Hyperscale Vortex Path of Destiny Destruction Service Providers and OCP

OTT Storm Clouds in Next Gen Services

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Vor·tex

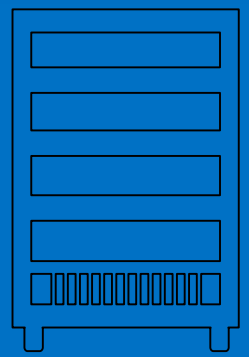
/ˈvôrˌteks/ a whirling mass, irresistible force, a powerful current

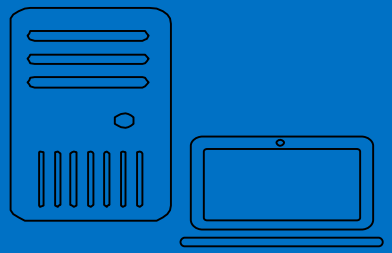
It’s about dynamic-meshed-anywhere services

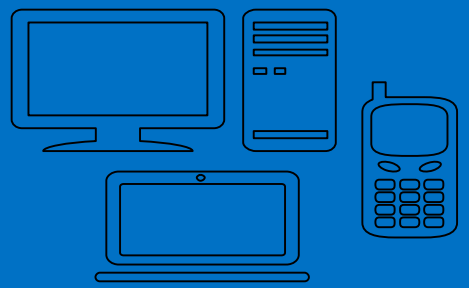
It’s about the user experience

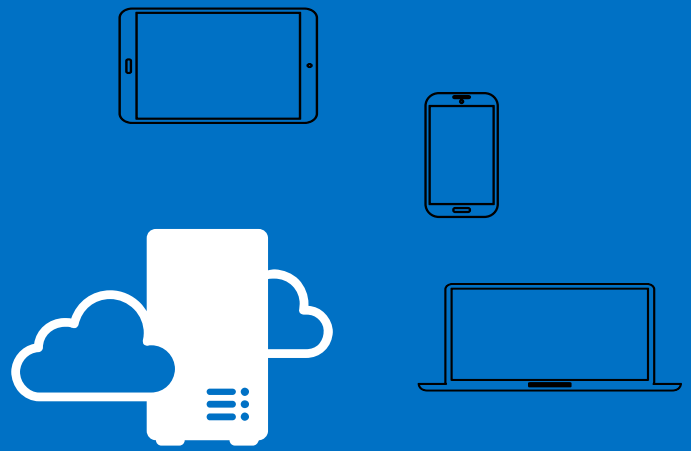
And, It’s about the constant cycle of technology

New Service Models Forming









Mainframes

Client/Server

Web

Cloud

1960s

1990s

2000s

2010s

1 Infrastructure Architecture

2 Services Delivered

3 Service Provider

New Service Models Forming

The
Service
provided

- **Infrastructure/ Platform**
  IaaS/PaaS - server, storage, & network, developer tools
- **Application**
  SaaS – software delivered

Who has
Access
to the service

- **Public**
  Open to all
- **Hybrid**
  Public &/or Private
- **Private**
  Finite, select users

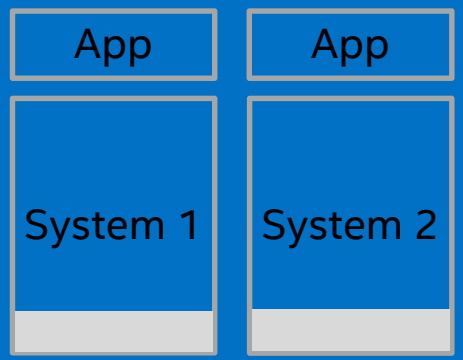
How the Cloud Software
Solution
Stack is built

- **Open Source**
  OpenStack, Mesos
- **Commercial**
  VMware, Microsoft, RedHat, HP Helion

