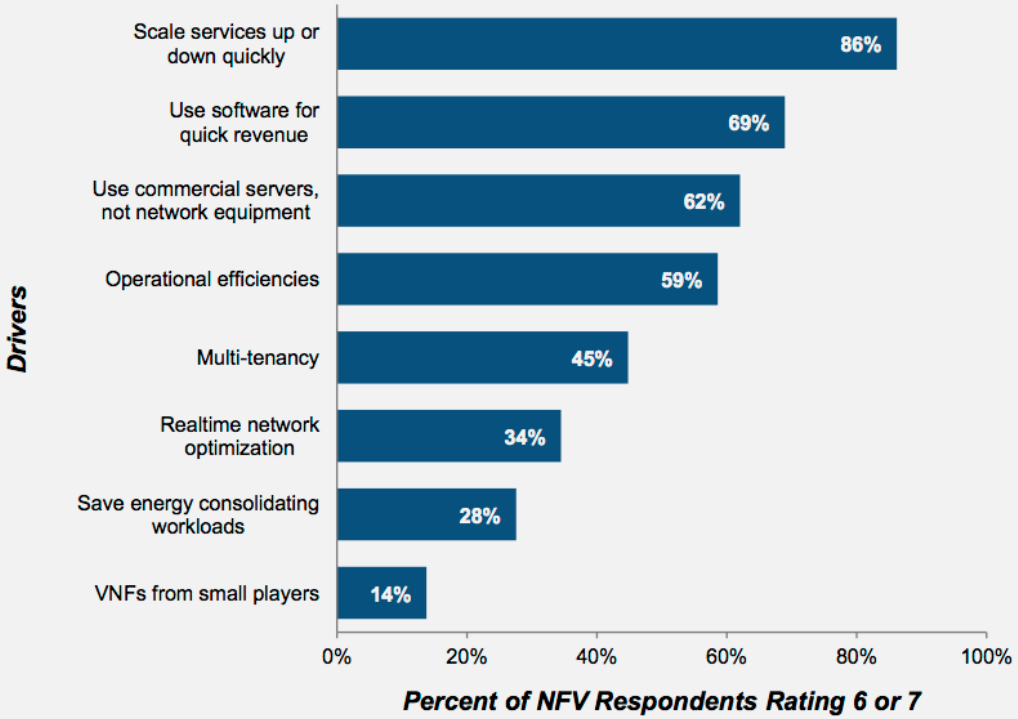
NFV Deployment Drivers



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

Source: Infonetics/IHS 2015

