

A nighttime cityscape with a prominent skyscraper on the right side that has a glowing white grid outline. The city lights are reflected in a river in the foreground. The sky is dark blue with some clouds.

THE ON-DEMAND DATA CENTER

NETWORK TRANSFORMATION IN A CHANGING INDUSTRY

Ken Cheng, CTO, Brocade
October, 2013

“Fundamentally we’ve had to redesign and challenge the way we’ve run distributed infrastructure for the past 15 years.

Not a single thing that we’ve done in the past is now acceptable for the future.”

Steve Hilton, Chief Information Officer, Credit Suisse Group

Capture Historic Industry Shifts



Closed
to Open



Blurring of Hardware
and Software



Software Defines
Everything



Cloud Evolution

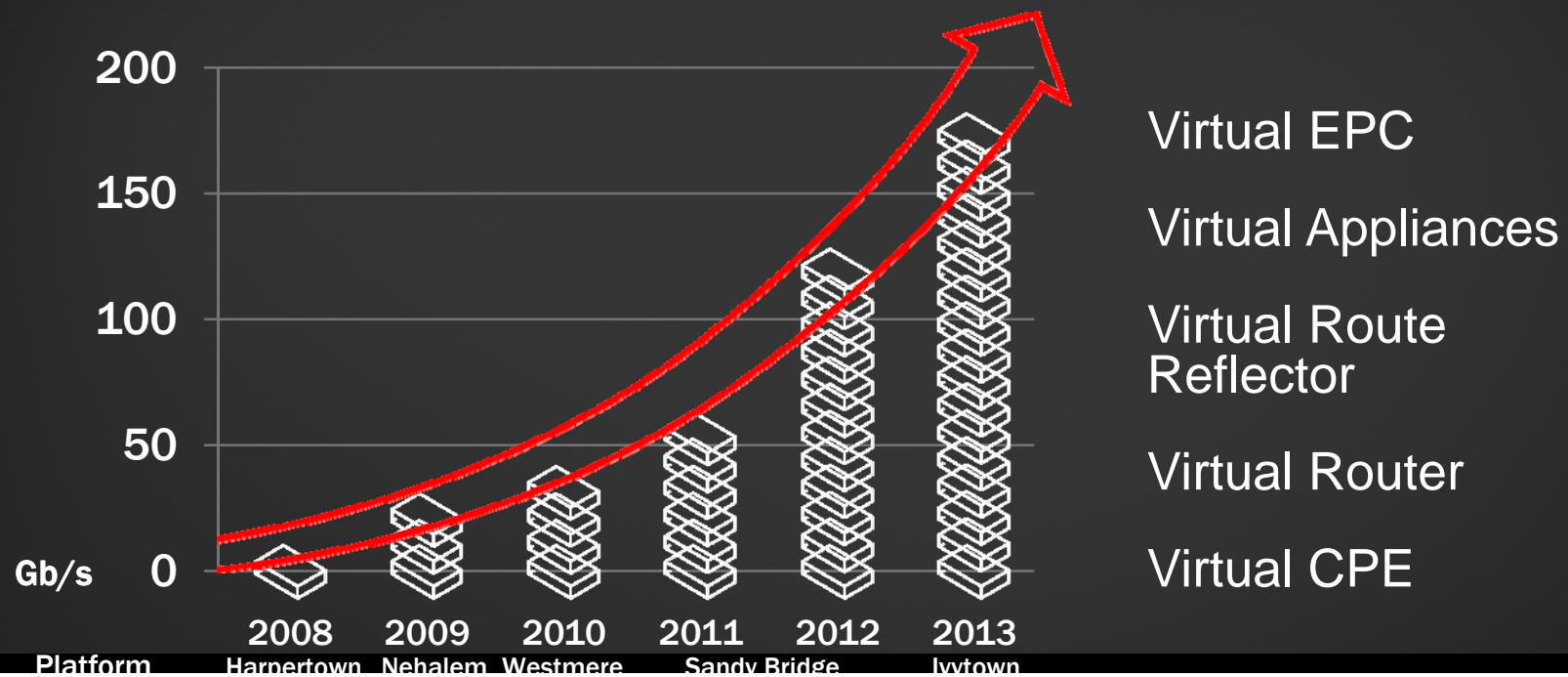
Flexible, Efficient, Programmatic, Elastic