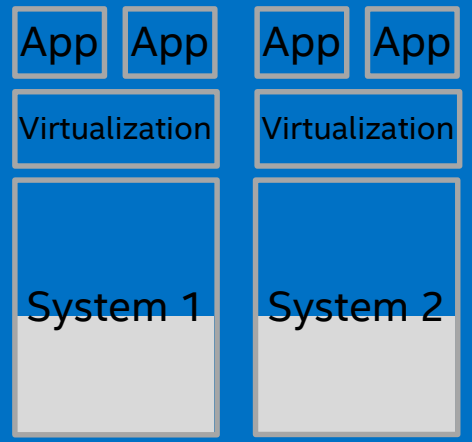
The
Location
of the service

- **On-premise**
- **Off-premise**

New Service Models Forming

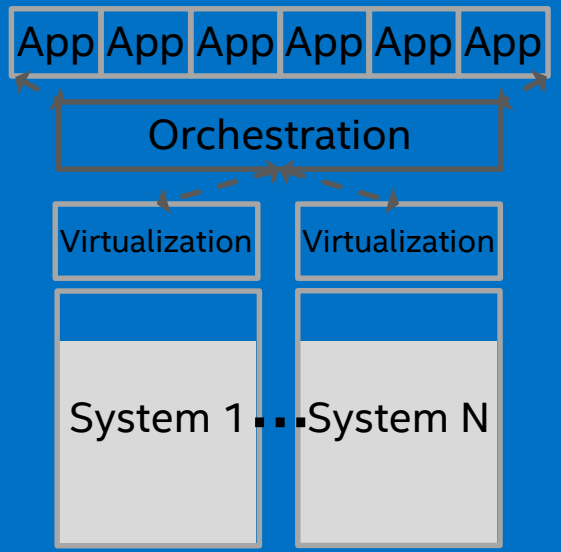


Traditional



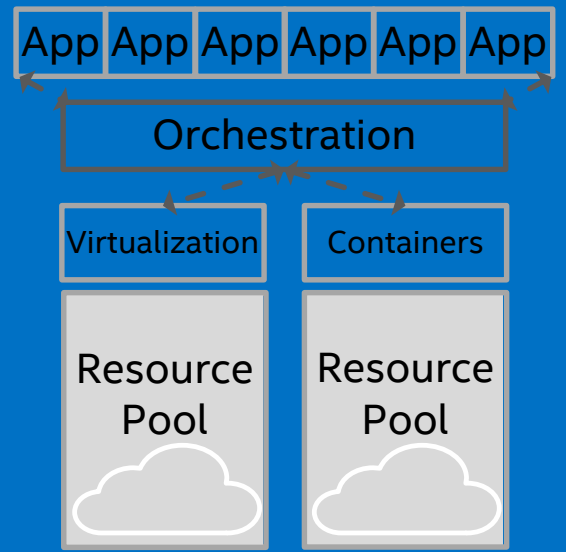
Virtualized

1. Shared resources



Cloud Type A

1. Self-service
2. Automation
3. Multi-tenant
4. Rapid elasticity
5. Measured services



Hyperscale Cloud Type B

1. Highly efficient
2. Highly optimized

= Resource Utilization

Multiple computing models will persist for the foreseeable future

Hyperscale Impact to Telco

Trend #1 →

OTT Services Dominate User Experiences and Your Traffic Load

Trend #2 →

Top 7 Web Cos. Created this Hyperscale Vortex and are Now Fully Benefiting

- Best Cloud Service Platform
- Best Scale
- Best TCO

Trend #3 →

Tech. Ecosystem is Formulating Viable Choices for the Next Tier

Pervasive 'Cloud' across Industry Sectors brings New Telco Opportunity

Majority of Telcos Surveyed Will Offer Cloud Solutions by 2016

82%

Will offer hybrid cloud by 2016 vs 55% now

>60%

Will offer SaaS in collaboration, email, security, voice communication, virtual desktop

95%

Will offer public cloud by 2016 vs 64% now

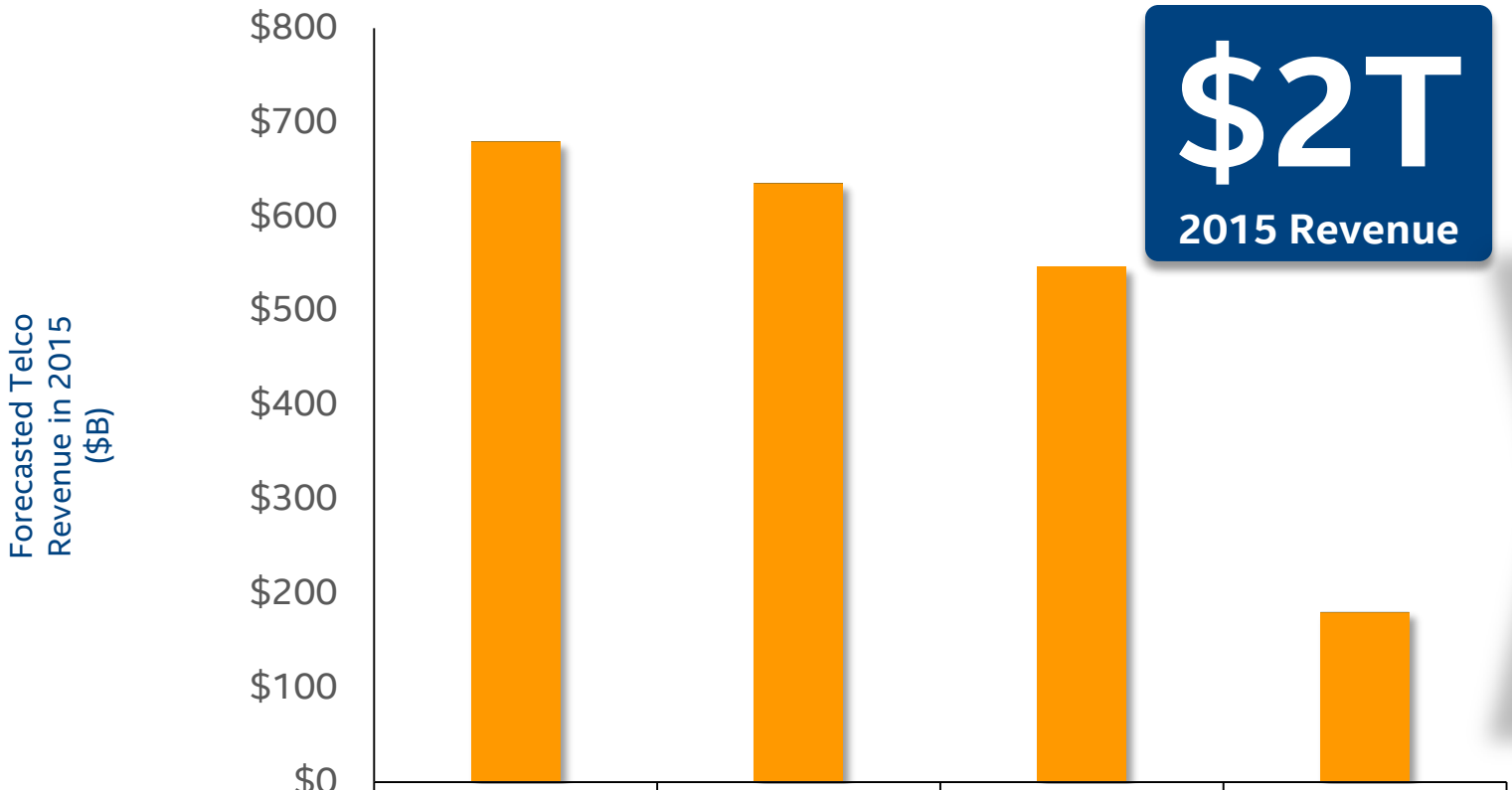
74%

Say security is a top customer concern when adopting cloud

Source: Infonetics survey of 23 service providers, Dec'14
Cloud-aaS provides an application execution environment; includes servers, network, storage, management, and orchestration; this service is purchased as a bundle
Hybrid cloud: Cloud-aaS delivered by a service provider from an off-premises public cloud in conjunction with applications served from the enterprise's on-premises private cloud