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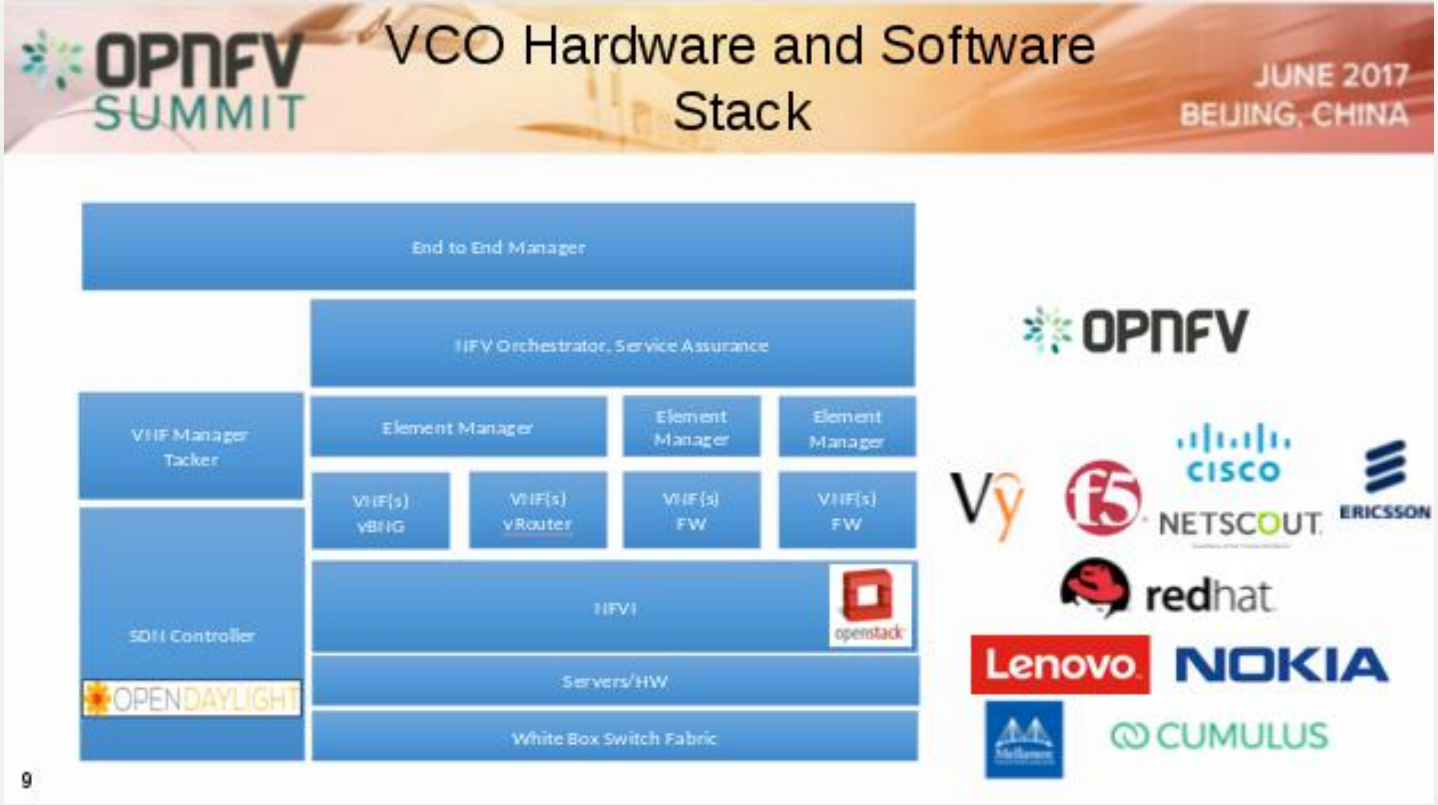
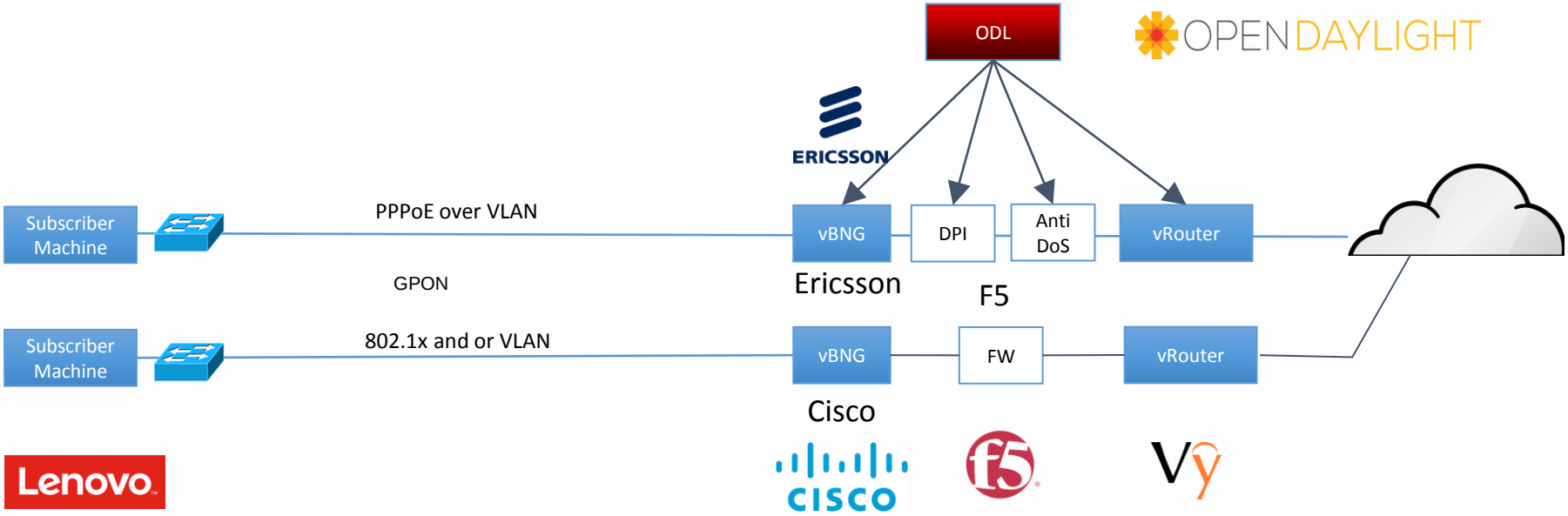
Virtual Central Office demo@OPNFV summit



