Infrastructure for the Future Interne

Paul Congdon

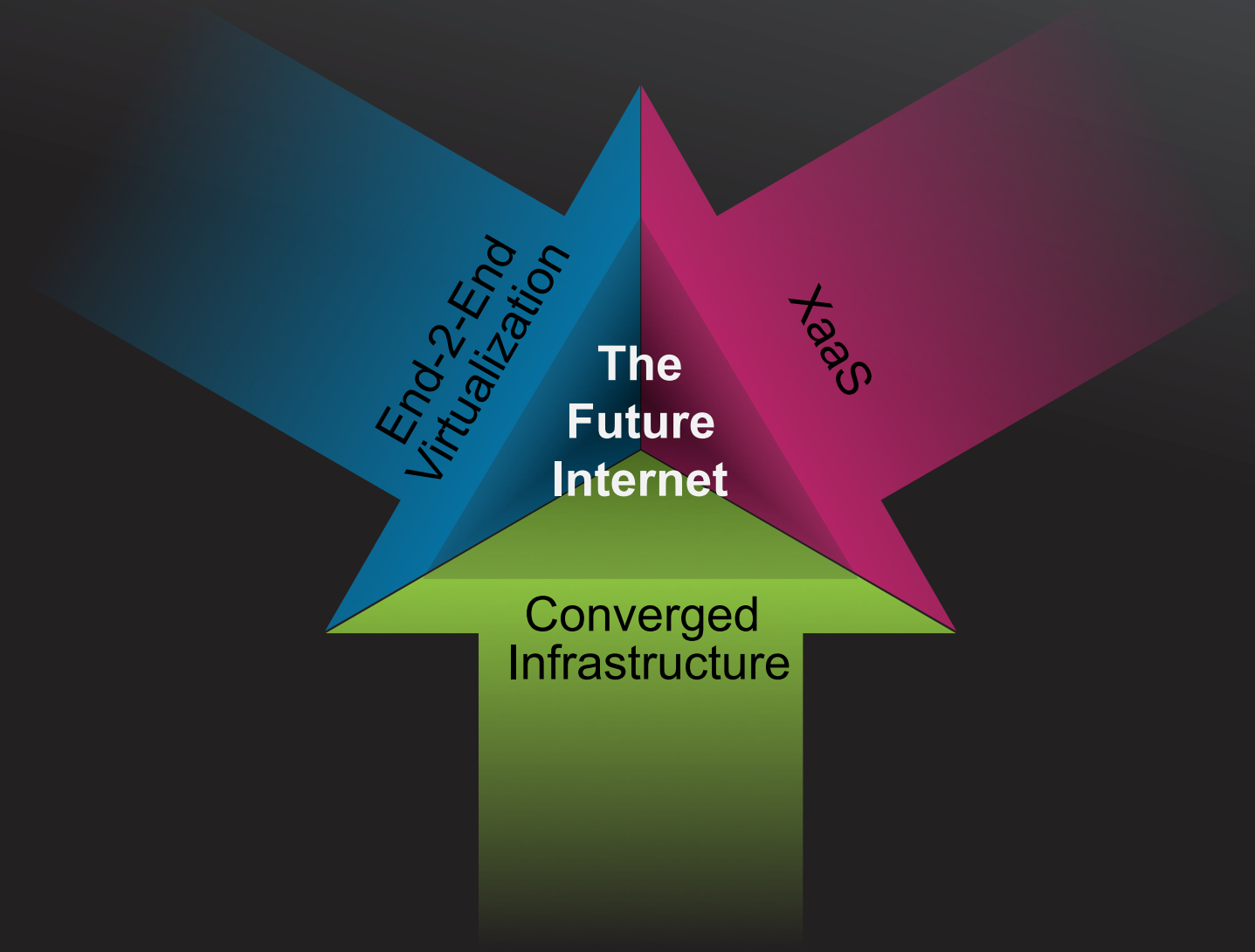
Chief Technologist and HP Fellow

HP Networking

October 2010

© 2010 Hewlett-Packard Development Company, L.P.
The information contained herein is subject to change without notice.

Our time together…



Macro forces

POPULATION GROWTH	– By 2025, worldwide population growth of about 20%, from 6.6 to 7.8 billion
URBANIZATION	– Cities are expanding by 60 million people annually, adding a Beijing every two months
GLOBALIZATION	– Increasing participation in the global economy – By 2030, the global middle class is projected to swell from 440M to 1.2B
INFORMATION EXPLOSION	– 1.8 billion people online – Information doubles every 4 years, digital content every 18 months – 4.1 billion SMS sent daily in US (data 1H2009)

DATA: Population: United Nations; Urbanization: World Resources Institute; Globalization: World Bank; Online: Internet World Stats; CTIA Data

2020: Where will it go?