Telco Revenue is Healthy But Constantly Challenged for Growth

$45B revenue increase in 2015… 4x more than AWS and Netflix Revenue Combined



	Asia Pacific	North America	EMEA	Latin America & Mexico
Growth	4%	3%	-1%	3%
CY15	$680	$635	$547	$180

Next Digital/Cloud Services Opp'ty

Digital services: anything beyond the voice, messaging, data connectivity, and core communications services offered

Communications
- IP voice services
- IP messaging services

Entertainment
- Music
- Games
- Video and TV
- E-publications

Mobile commerce and payments
- Mobile money
- Card-emulation
- Beyond payments
- Operator billing

Advertising and Big Data
- Analytics / Big Data
- Mobile advertising

Cloud, security, and trust
- Cloud/storage
- Personal data and big trust
- Mobile security

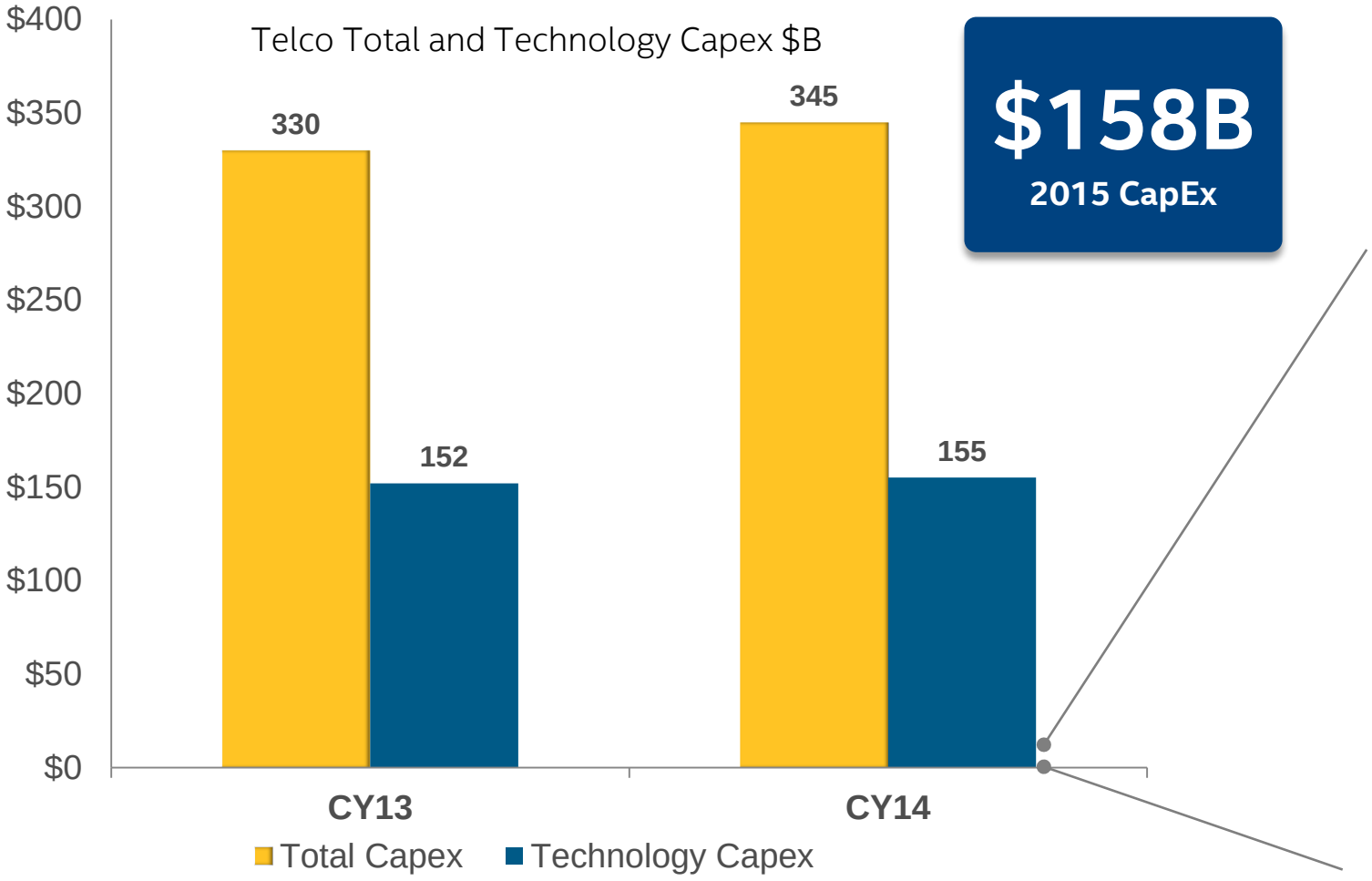
M2M, IoT, and smart home
- Smart home
- M2M and IoT

Verticals
- Connected cars
- Transportation
- Retail
- Utilities
- Education
- Healthcare
- Smart cities