PROPRIETARY



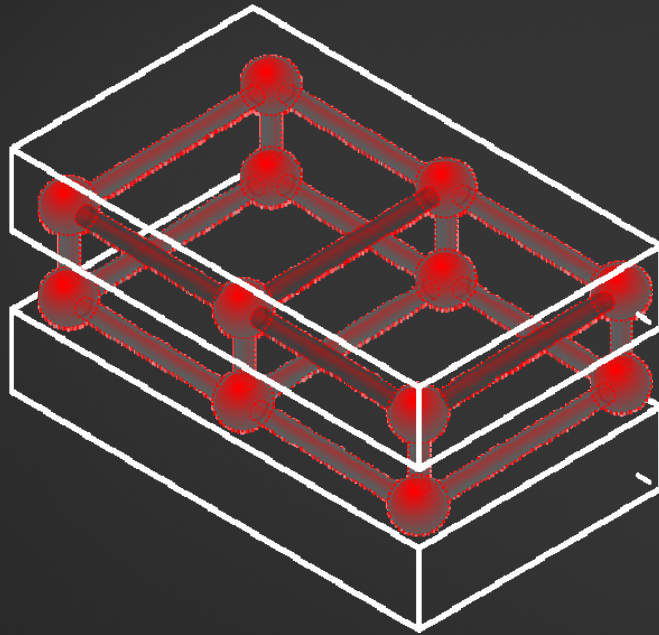
Blurring Hardware and Software Boundaries