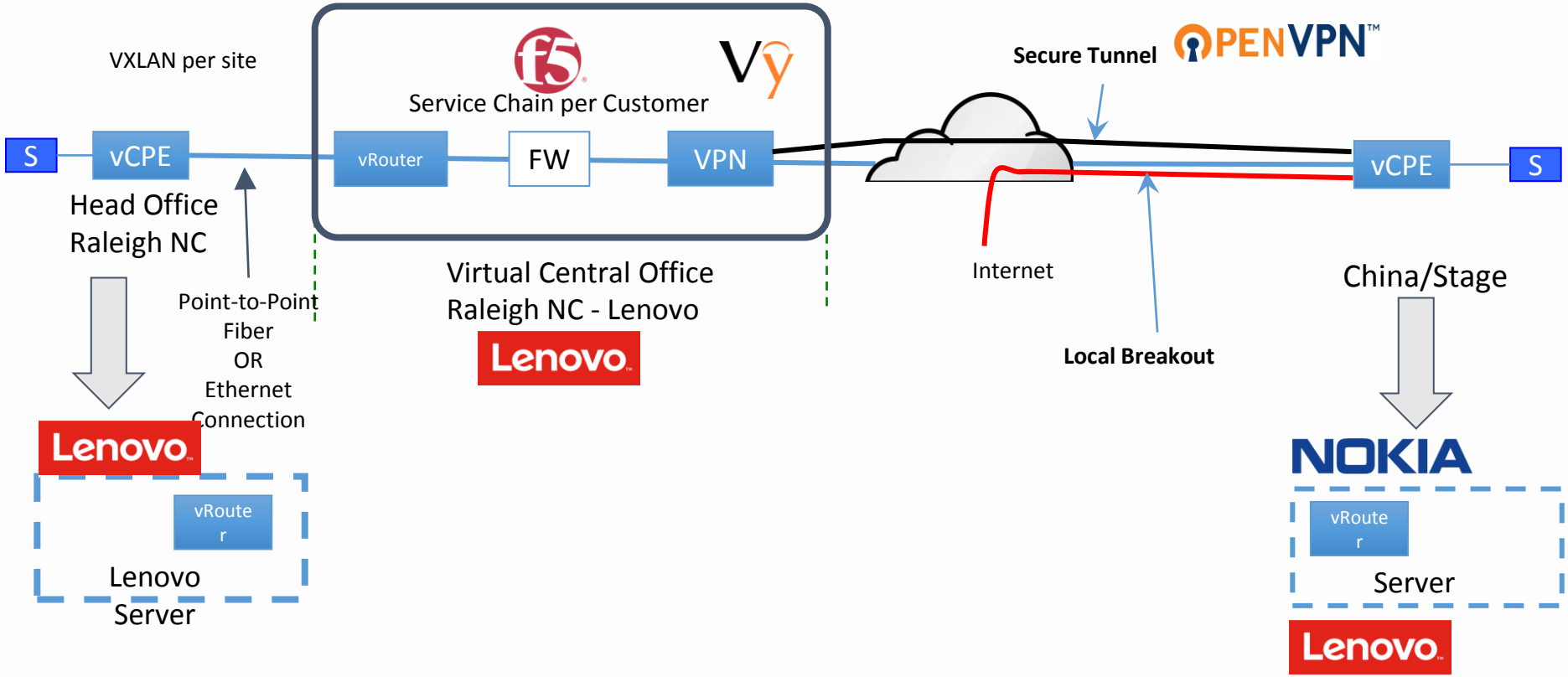
RHOSP 10, OPEN DAYLIGHT - Carbon w/ Patch