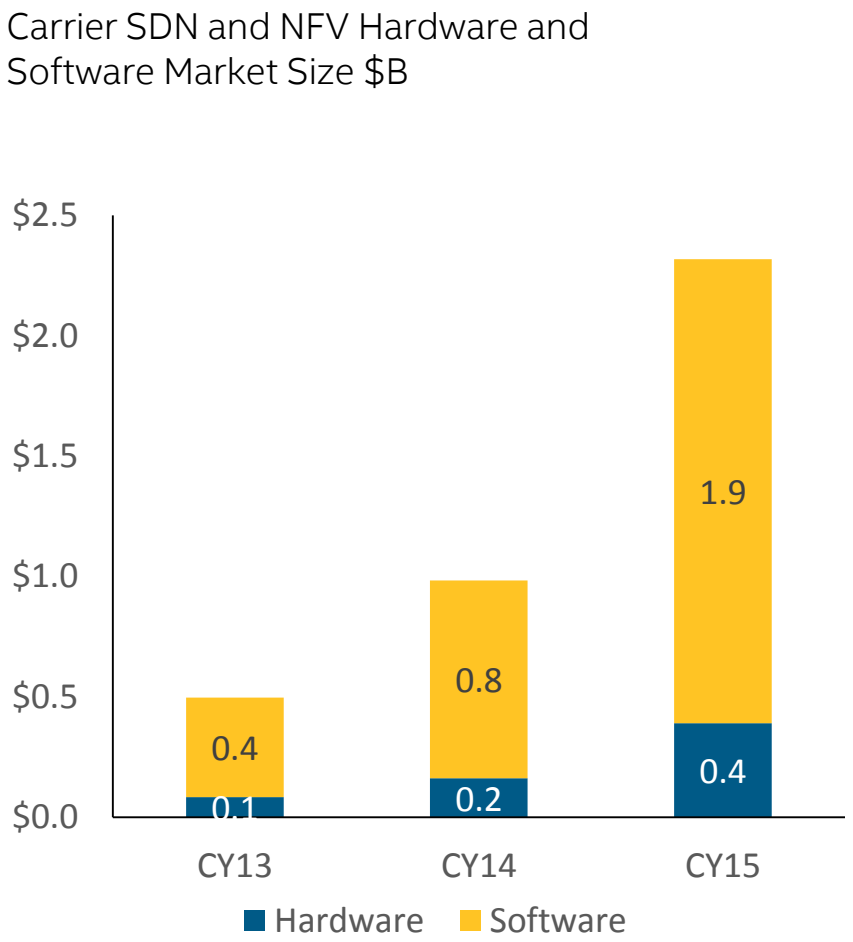
Source: infonetic 2014-Infonetics-SP-Cpx-Rev-and-Cpx-by-Eqpmt-Mkt-Fcst-2nd edition; Include - fixed and wireless telco, Cable Operators, Satellite, Intel MW

Telcos Continue To Invest Heavily In Capex

If you can't compete with $150B+ in Annual Capital Spend – You…



$158B
2015 CapEx



Source: Infonetics Revenue and Capex by Service Provider Type, Worldwide and Regional Size and Forecast and Carrier SDN and NFV Hardware and Software Worldwide;
Total CapEx includes fiber, copper plant, real estate, capitalized labor, and service vehicles which are non-telecom/datacom network equipment, as well as network infrastructure equipment
Technical CapEx includes network infrastructure equipment plus servers and OSS/BSS systems in the telco enterprise environment and back end infrastructure

Suc·cess in the Vor·tex

/ˈvôrˌteks səkˈses/ a whirling mass, irresistible force, a powerful current + accomplishment of purpose and attainment of profit

1. Strategic Differentiation
2. Execution velocity – Plan, Implement, Execute
3. …Constant adaptation



Telco Segmentation and Hyperscale Fit

e.g.	Internal IT	Business Operations	verizon terremark Verizon Cloud	Verizon FiOS Verizon Internet Services Platform	verizon verizonwireless
	Enterprise IT, Office Apps, Web Front-end, IT Productivity	Operations & Business Support Systems, Data Vault, BI/Analytics	Public Cloud Services IaaS, PaaS, SaaS, Co-Location, Hybrid	Services and Media to Wireline and Wireless Subscribers	Core Infrastructure, MPLS, TDM and IP Fixed and Wireless