EXPONENTIAL GROWTH OF X86 PERFORMANCE



Platform	2008	2009	2010	2011	2012	2013
Total Cores	8	8	12	8	16	20

Connecting IT and Networks



IT

SDN

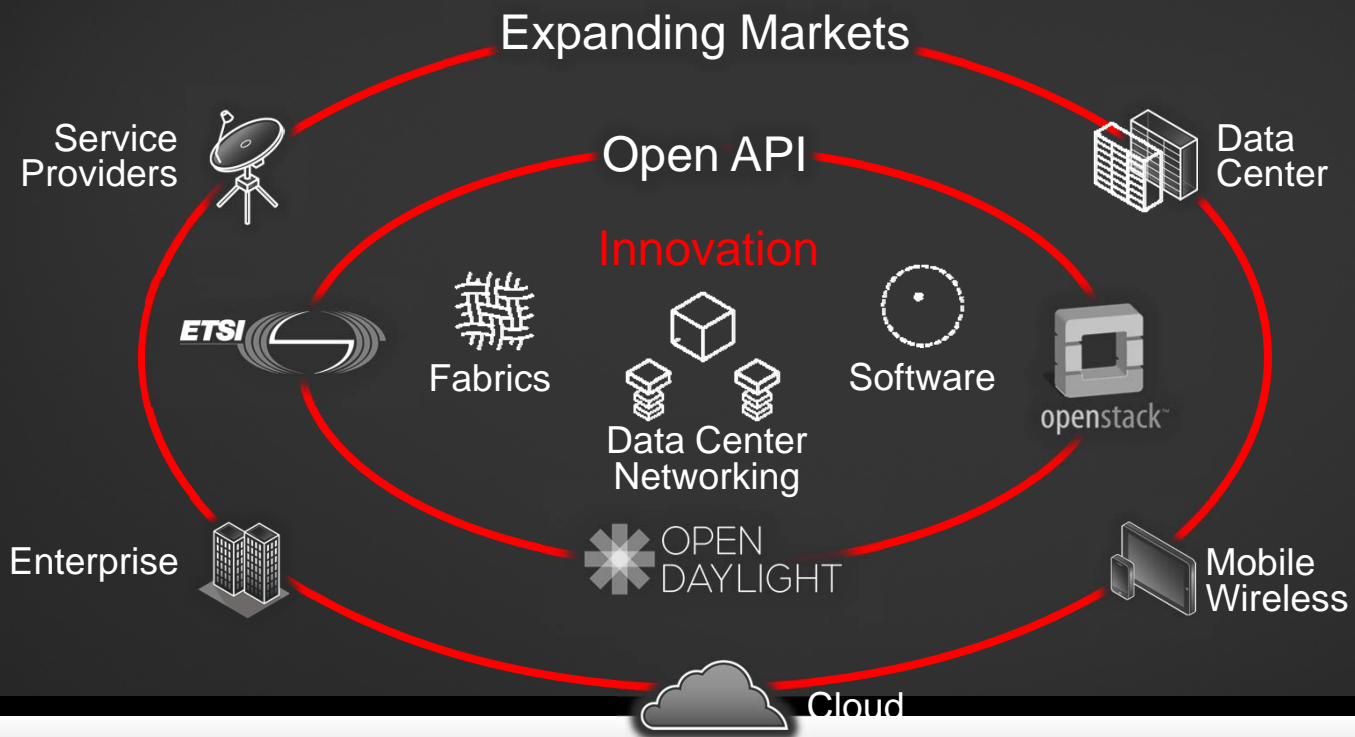
NETWORK

Evolving Cloud Services



- Basic
- Uniform
- Low Cost
- Rich Services
- Application Optimized
- Public cloud architecture
- Enterprise Policies
- Increased Security