Residential Services - vBNG

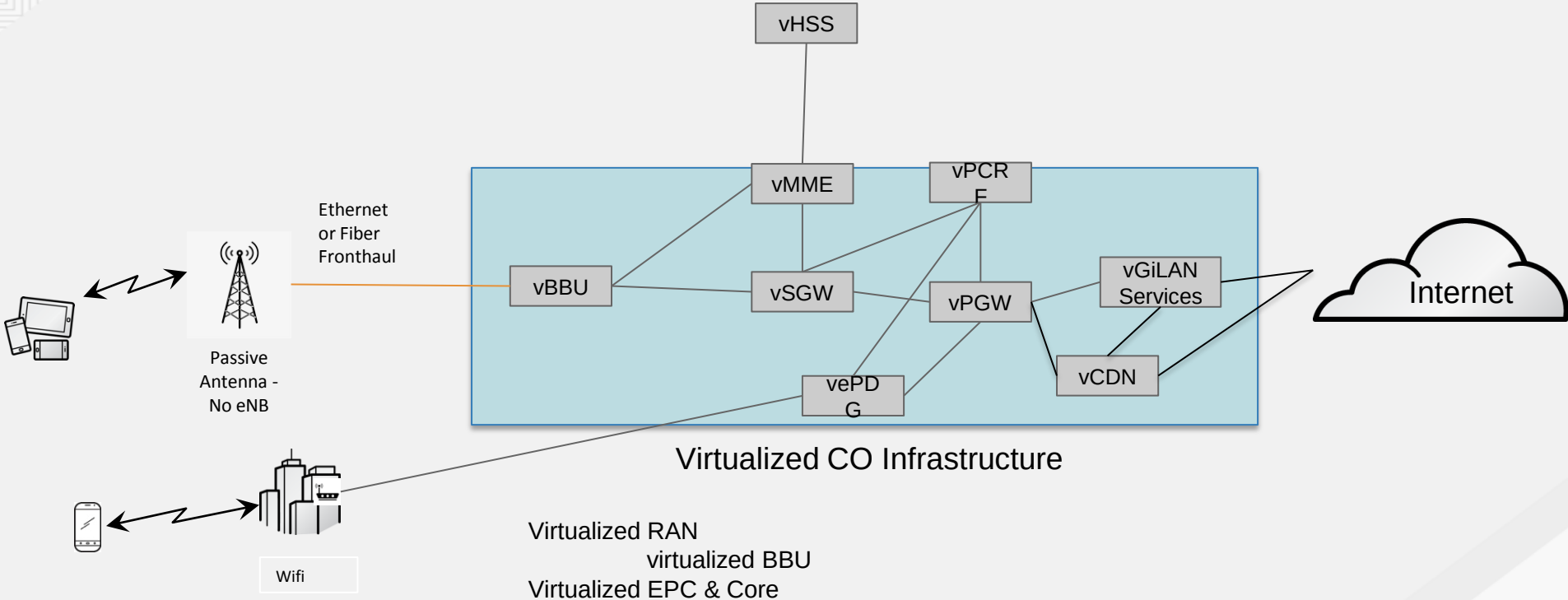


vBNG - Model

Business Services
E-vCPE



Mobile Services



Virtualized CO Infrastructure

Virtualized RAN
- virtualized BBU

Virtualized EPC & Core
- virtualized MME, SGW, PGW, ePDG & PCRF

Virtualized Services including vGiLAN
- vGiLAN - TCP Optimization, DNS Proxy, NAT, FW
- virtualized services - Cache, billing, SON etc

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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

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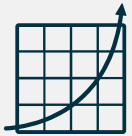
Technology Readiness