Everything as a Service: From computing power to personal interactions

Next-generation data centers

- Converged infrastructure
- Cloud

Mobile, personal experiences

- Seamless across devices

Digital and social media

- Every voice can be heard
- New business models

Sensors and predictive analytics

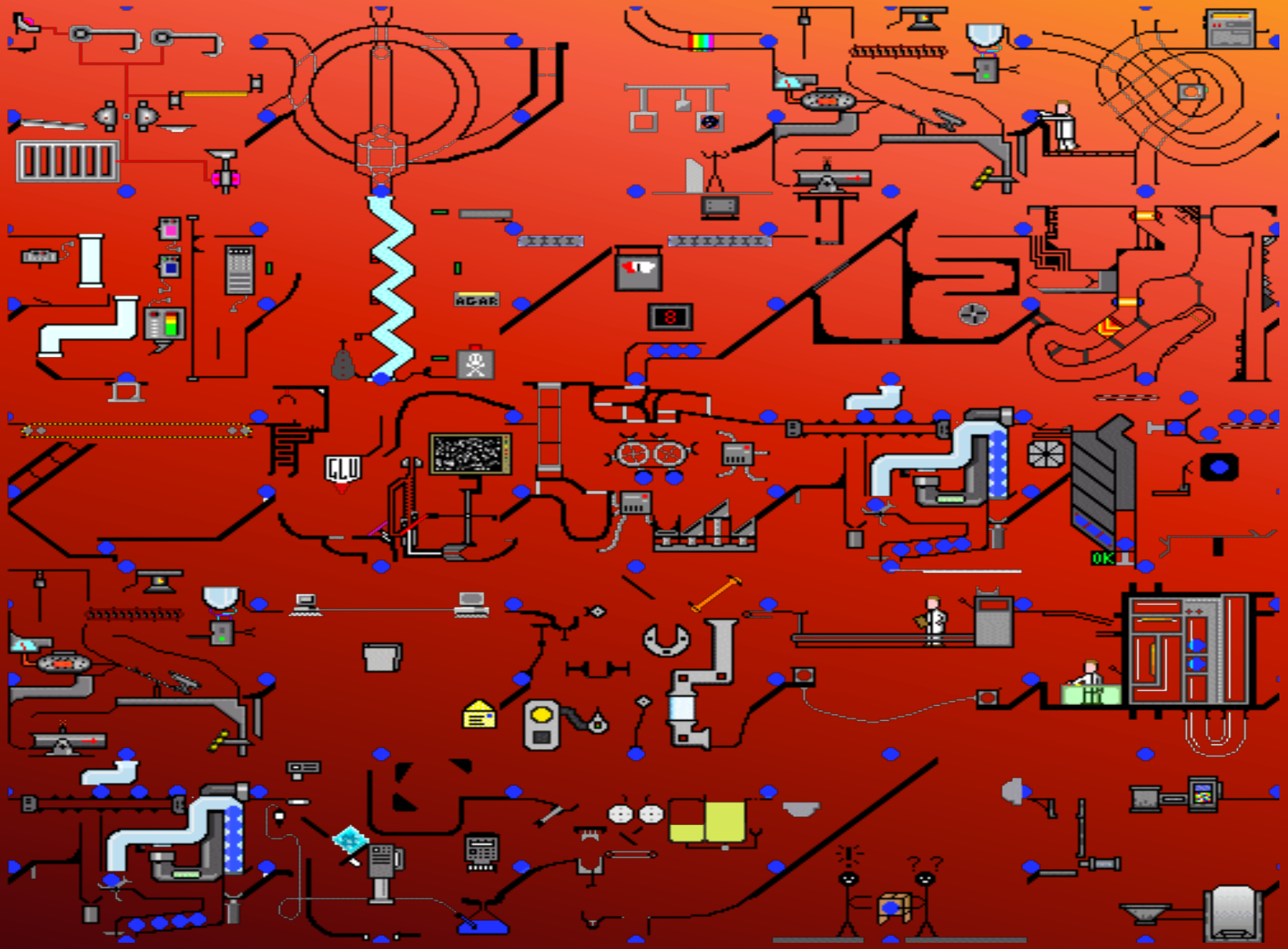
- Real time insight on a massive scale

Sustainability

- Carbon emissions: 2% IT, 98% other industries

©2010 HP

Trouble in Today's Data Centers…

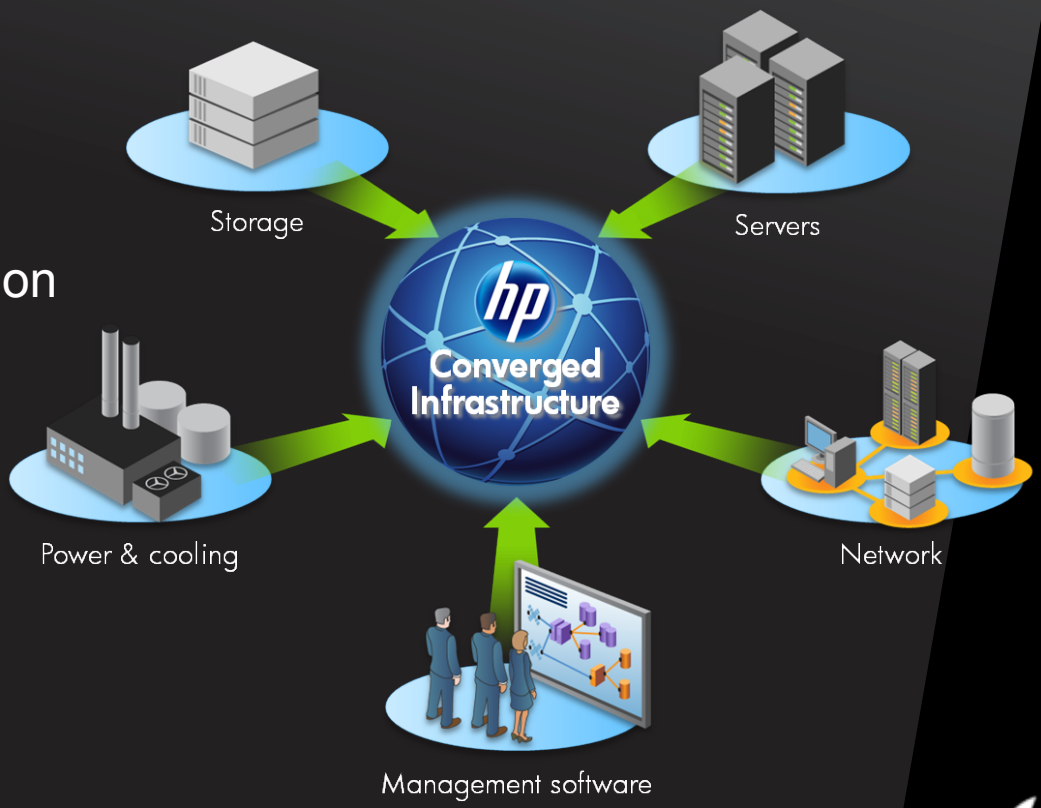


©2009 HP Confidential

Next generation data center…

Simpler and more reliable IT infrastructure

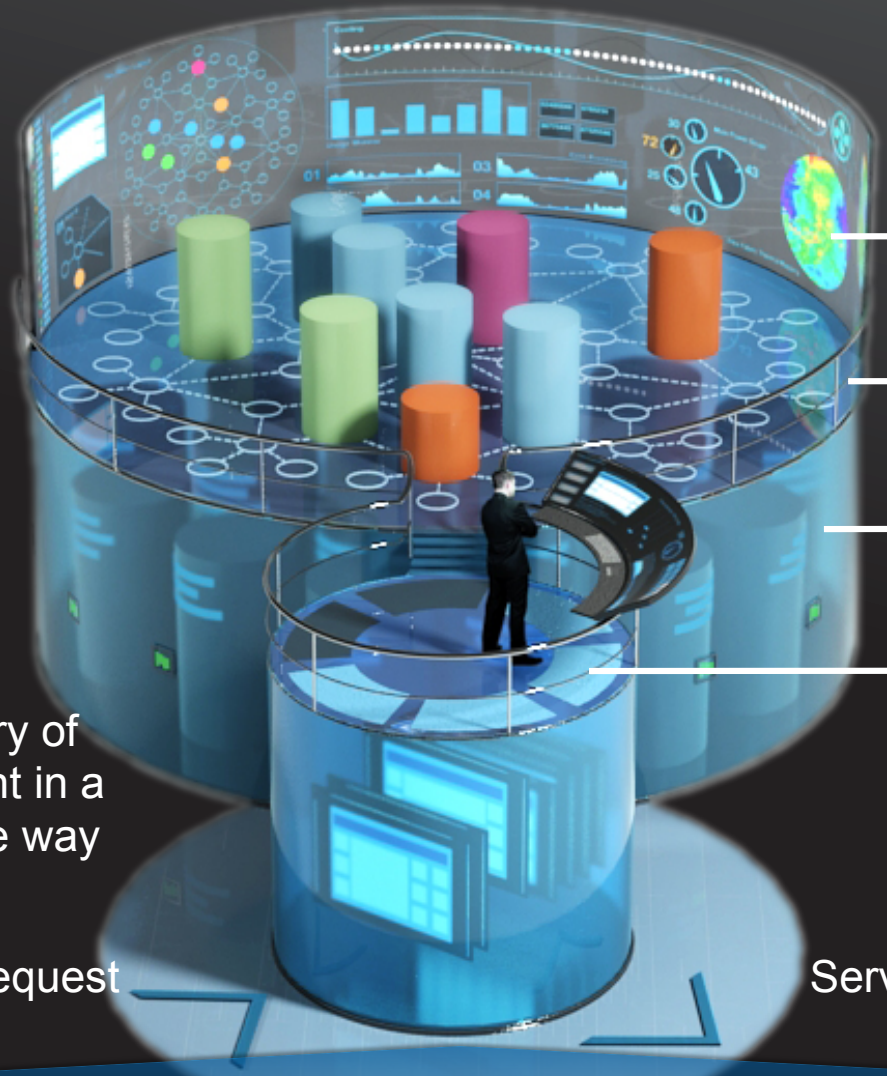
- Server & storage using common modular components
  - Learn things once, choose operating system
- Sea of Sensors
  - Use only what is needed
- Edge Virtual Bridging
  - Fewer ports, coordinated operation
- Infrastructure management
  - automation / orchestration
- Value-add services
  - Architect, build, run



Next generation data center…

Built on Converged Infrastructure, based on standards

Make the most of efficient use of IT, facility and staff resources to drive business innovation



Data Center Smart Grid

Flex Fabric

Virtual Resource Pools

Infrastructure Operating Environment

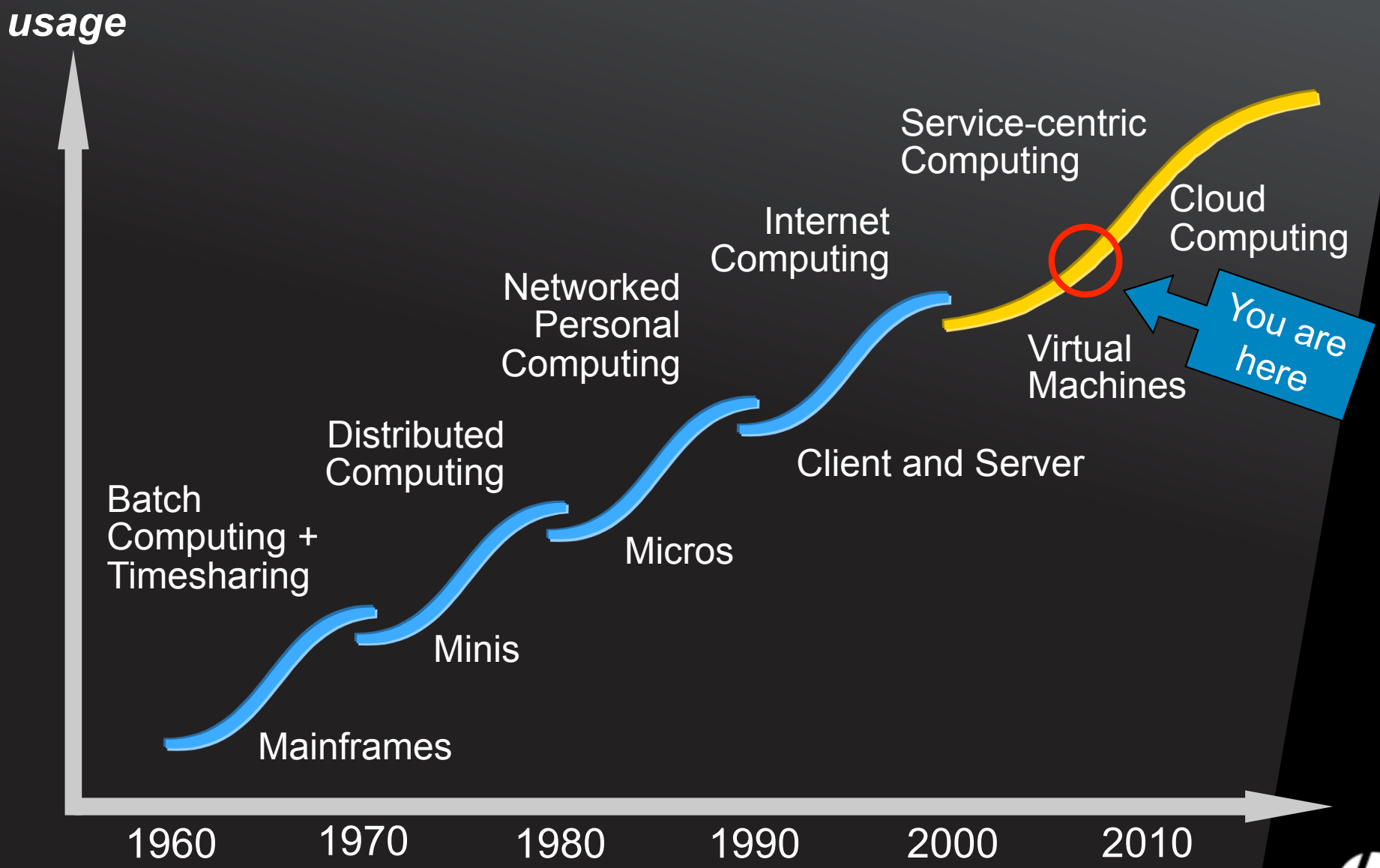
Accelerate the delivery of application environment in a predictable, repeatable way