The On-Demand Data Center



Market Dynamic and Opportunities

FUELING VALUE DISLOCATION

Telco

- Economics: ARPU vs Cost
- Threat: Cloud SPs, OTT

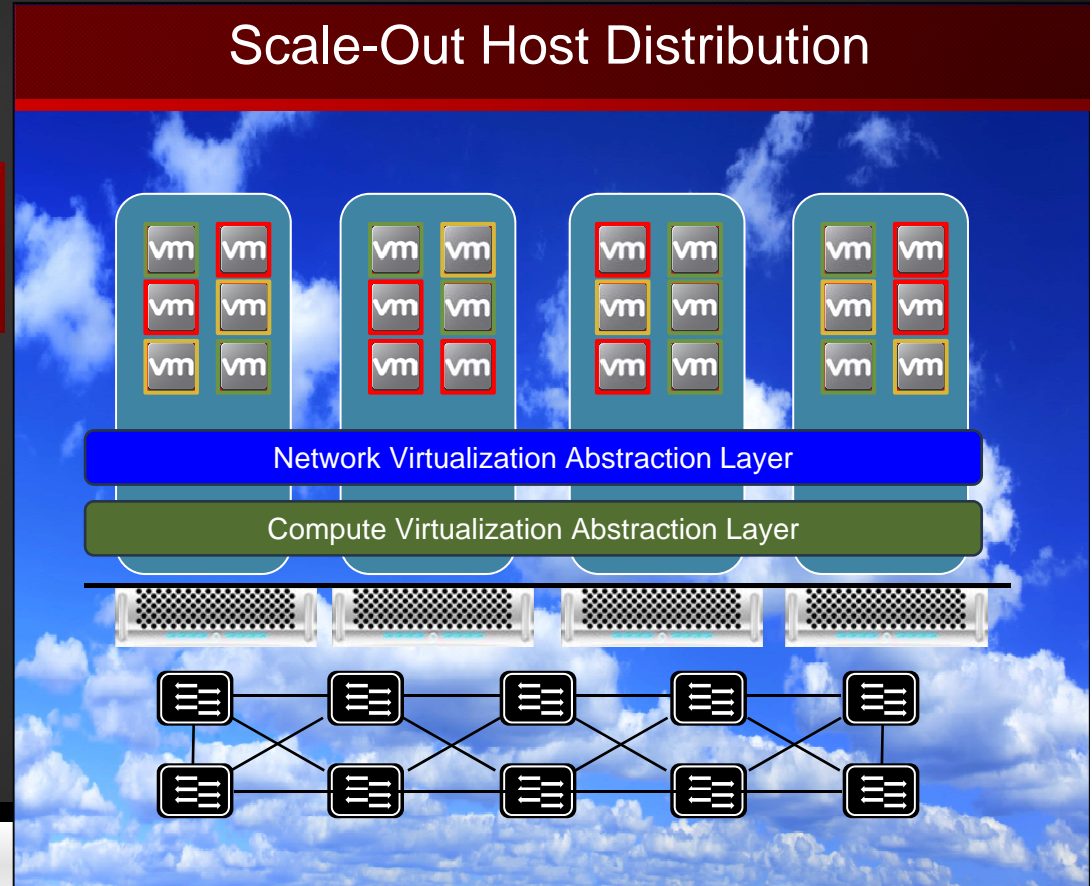
Cloud SP

- Multi-tenancy challenges
- Efficient and economic scale

Enterprise

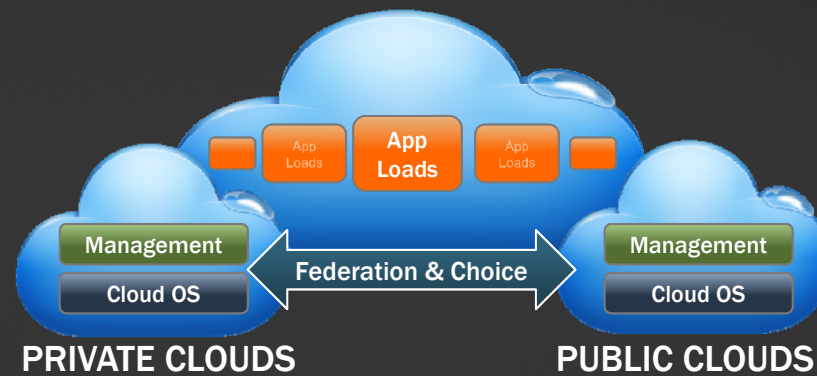
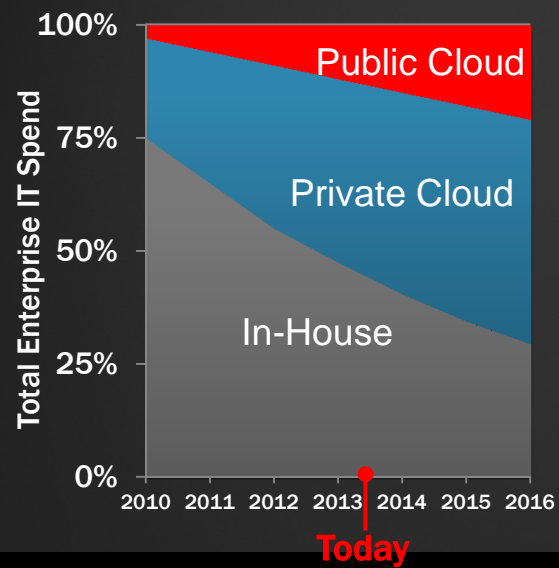
- Apps shifting to Virtualization
- Workloads shifting to Cloud