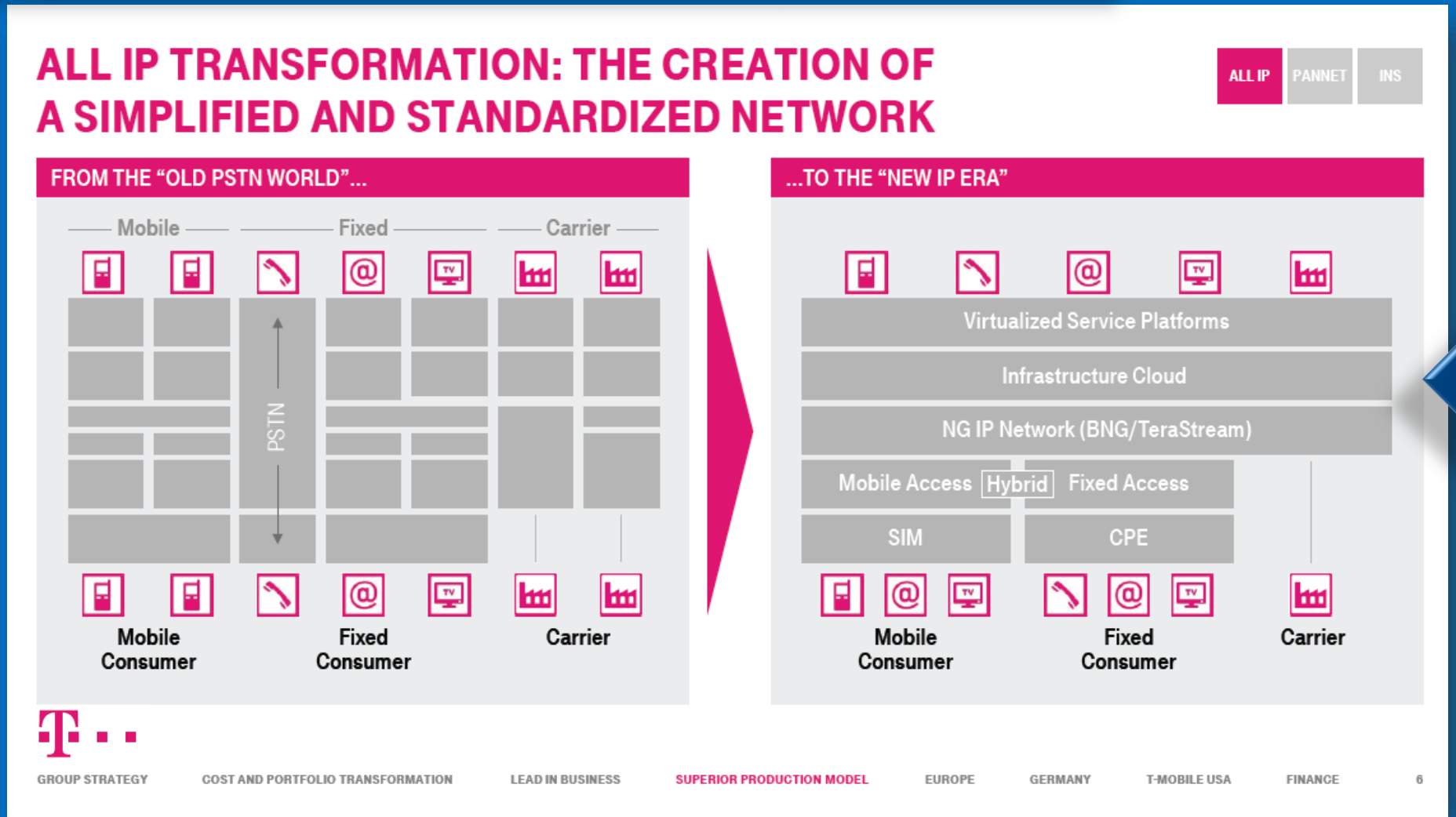
Telco as a Cloud Service Provider

Hyperscale

SDN / NFV

*** names and brands may be claimed as the property of others.**

The Science of Cloud Transformation

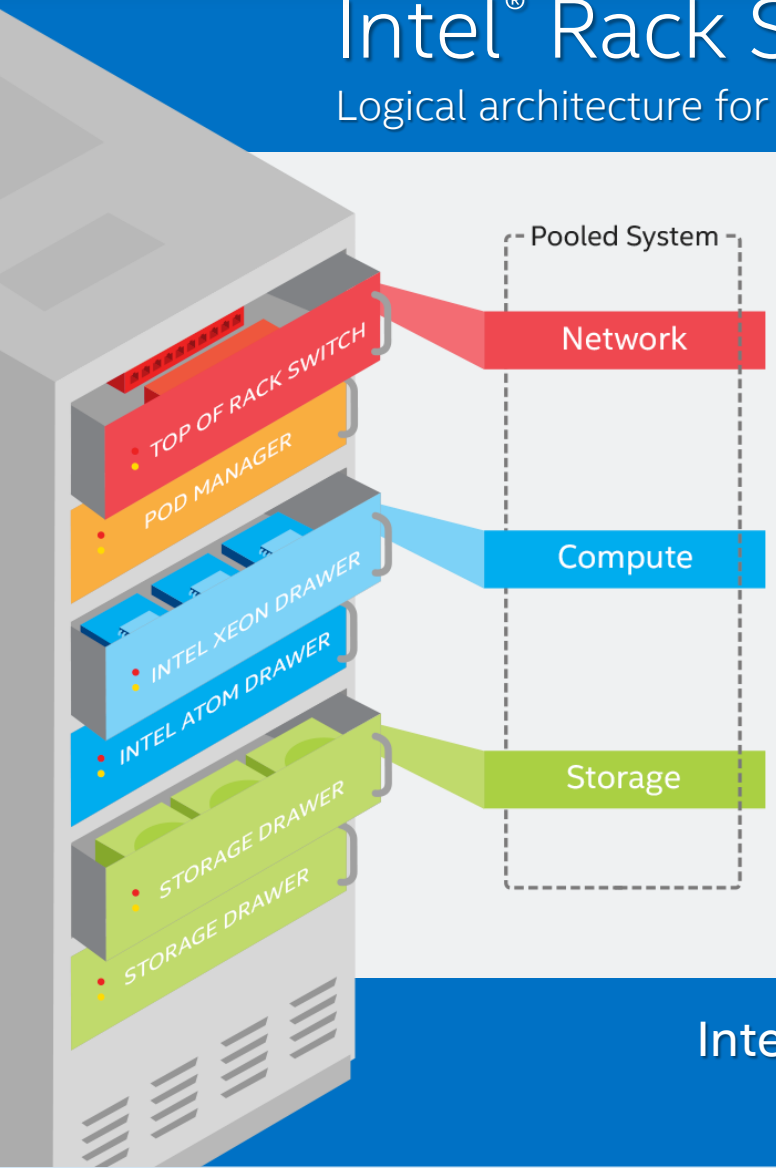


Source: http://www.telekom.com/cmd15

The Science of Cloud Transformation

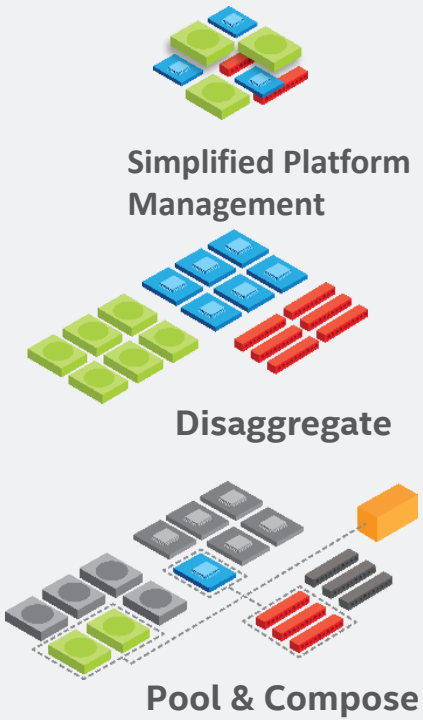
Intel® Rack Scale Architecture (RSA)

Logical architecture for efficiently building and managing cloud infrastructure



Benefits

- >25% decrease in capital costs
- Increase capacity/IT $
- Reduce time to cloud deployment