Service Request

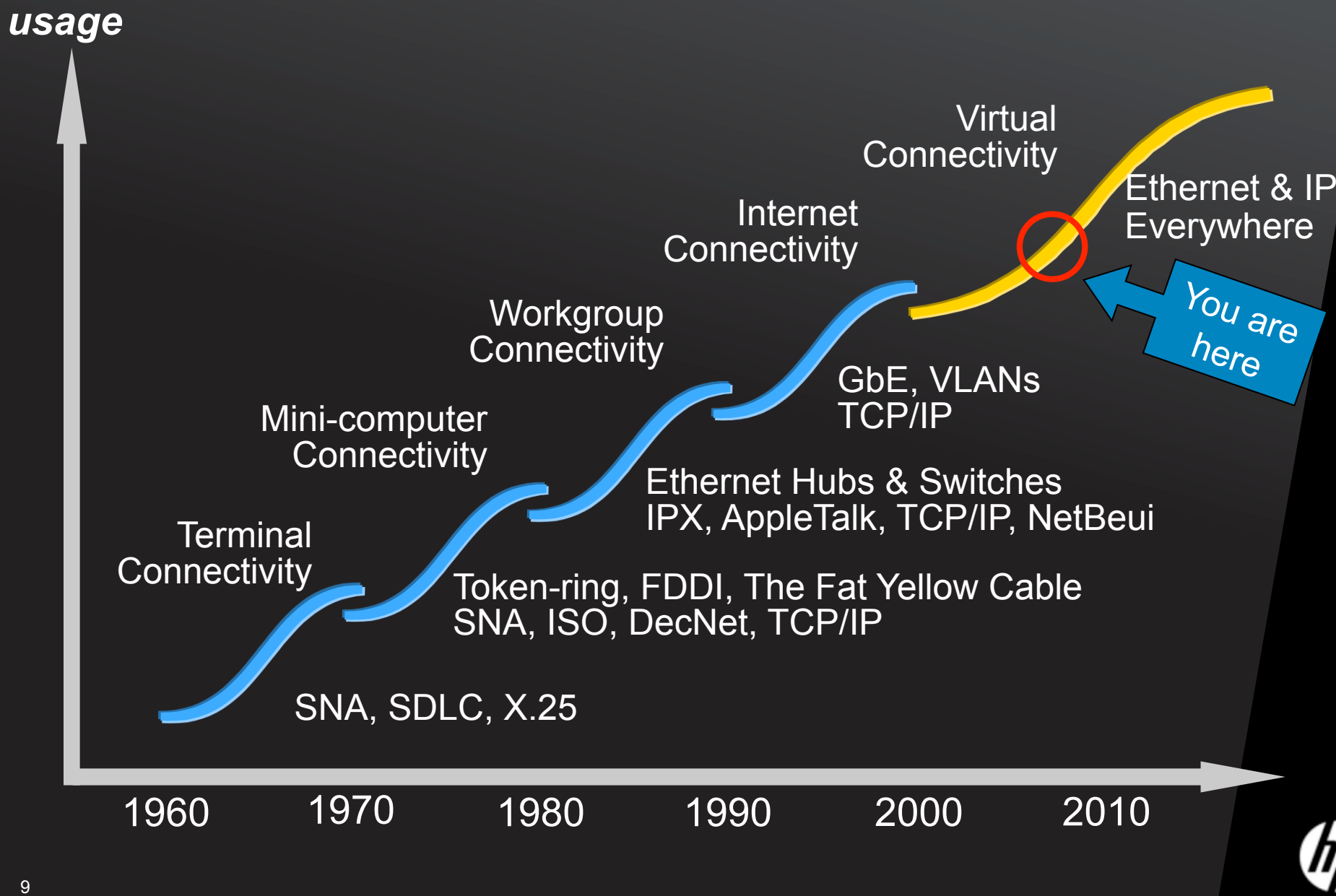
Service Delivery

Virtualized • Resilient • Orchestrated • Optimized • Modular

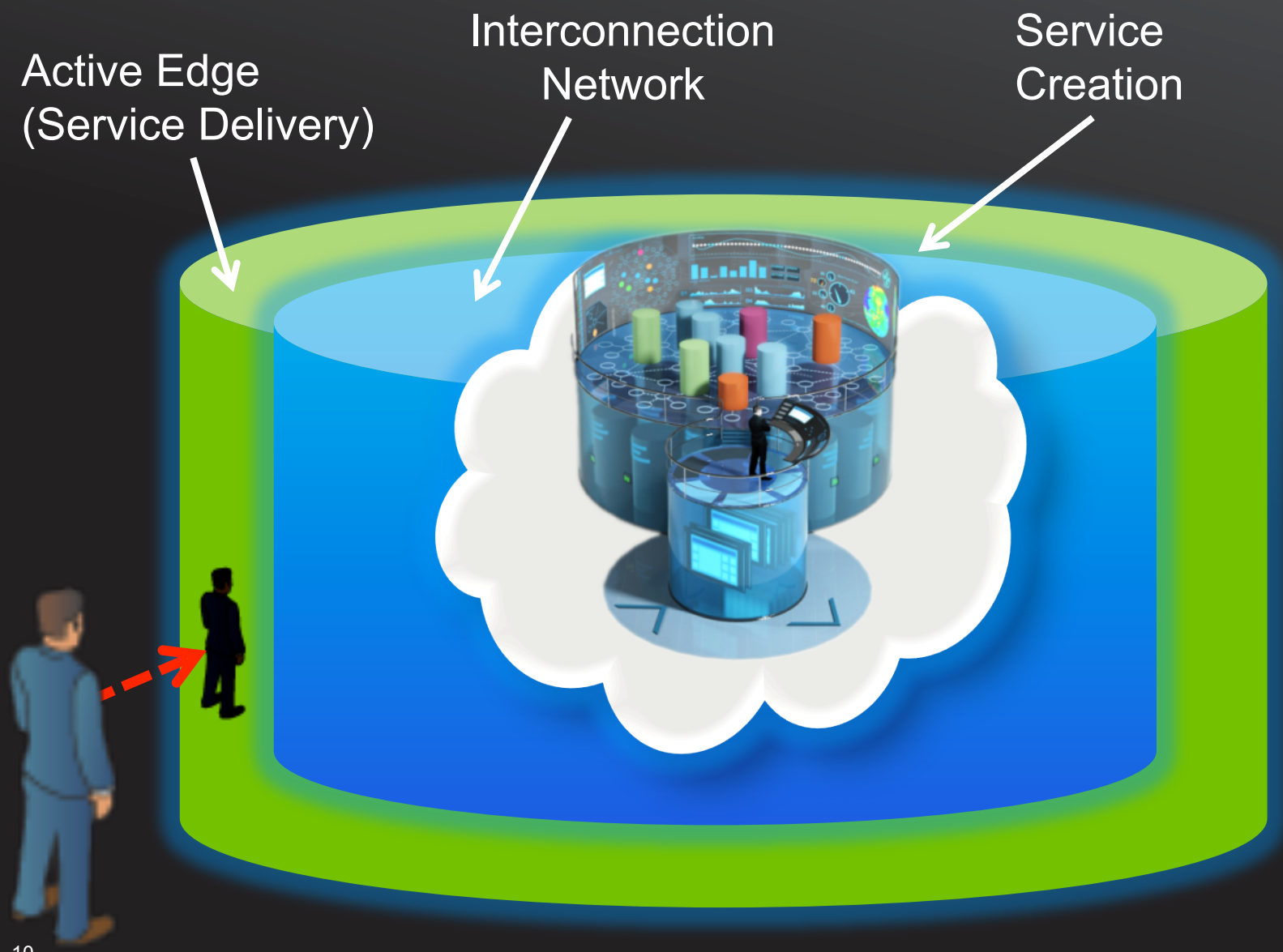
The Eras of Computing



The Eras of Networking



Coordinated Service Delivery

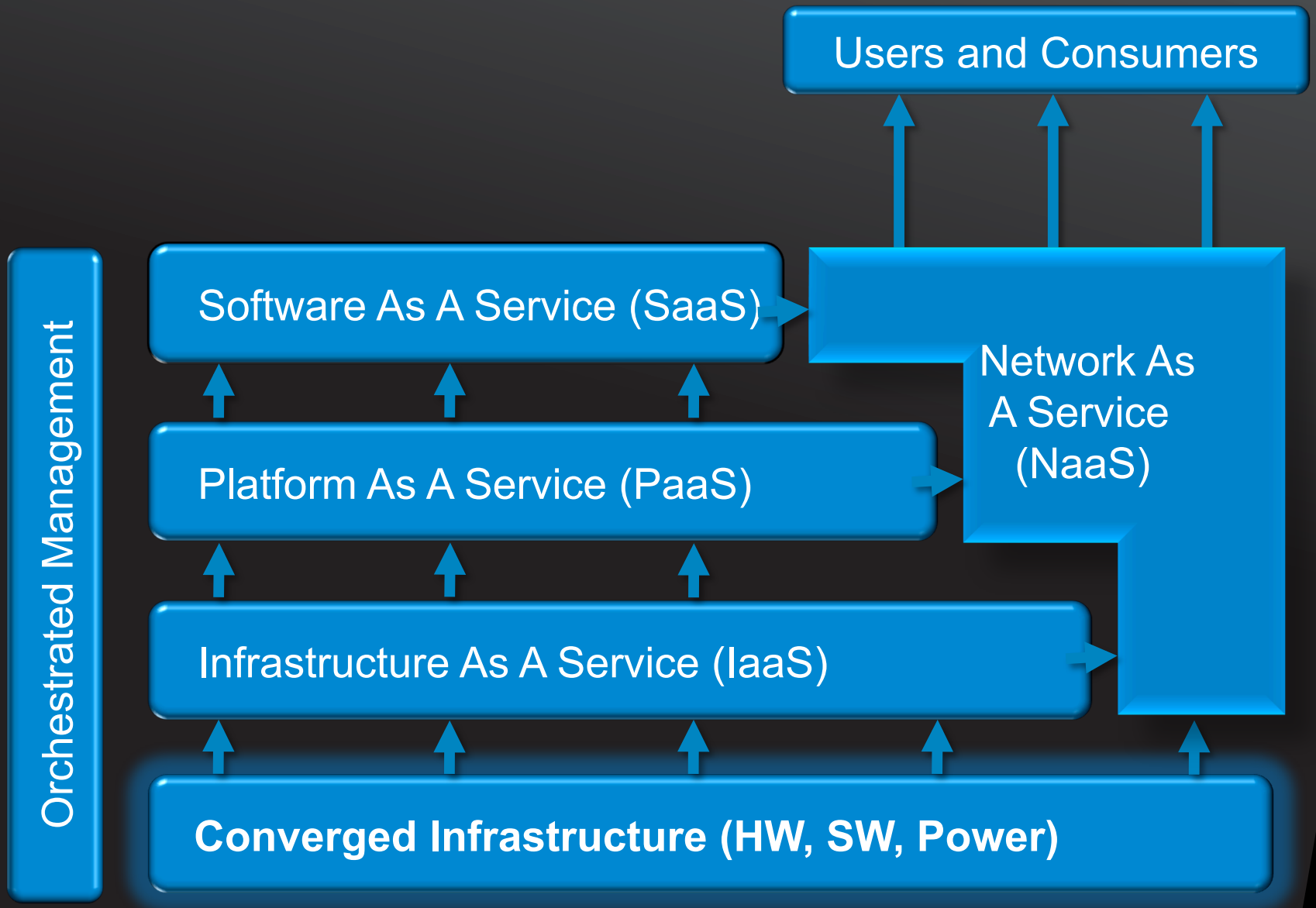


Networking is Key to Converged Infrastructure

Connecting applications, infrastructure, and users

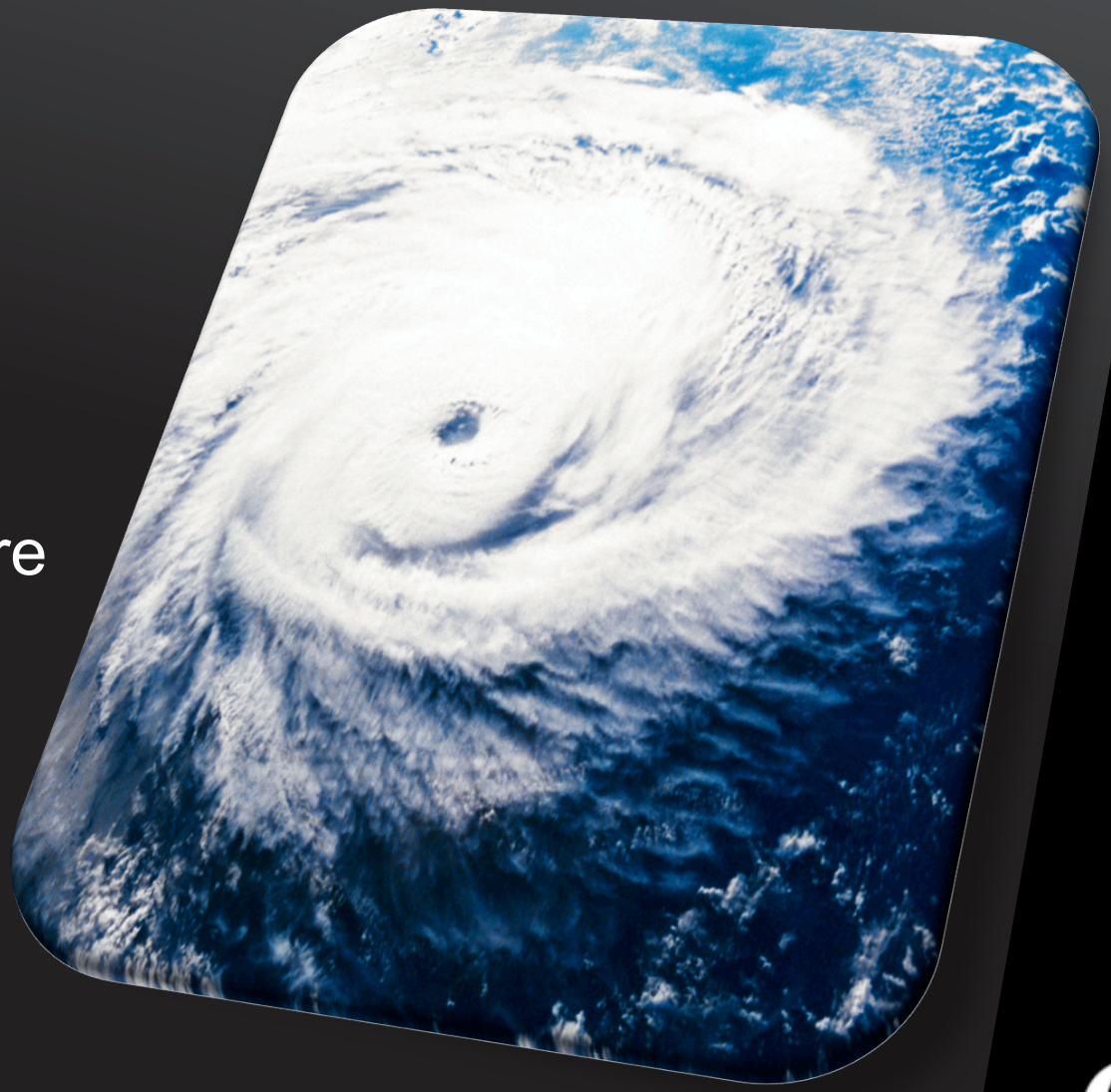
- Accelerate time-to-service and improve service delivery
- A highly efficient services fabric for data, voice, and video