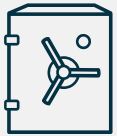


PERFORMANCE

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

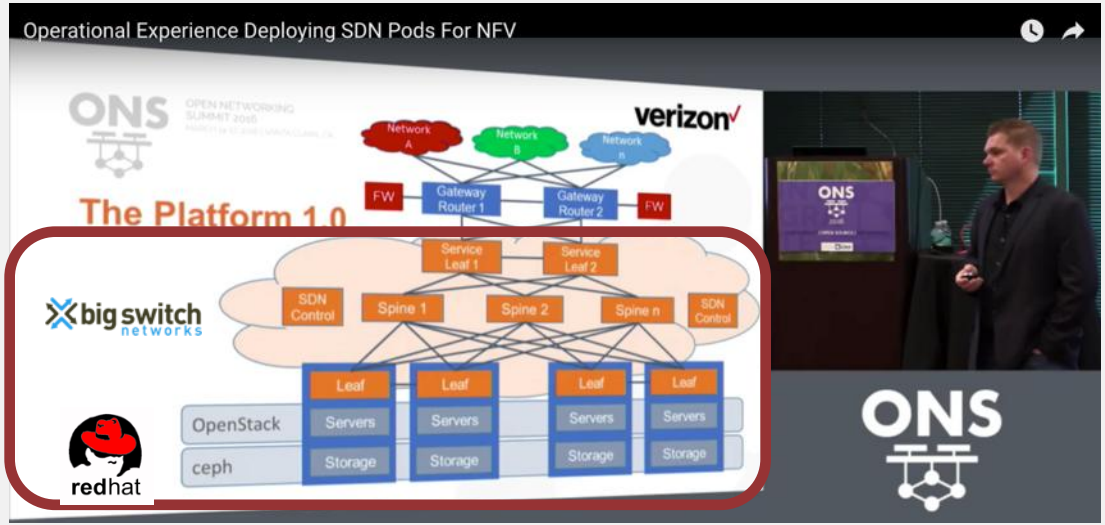
IT

1. Back End Virtualization
2. Moving OSS/BSS

Verizon: NFV Cloud on OpenStack/SDN

redhat	Red Hat OpenStack Platform
big switch networks	Big Cloud Fabric
DELL EMC	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

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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

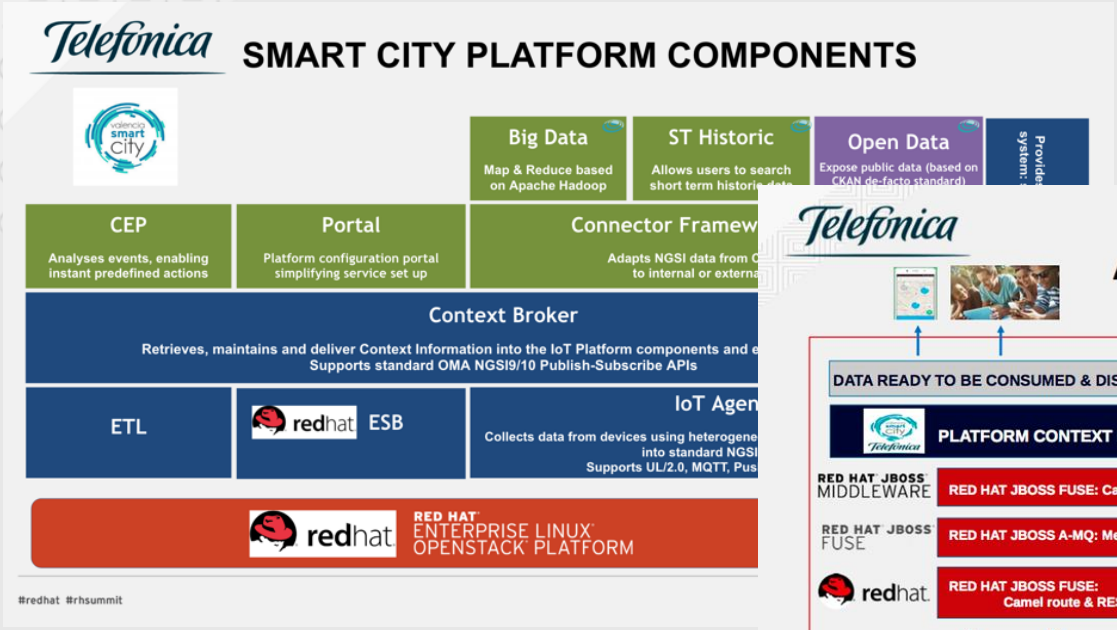
Swisscom is committed to guiding our customers into the digital age. Being a partner for us really means that you're engaged in the way we build our solutions, how we offer them to our customers, and how we develop them in the future. Red Hat is a pivotal partner in this mission.