Compute, Network & Storage

Intel's Goal is to increase performance per TCO$ & accelerate cloud adoption

Intel® Rack Scale Architecture & Telco

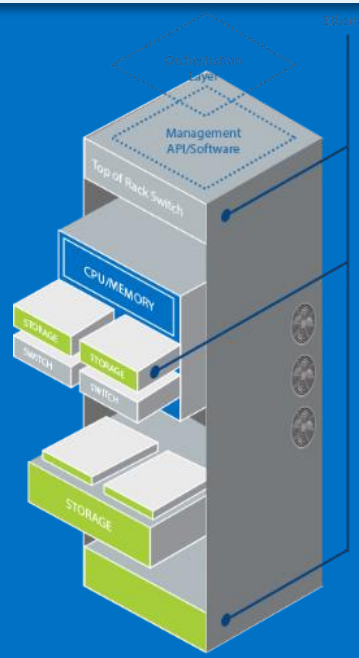
1 Utilize Common Hyperscale Cloud Sub-Components Made Available

2 Sandbox for Telco Systems Innovation

- SW Innovation for QoS / SLA Service Capability
- SW Innovation for OSS/BSS Integration
- SW Innovation for SDN/NFV
- SW Innovation for Distributed DC Locations
- Tray Innovation for Media Services Accelerators
- Tray Innovation for Security Accelerators
- Networking Performance Innovation
- …

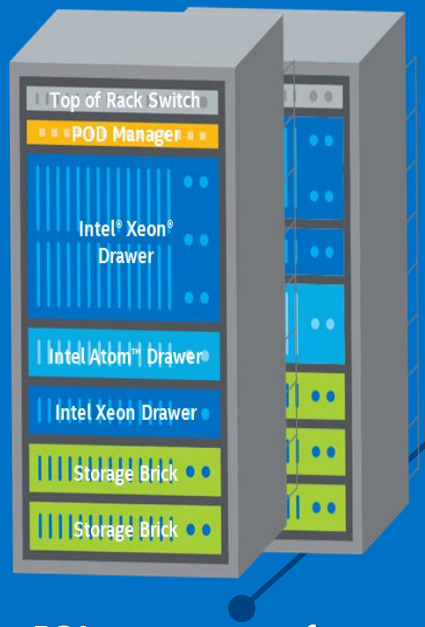
3 Developer Platform Innovation

Today: Physical Aggregation



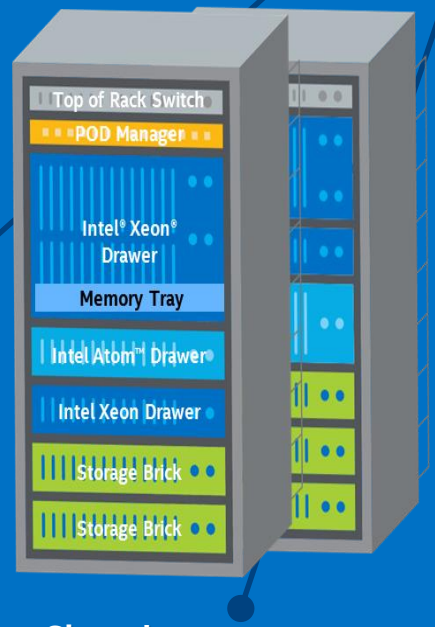
- Shared power and cooling
- Modular platforms—upgradable nodes with CPU, memory, and storage

Emerging: 2015 + Composable Resource Pools



- RSA management framework
- Pooled system architecture
- Scalable fabric architecture

Future: 2017 + Service-Aware Orchestration

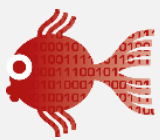


- Shared memory
- Service-aware orchestration

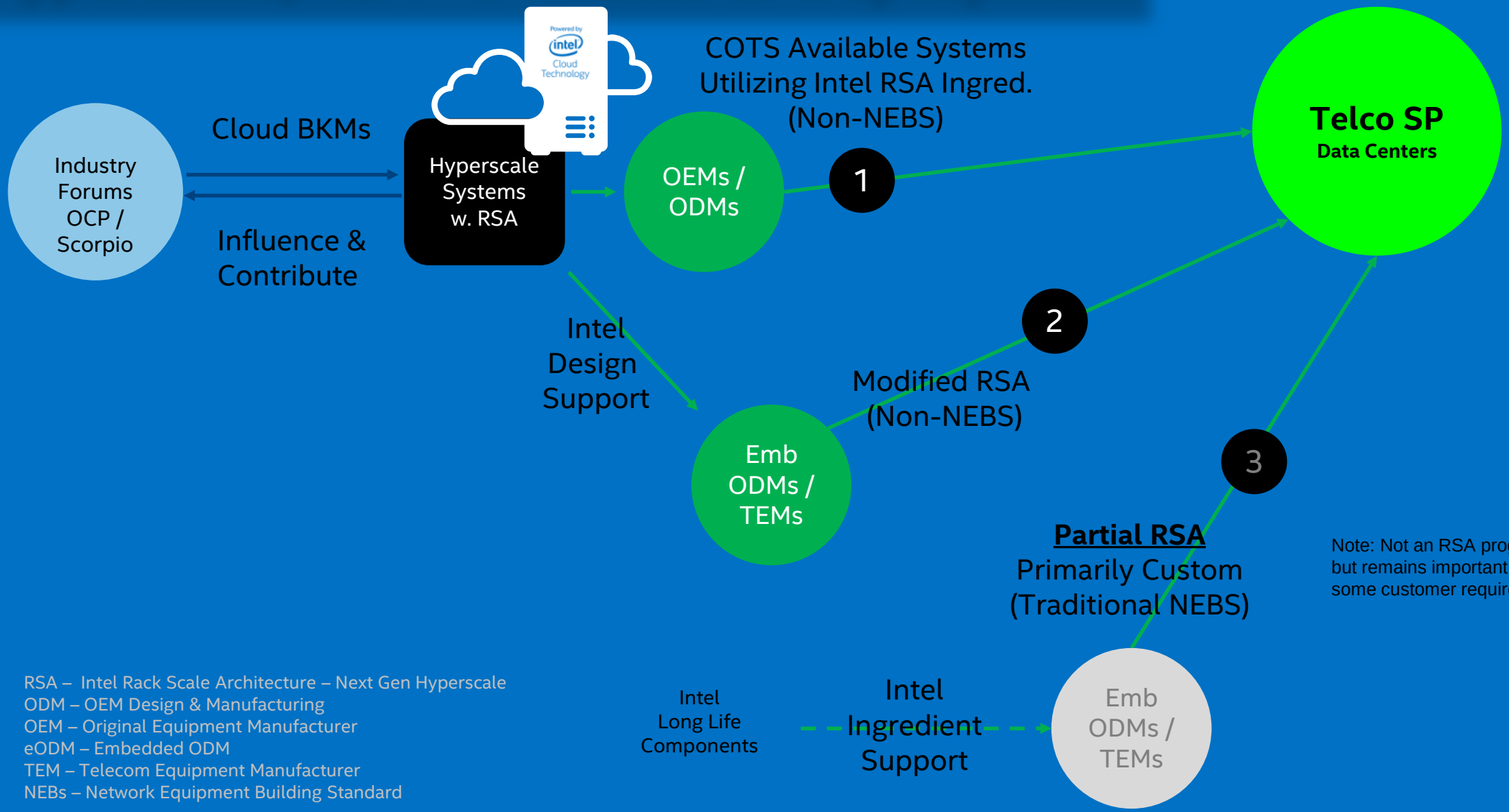
From ‘box systems’ to ‘composable resource pools’