Scale-Out Host Distribution



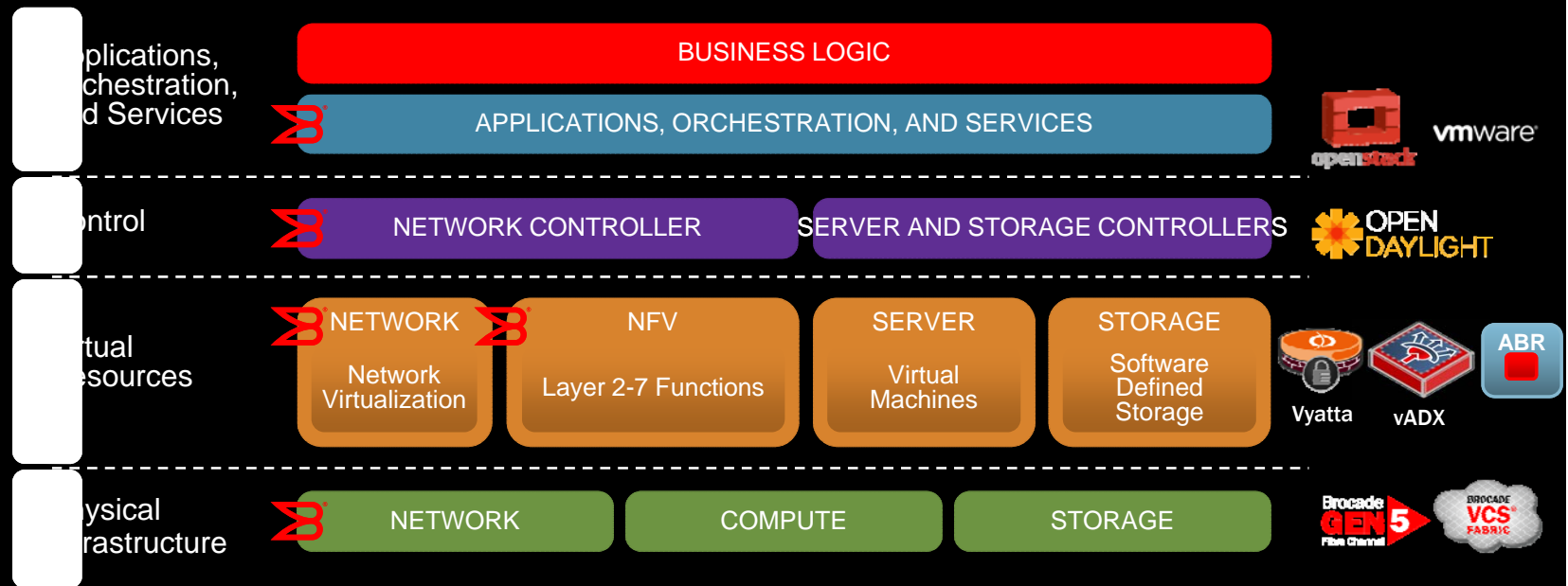
Migration to Cloud

PUBLIC, PRIVATE, HYBRID AND COMMUNITY CLOUD



Data Center Architecture of the Future

THE ON-DEMAND DATA CENTER



NETWORK FUNCTION VIRTUALIZATION (NFV)



Network Function Virtualization

A NEW NETWORKING FRONTIER EMERGES

Deployment

- Huge improvement in SWAP
- Modern logistics impacts

Architecture

- Apps shifting to virtualization
- New network constructs

- Release
 - Network functions from physical constraints
- Relocate
 - Network services from server hardware
- Scale-Out
 - Simple additions of virtual machines

NFV Use Cases

9 MAIN USE CASES*

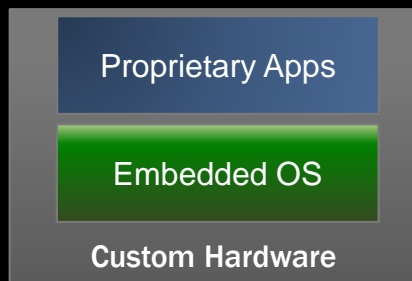
1. Network Function Virtualization as a Service (NFVlaaS)
2. Virtualisation of Mobile Core Network Nodes (including IMS)
3. Virtualization of Mobile Base Stations
4. Virtualized Home Environment
5. Virtual Network Function as a Service (VNFaaS)
6. Service Chaining (VNF Forwarding Graphs)
7. Virtualization of CDNs
8. Virtual Network Platform as a Service (VNPaaS)
9. Fixed Access Network Functions Virtualization

*All 9 approved at NFV#3.