- STEPHAN MASSALT
Vice President of Cloud, Swisscom

https://www.redhat.com/en/resources/swisscom-case-study

https://www.youtube.com/watch?v=06kstE5qHis

IoT Smart City



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

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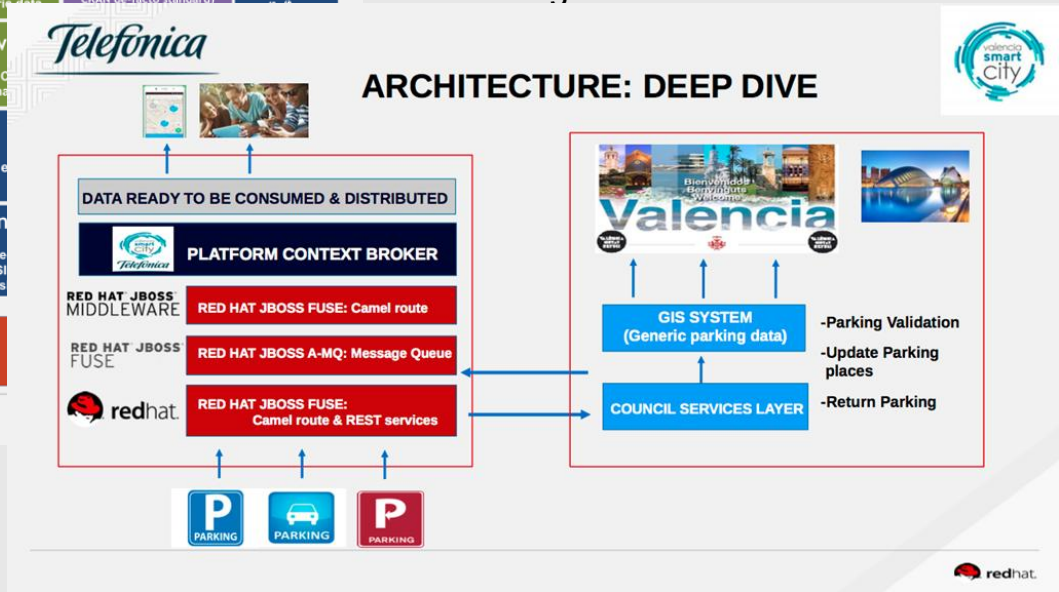
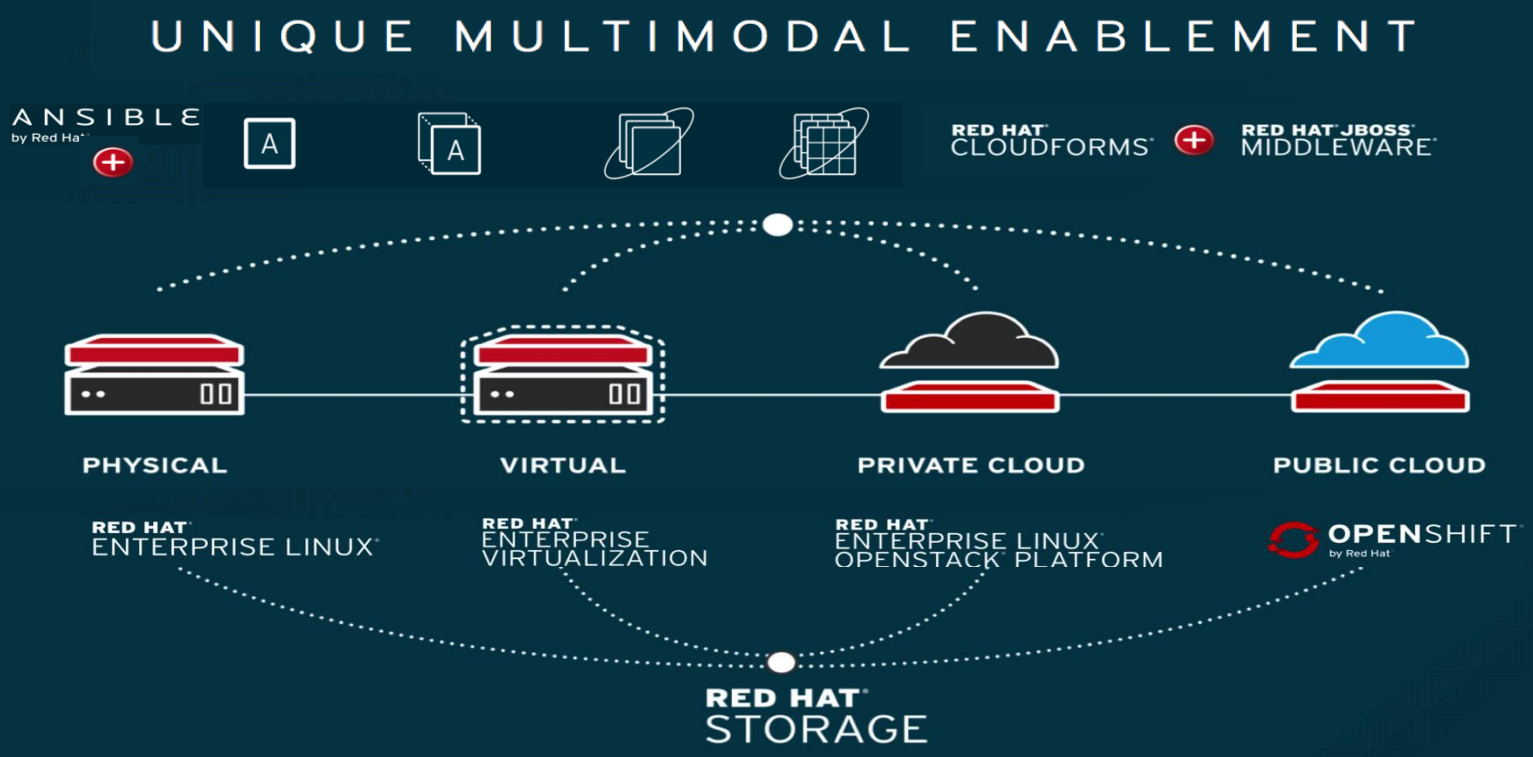