- Secure and flexible access to application and business services from anywhere
- End-to-end security to protect attached enterprise assets
- A point of management and orchestration control

Cloud delivery models



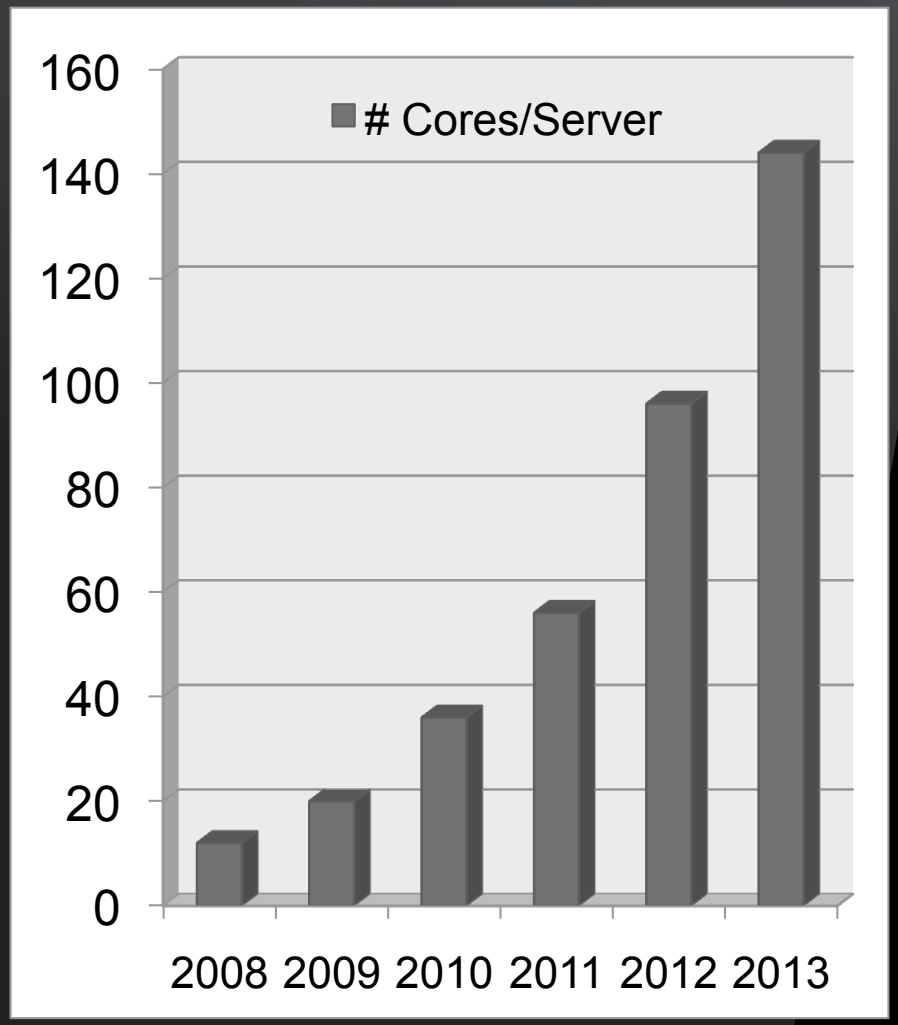
What is Fueling Cloud Success?

- The Internet
- The Browser
- Application Architecture
- Virtualization



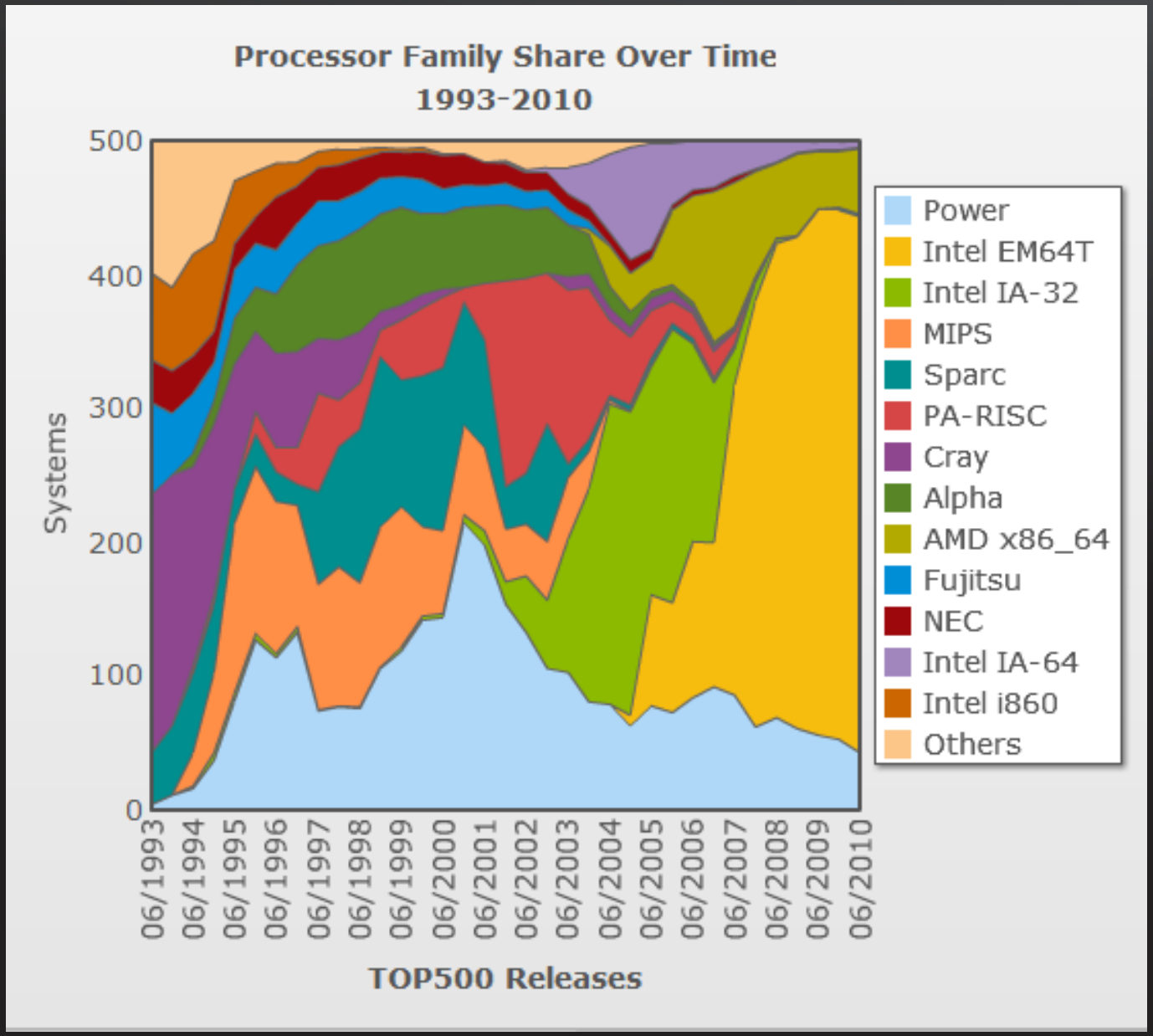
Ongoing Technology Enablers

- Processors
  - Multi-core CPUs
  - Virtualization-enhanced processors
  - Elimination of the CPU -I/O bottleneck
- Interconnect Standards
  - PCI SIG SR-IOV enables high-performance I/O for virtual servers