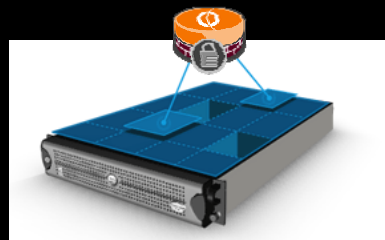
The Disruptive Simplicity of NFV

DE-COUPLE TRADITIONAL SYSTEM ARCHITECTURES

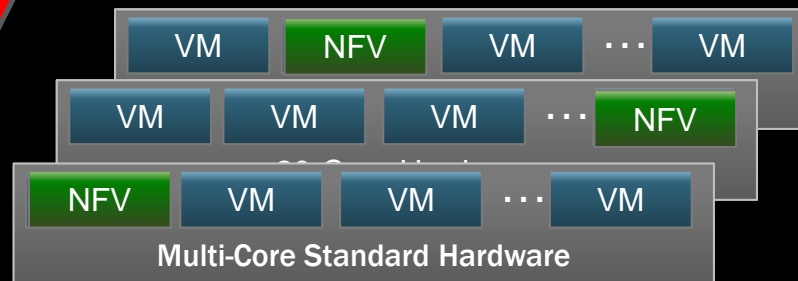
Network Devices



NFV on Virtualized X86 Hardware

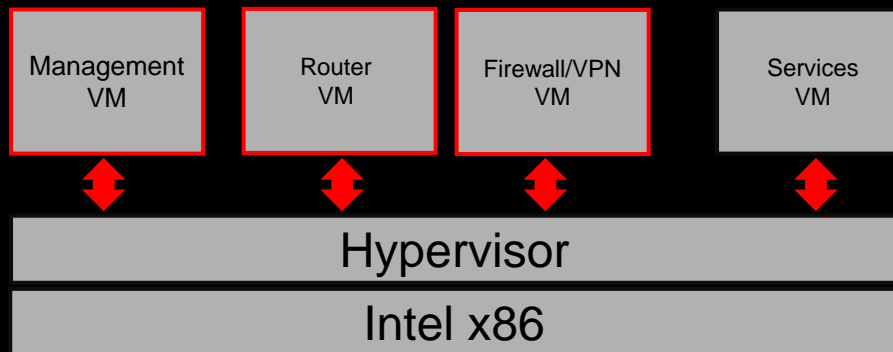


- ✓ 90% lower hardware cost
- ✓ Agility of software
- ✓ Efficiency of virtualization
- ✓ Dynamic Life-Cycle



NFV Use Case: U.S. Federal Virtual Router

WARFIGHTER INFORMATION NETWORK



Federal Virtual Router

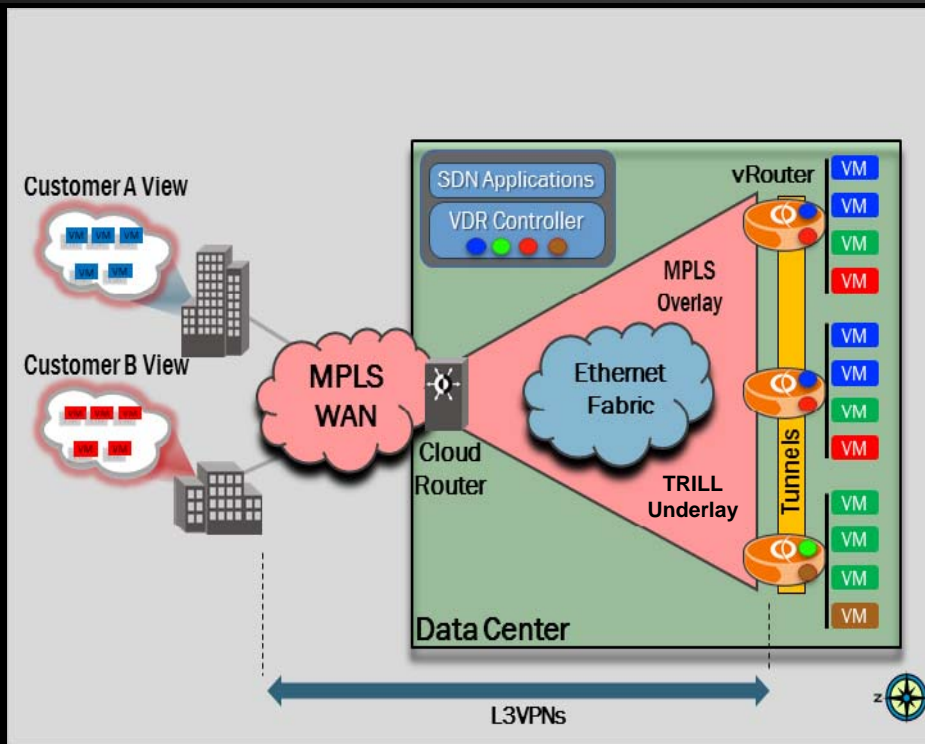
L3 Routing – OSPF, BGP
Security services – Firewall, VPN, etc
VM Management capability
CLI, GUI, API