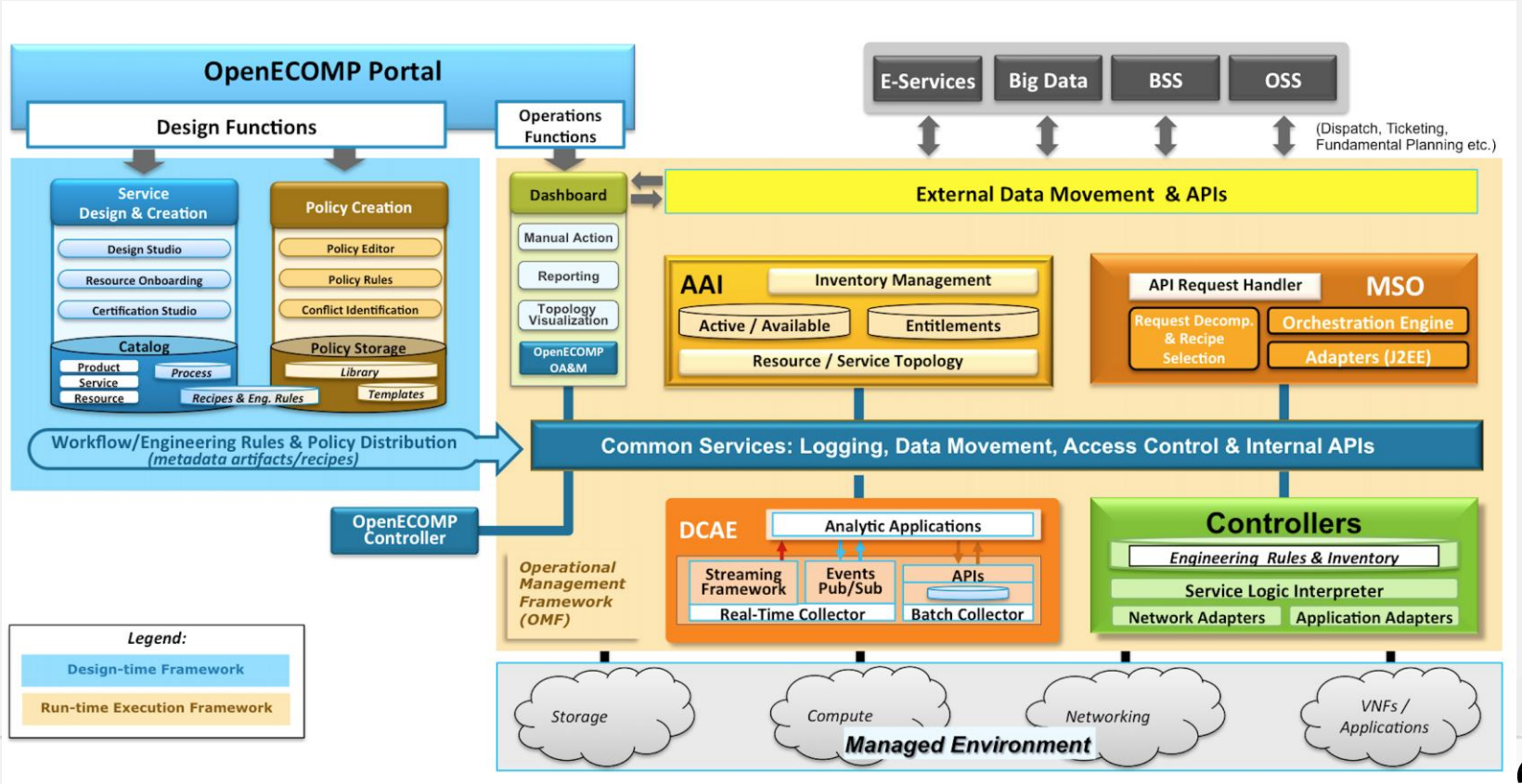
https://www.redhat.com/en/about/videos/telefonica-global-iot-platform-and-red-hat-iot