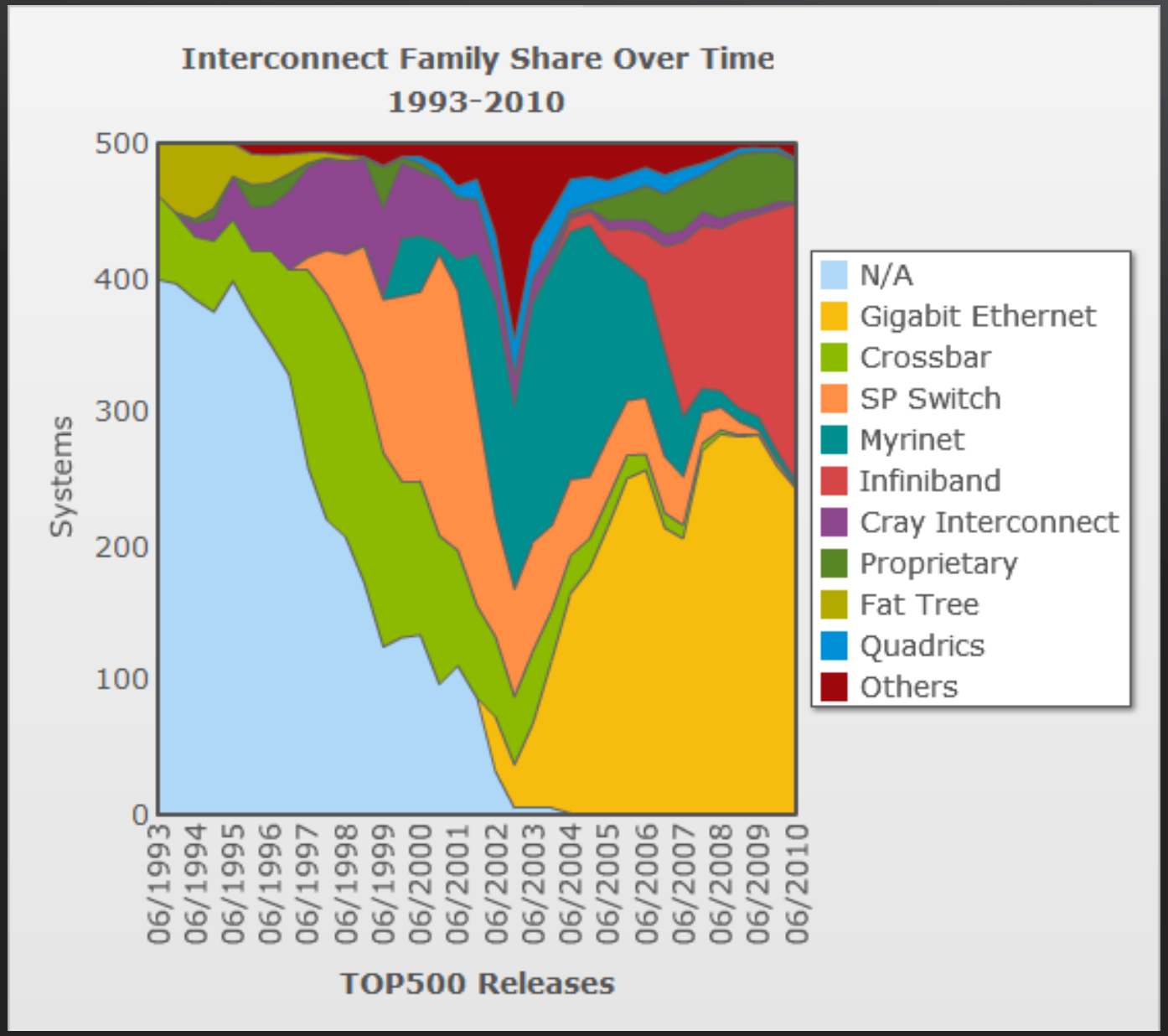


Source: TechAlpha – "Ripple Effects of Virtualization" January 2009

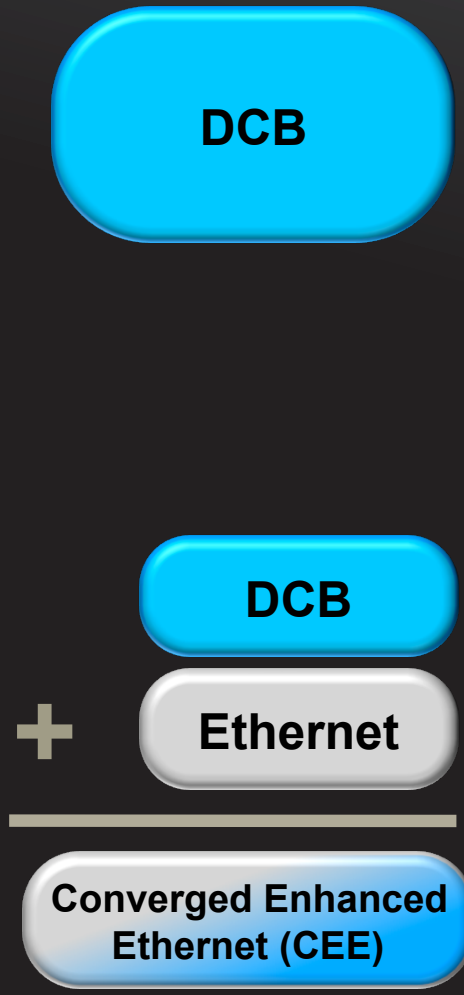
Top500 Processor Families



Top500 Interconnects

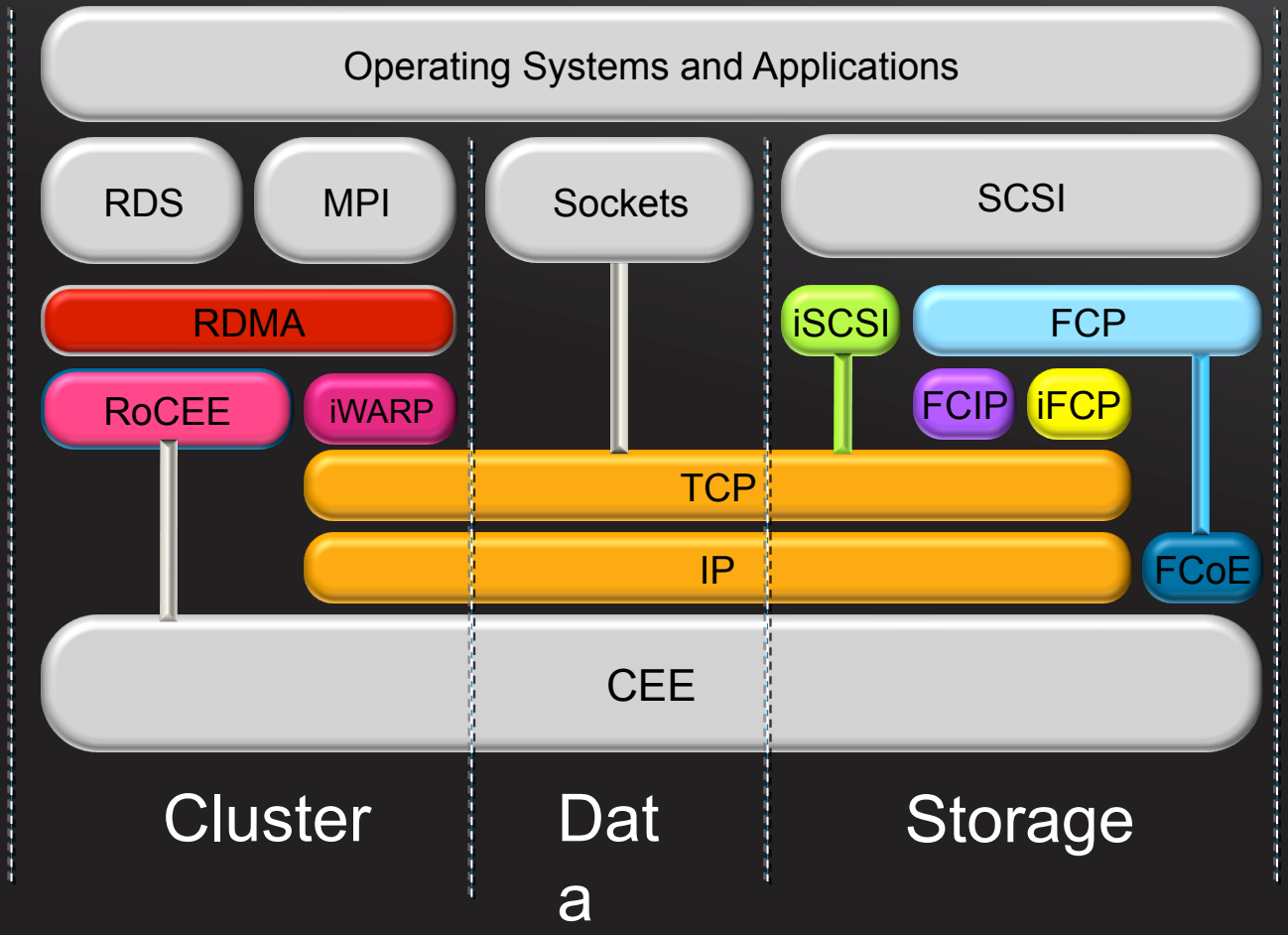


The New Ethernet



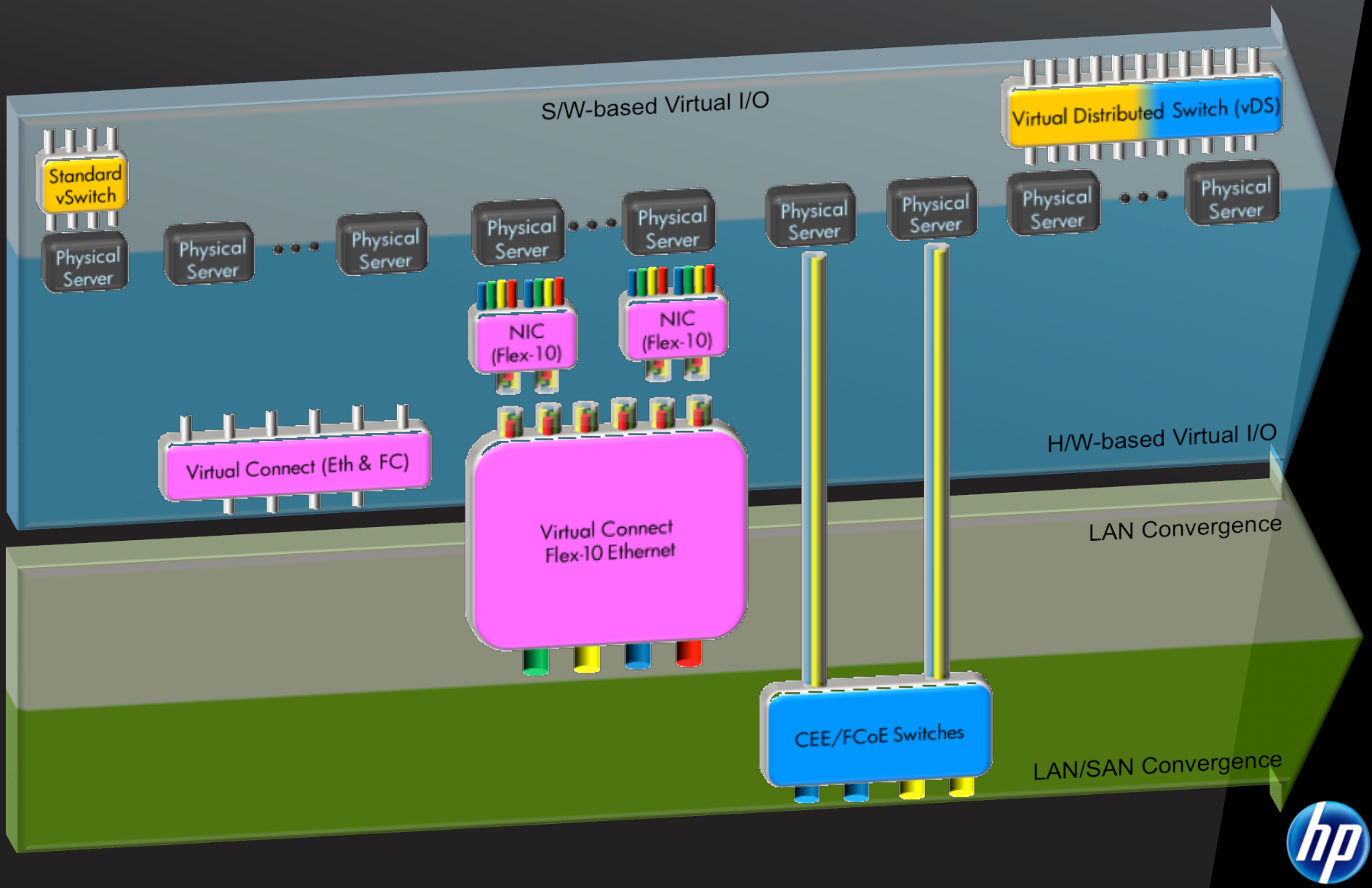
- Data Center Bridging (DCB)
  - Standards to enable multiple traffic classes over Ethernet
  - Focused initially on FCoE, IB next
  - Amendments to IEEE 802.1Q, Virtual Bridged Local Area Networks
    - 802.1Qbb – Priority-based Flow Control (PFC)
    - 802.1Qaz – Enhanced Transmission Selection (ETS) DCB Capability Exchange Protocol (DCBX)
    - 802.1Qau – Congestion Notification (QCN)
- Converged Enhanced Ethernet (CEE)
  - CEE is new Ethernet infrastructure that implements DCB
  - Both hardware and software changes to traditional Ethernet