Hyperscale/RSA Aligned Ecosystem

- Supports common rack management framework and telemetry
- Supports range of platforms and solutions

OEMs/ ODMs	     
ISVs/OSVs	  
Industry initiatives/ Standards	  
End Users	   

Hyperscale/RSA – 3 Routes to Deployment



RSA – Intel Rack Scale Architecture – Next Gen Hyperscale
ODM – OEM Design & Manufacturing
OEM – Original Equipment Manufacturer
eODM – Embedded ODM
TEM – Telecom Equipment Manufacturer
NEBs – Network Equipment Building Standard

The Science of Cloud Transformation

Real Example

PRESS RELEASE
MARCH 02, 2015

ERICSSON

ERICSSON CLOUD SYSTEM GETS HYPERSCALE UPGRADE

- Demand for cloud is growing but concerns around security and governance are slowing adoption.
- Ericsson Cloud System adds new software and hardware to ensure highly governed, secure and hyperscale cloud is possible while increasing speed and control.
- For the operator it enables the opportunity to provide competitive cloud based offerings focused on modern, automated IT, including operator cloud transformation for Network Functions Virtualization (NFV), IT and commercial cloud.

Demand for cloud agility, operational scale and associated economics is growing but existing concerns around security and governance are slowing the full adoption of cloud by the world's largest enterprises.

Ericsson (NASDAQ: ERIC) today introduces new software and hardware to its Ericsson Cloud System to mitigate this need, creating new disruptive levels of performance, operations, compliance, economics and can work across multiple clouds to achieve competitive differentiation and value-add for operators and their large enterprise customers.

New products in Ericsson Cloud System include; Ericsson HDS 8000 (Hyperscale Datacenter System), built on Intel® Rack Scale Architecture, Ericsson Secure Cloud Storage and Ericsson Continuum ® delivering the world's best policy driven platform for hybrid cloud leveraging Ericsson's investment in Apcera.

Source: Ericsson http://www.ericsson.com/mwc2015/launches/hyperscale-datacenter-system-ericsson-hds-8000
Ericsson CEO summary. https://www.youtube.com/watch?v=M9WqrUBNTyI

The Science of Cloud Transformation

Dell DCS 'G5' Delivering on the **open Hyperscale** promise

120
third-width nodes per rack to maximize density

Third-, half-, and full-width sleds to maximize compute and storage flexibility

For customers seeking Intel Rack Scale Architecture, Project Scorpio, and Open Rack capabilities

Fits 21" servers in the **same footprint** as a 19" EIA rack

Real Example

10 system bays

2 power bays

2 switch bays

Dell **Data Center** Solutions (DCS)

Next-generation, **standards-minded shared infrastructure** for workloads at any scale