Purpose-Built X86 Server

6 Core CPU
96GB of RAM
1TB SSD
2 GbE

NFV Use Case: Carrier Network Virtualization

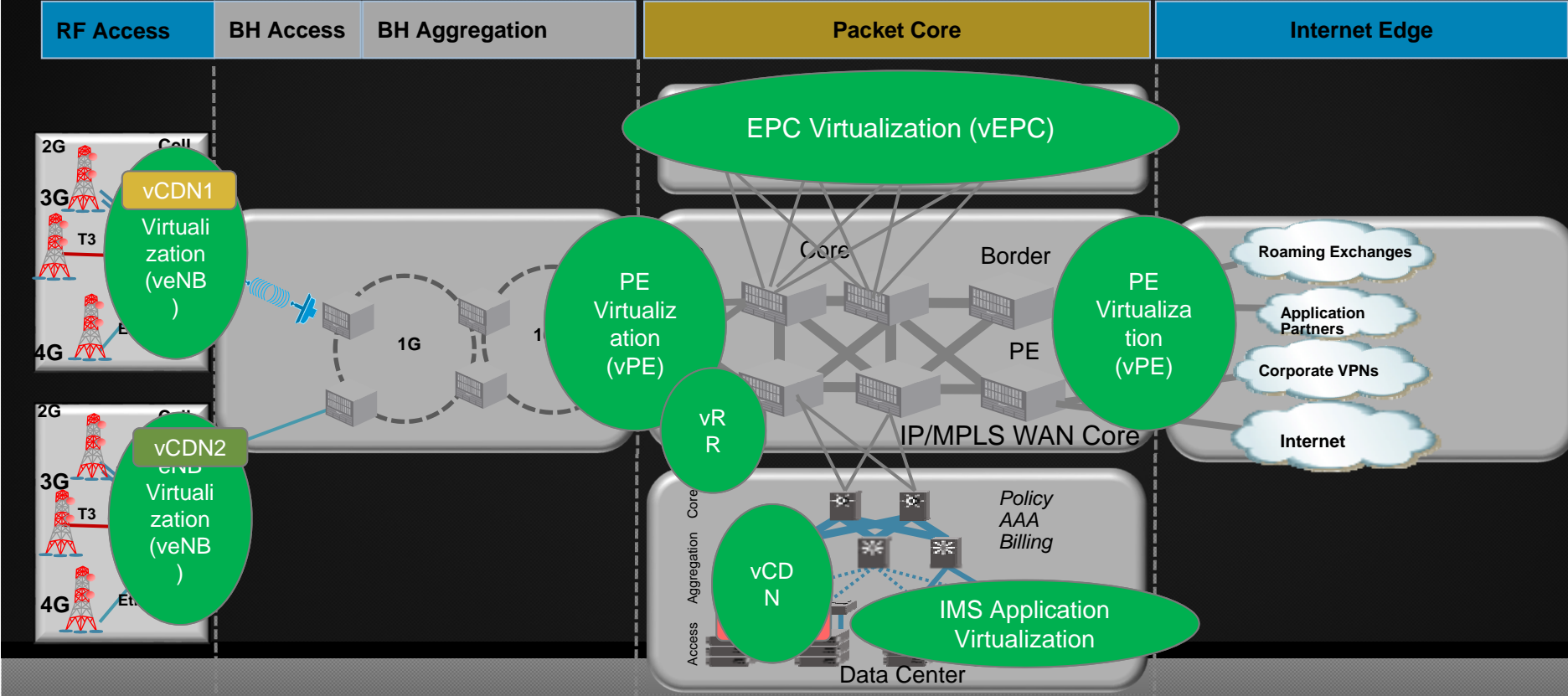
SEAMLESS EXTENSION OF CARRIER L3VPN TO DATA CENTER



- Provide cloud services over carriers' L3VPN networks
- Scale out PE to meet DC multi-tenancy requirements
- MPLS L3VPN extension to vRouter
- Reduce Operational costs
- SDN applications - service chaining, SDN analytics



NFV Use Case: Mobile Network Virtualization

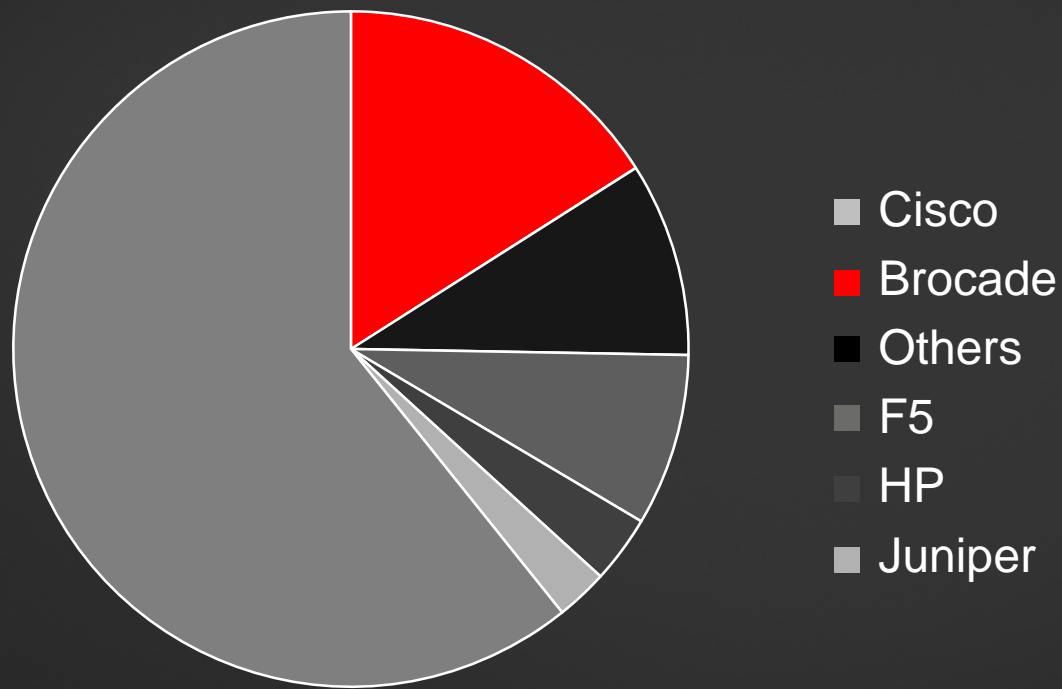


ABOUT BROCADE



Strength in Data Center Networking

BROCADE NO. 2 IN WORLDWIDE MARKETSHARE



N=\$9.2 Billion

Source: IDC Datacenter Network

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Brocade will be the network provider of choice to the world's data centers.



BROCADE ®

Gaining Market Momentum...

90%+

Deployed in Global 1000
Company data centers

#1 SAN
Marketshare
worldwide

#2 WW data center
networking
marketshare

1400+

Ethernet Fabric
Customers

**FIRST
TO
MARKE**

Etherne
t
Fabrics

200,000+

Brocade SANs in
production worldwide

~30

MILLION
SAN ports shipped
worldwide

↑.3+
MILLION
Virtual routers downloaded
worldwide

1 MILLION+

OpenFlow router ports
shipped