Goal: Use CEE for all workloads



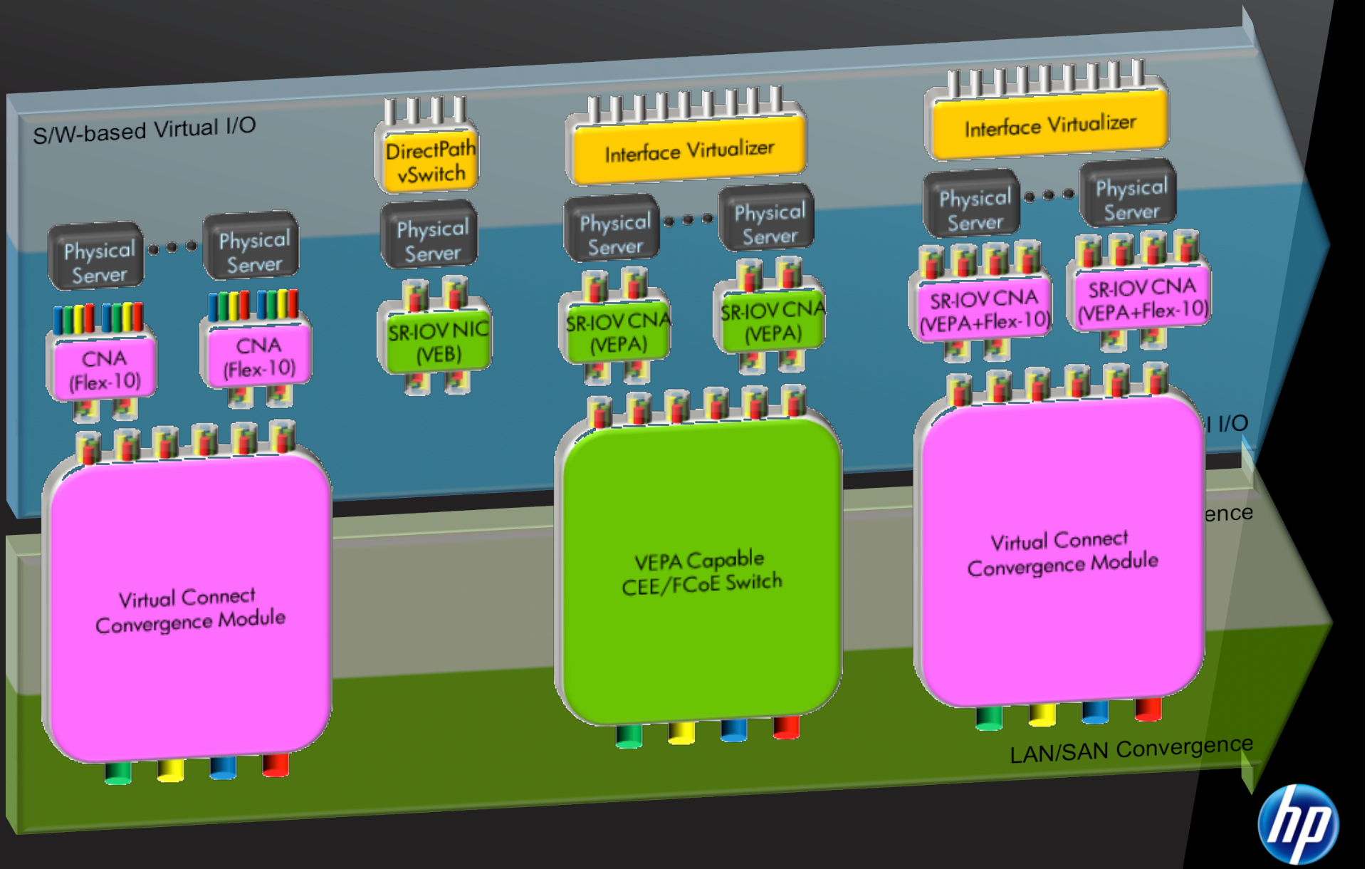
Virtual I/O & Converged Networks

Evolution & Integration - History

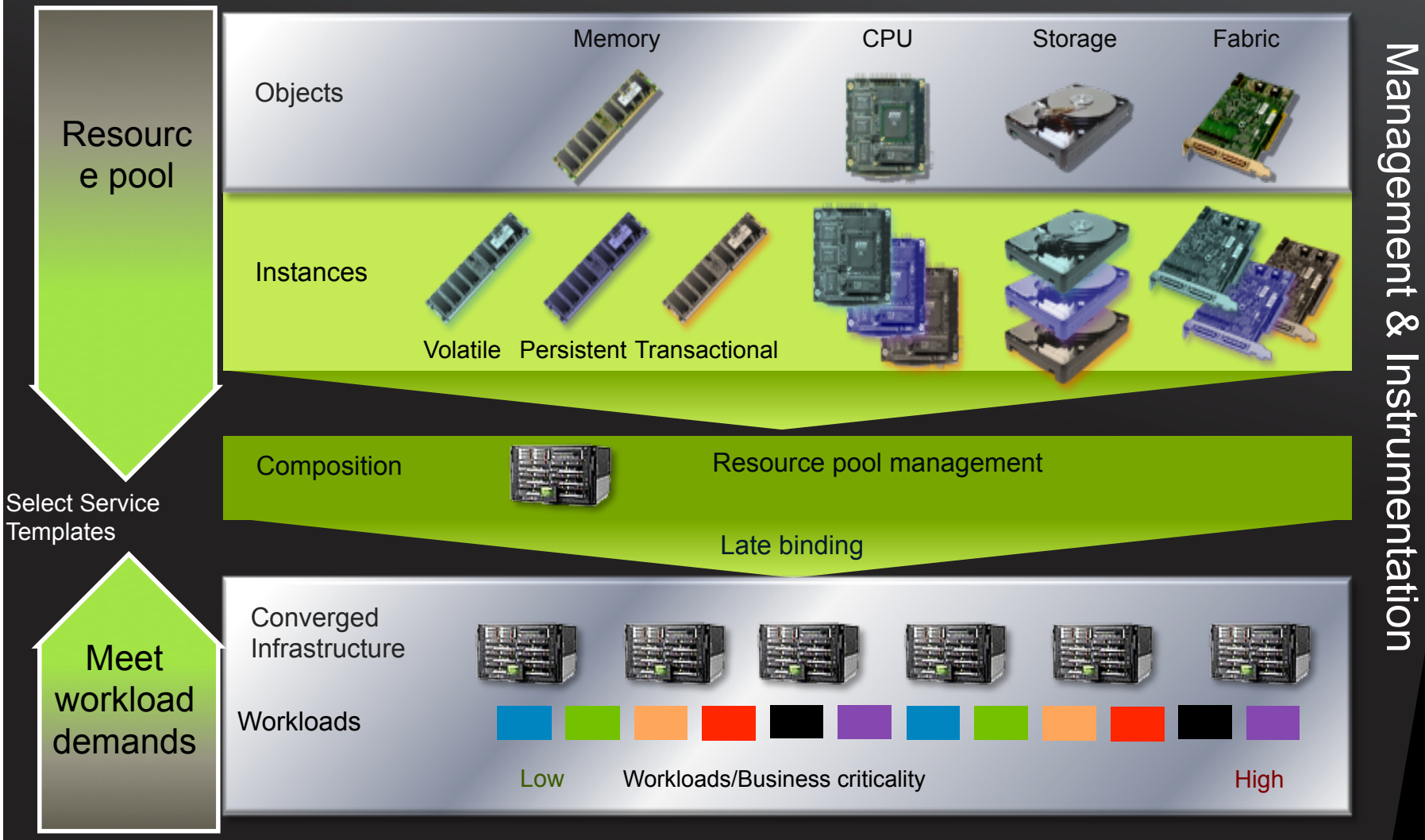


Virtual I/O & Converged Networks

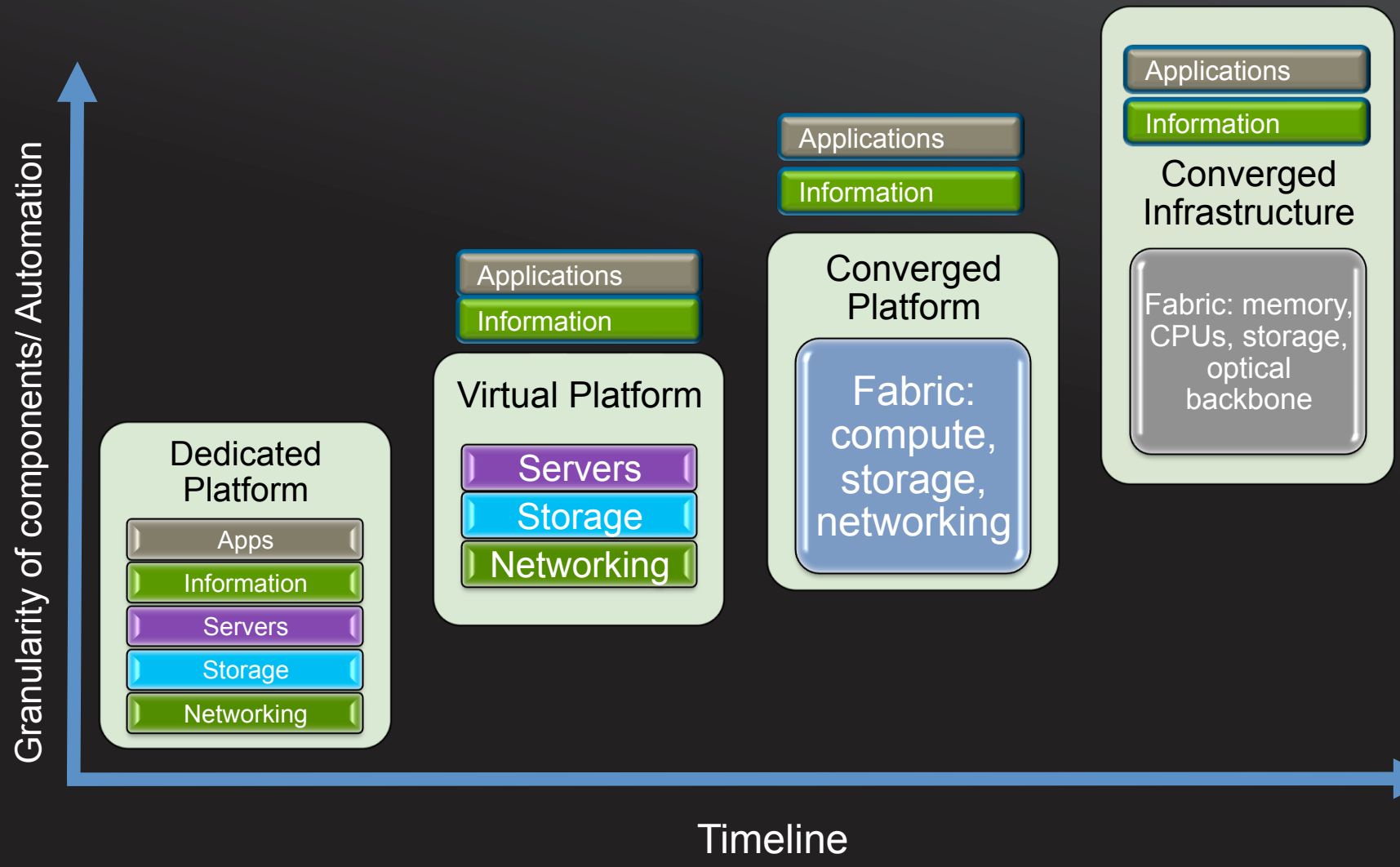
Evolution & Integration – Looking Forward