Road Ahead

TELCO CLOUDS ARE MULTIMODAL INFRASTRUCTURES



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

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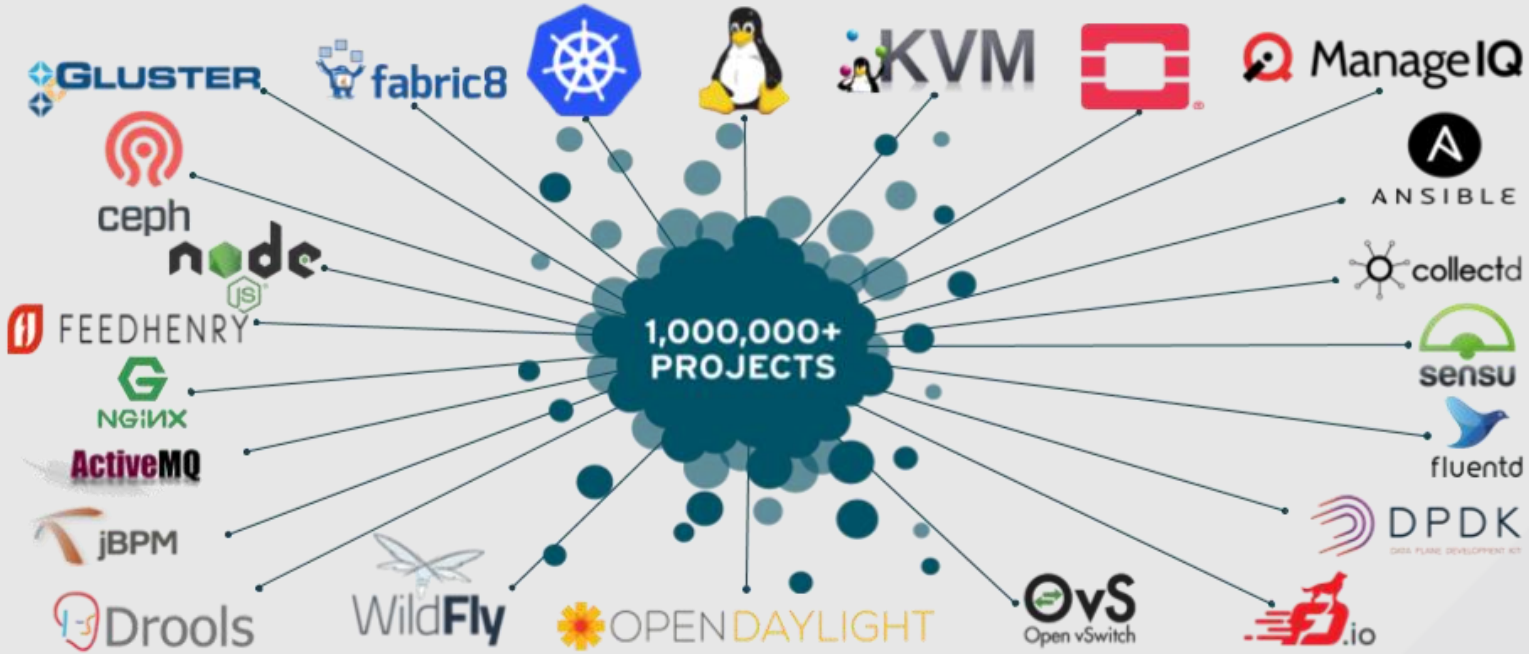
Open Source Innovation

Key to Digital Transformation



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