The Science of Cloud Transformation

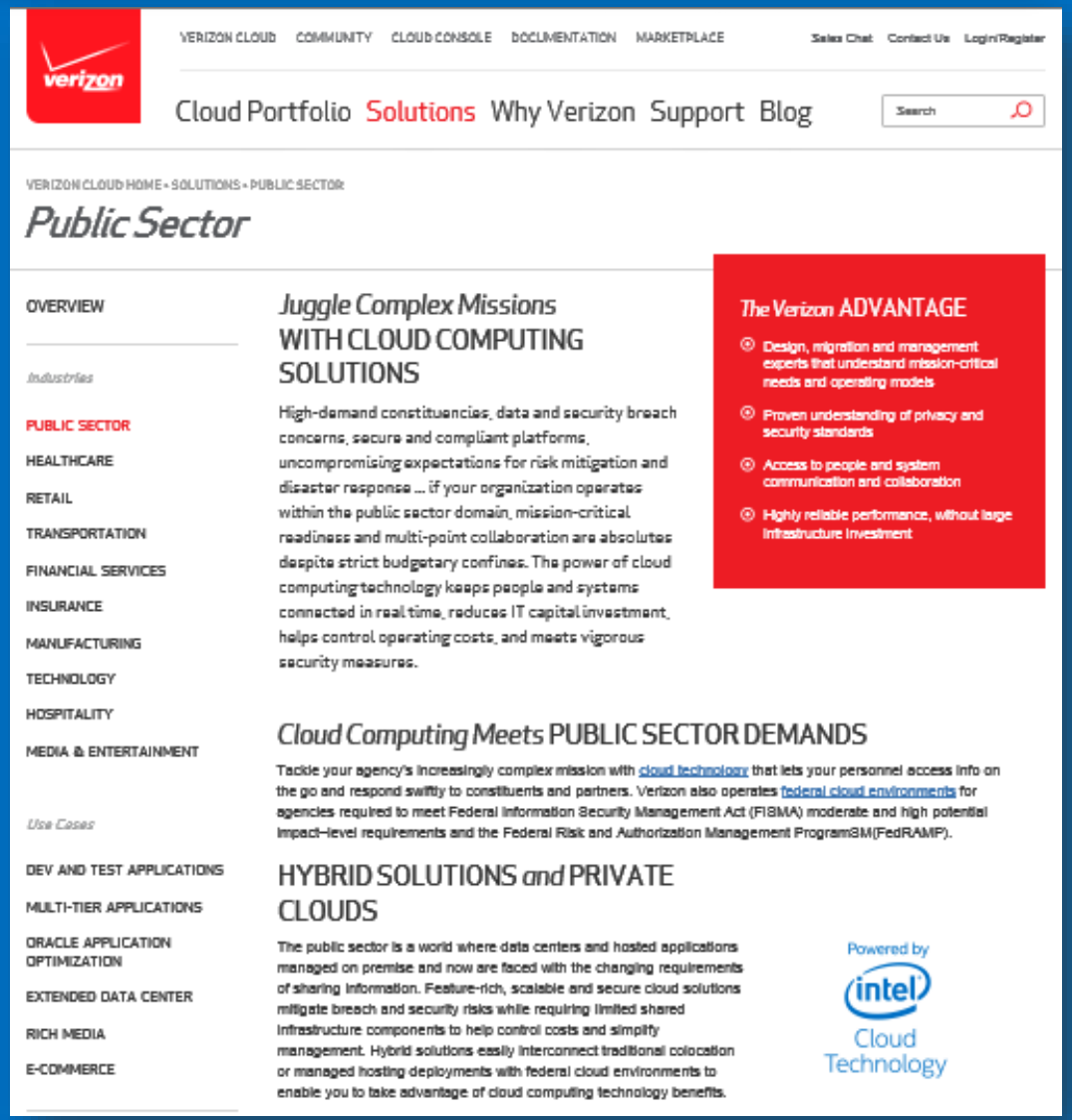
Real Example

2014 Hyperscale DC Installation

Hyperscale Data Center installation at a Tier 1 SP

The Science of Cloud Transformation

Real Example



verizon

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INSURANCE
MANUFACTURING
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HOSPITALITY
MEDIA & ENTERTAINMENT

Use Cases

DEV AND TEST APPLICATIONS
MULTI-TIER APPLICATIONS
ORACLE APPLICATION OPTIMIZATION
EXTENDED DATA CENTER
RICH MEDIA
E-COMMERCE

Juggle Complex Missions WITH CLOUD COMPUTING SOLUTIONS

High-demand constituencies, data and security breach concerns, secure and compliant platforms, uncompromising expectations for risk mitigation and disaster response ... if your organization operates within the public sector domain, mission-critical readiness and multi-point collaboration are absolutes despite strict budgetary confines. The power of cloud computing technology keeps people and systems connected in real time, reduces IT capital investment, helps control operating costs, and meets vigorous security measures.

The Verizon ADVANTAGE

- Design, migration and management experts that understand mission-critical needs and operating models
- Proven understanding of privacy and security standards
- Access to people and system communication and collaboration
- Highly reliable performance, without large infrastructure investment

Cloud Computing Meets PUBLIC SECTOR DEMANDS

Tackle your agency's increasingly complex mission with cloud technology that lets your personnel access info on the go and respond swiftly to constituents and partners. Verizon also operates federal cloud environments for agencies required to meet Federal Information Security Management Act (FISMA) moderate and high potential impact-level requirements and the Federal Risk and Authorization Management Program SM (FedRAMP).

HYBRID SOLUTIONS *and* PRIVATE CLOUDS

The public sector is a world where data centers and hosted applications managed on premise and now are faced with the changing requirements of sharing information. Feature-rich, scalable and secure cloud solutions mitigate breach and security risks while requiring limited shared infrastructure components to help control costs and simplify management. Hybrid solutions easily interconnect traditional colocation or managed hosting deployments with federal cloud environments to enable you to take advantage of cloud computing technology benefits.

Powered by intel Cloud Technology

Suc·cess in the Vor·tex

/ˈvôrˌteks səkˈses/ a whirling mass, irresistible force, a powerful current + accomplishment of purpose and attainment of profit

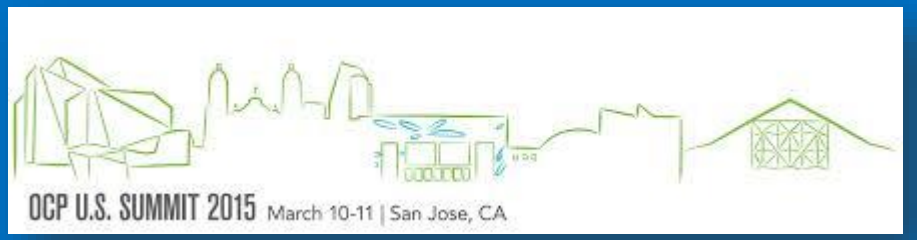
1. Strategic Differentiation
2. Execution velocity
3. …Constant adaptation

1
1. Telco's Have Significant Network Assets for QoS and SLA of Cloud Delivery
2. …Significant Enterprise Brand Value
3. …In-country Trust

2
1. Look to Adopt for TTM and Best CapEx ROI
2. Then, Look to Adapt for 'Comms' Specific Needs
3. Standardize vs. Specify???

3
1. Technology cycles every 3 years. Look to design for Adaptation and Cycling
2. *Create a Telco-ready Platform for Innovation*





Hyperscale Vortex Path of Destiny

Thank-you

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