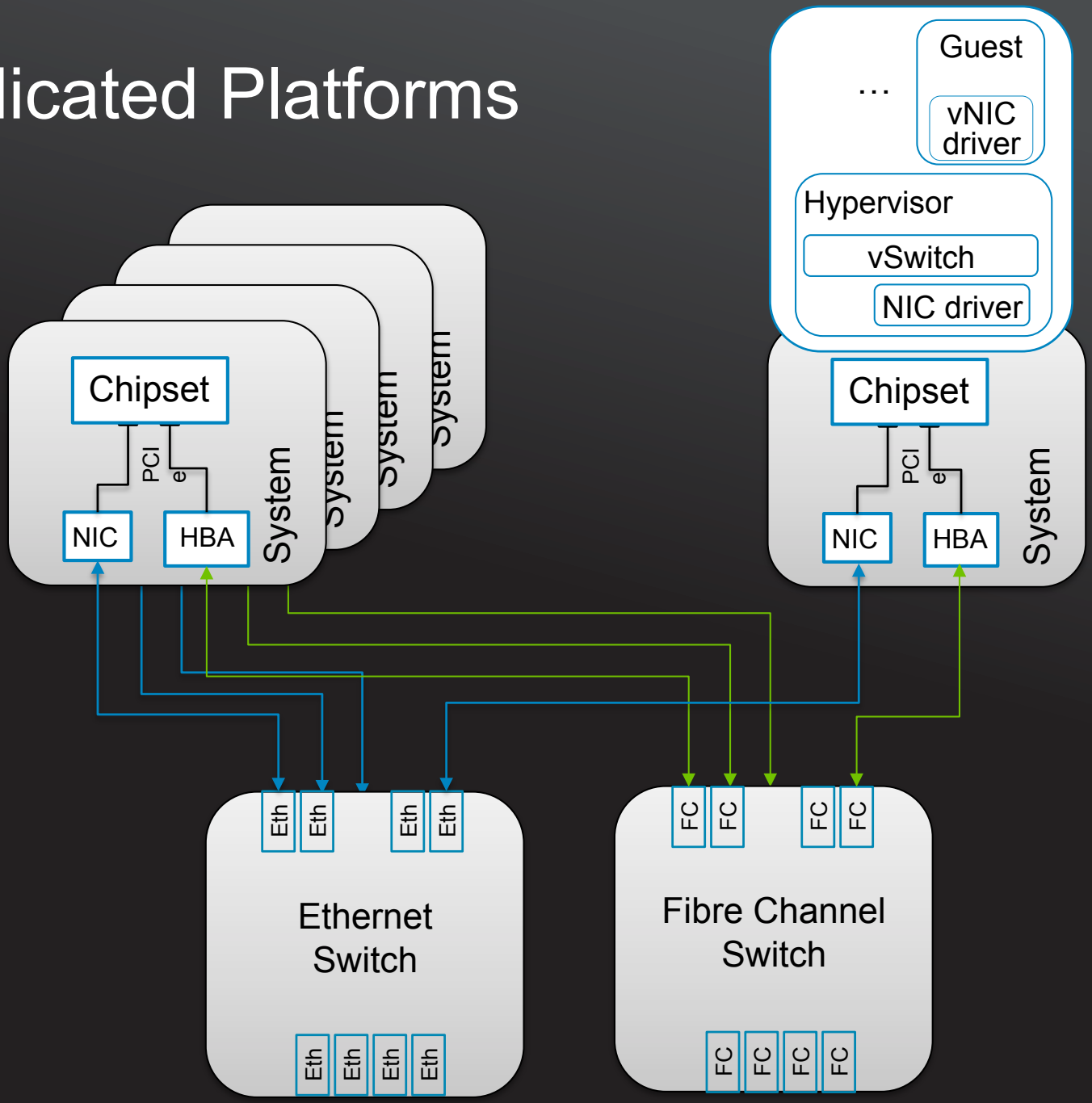
A Future Vision for the Data Center



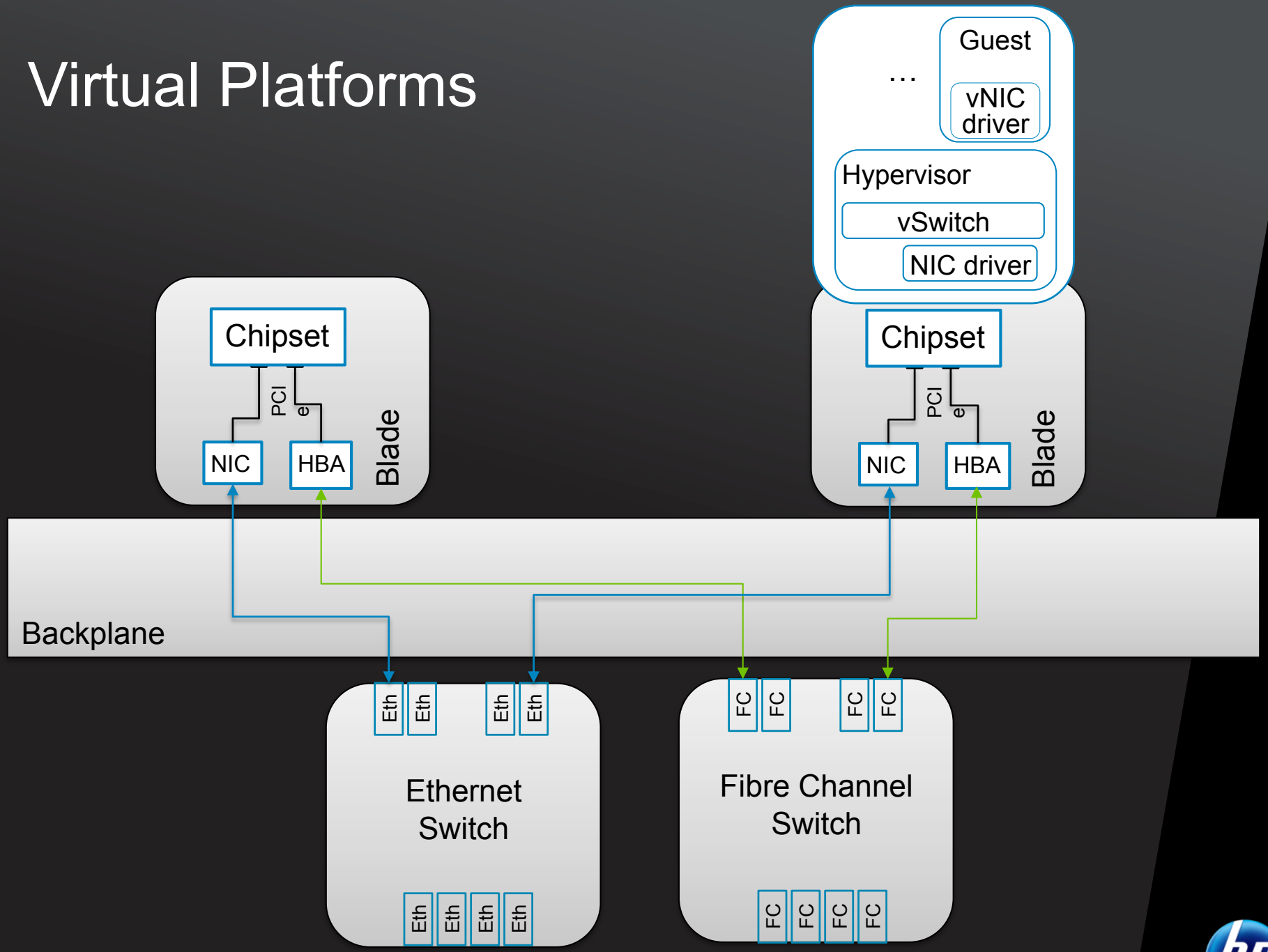
The Road to Converged Infrastructure



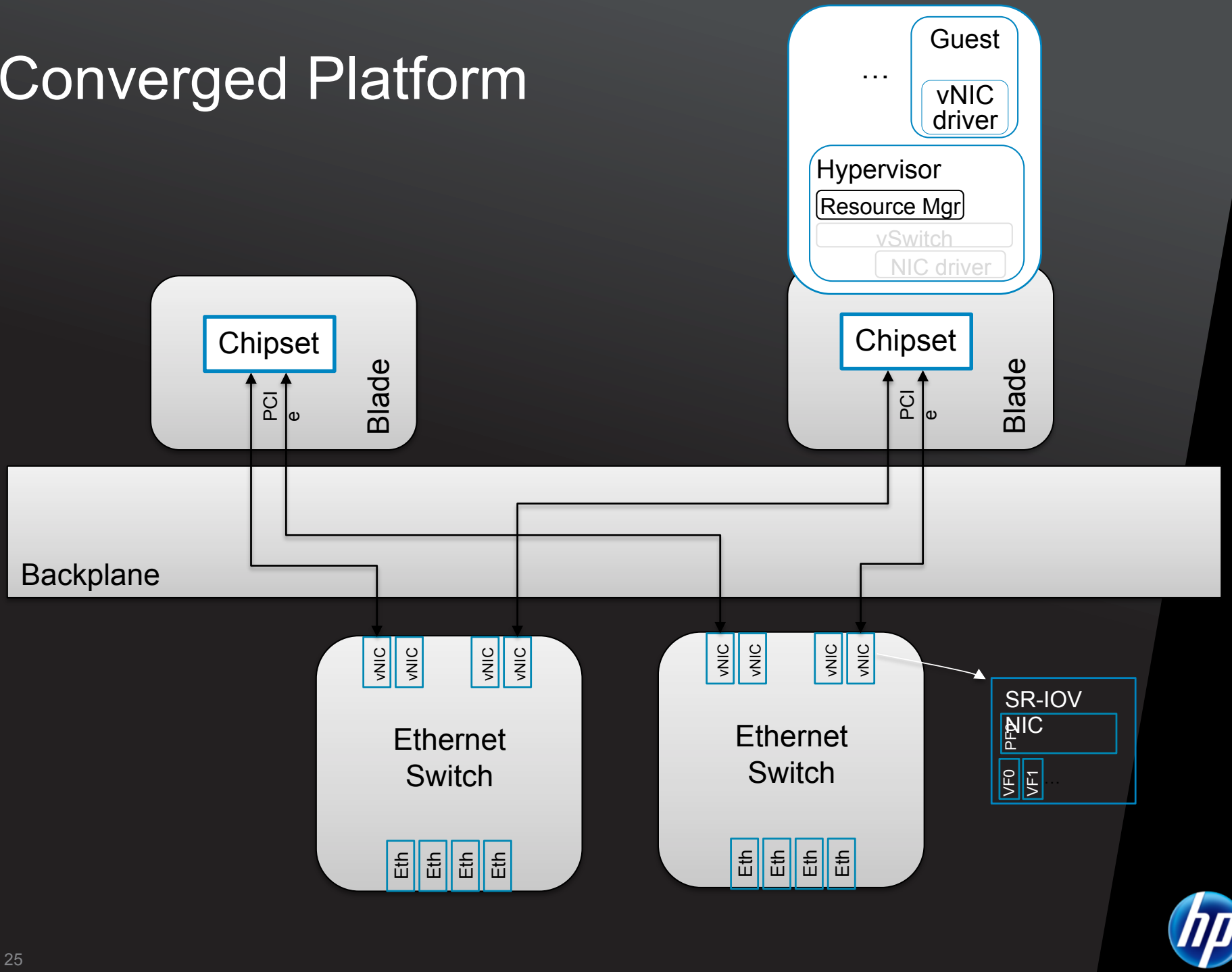
Dedicated Platforms



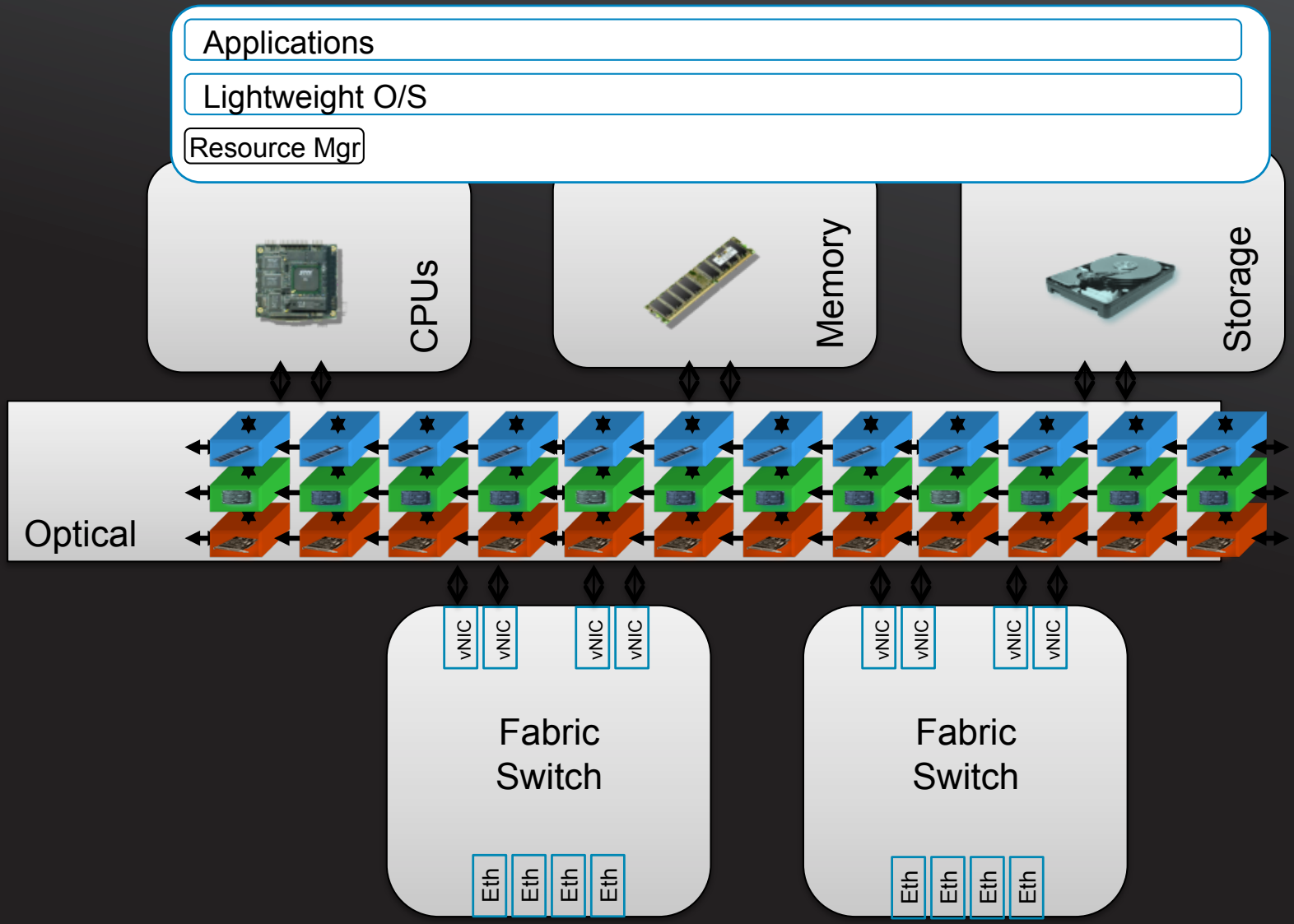
Virtual Platforms



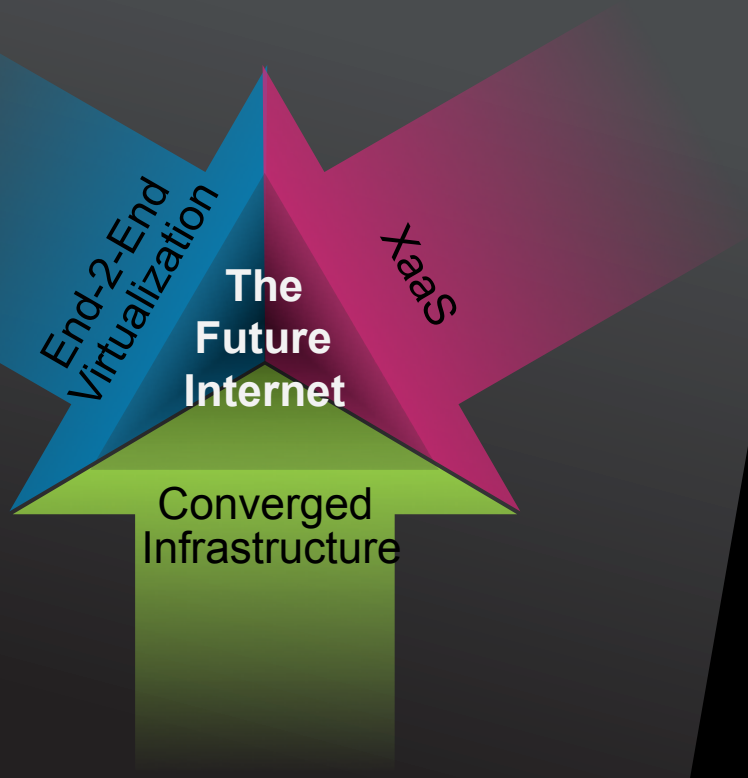
Converged Platform



Converged Infrastructure



Conclusions



- Massive growth and scale drive change to Internet Architectures
- The Cloud era will give business more time to focus on business
- End-to-End virtualization and hardware standardization are key enablers
- The Future Internet will be built on truly converged infrastructure