



Enabling Cloud Providers with Converged Infrastructure

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HP Networking at PLNOG Conference

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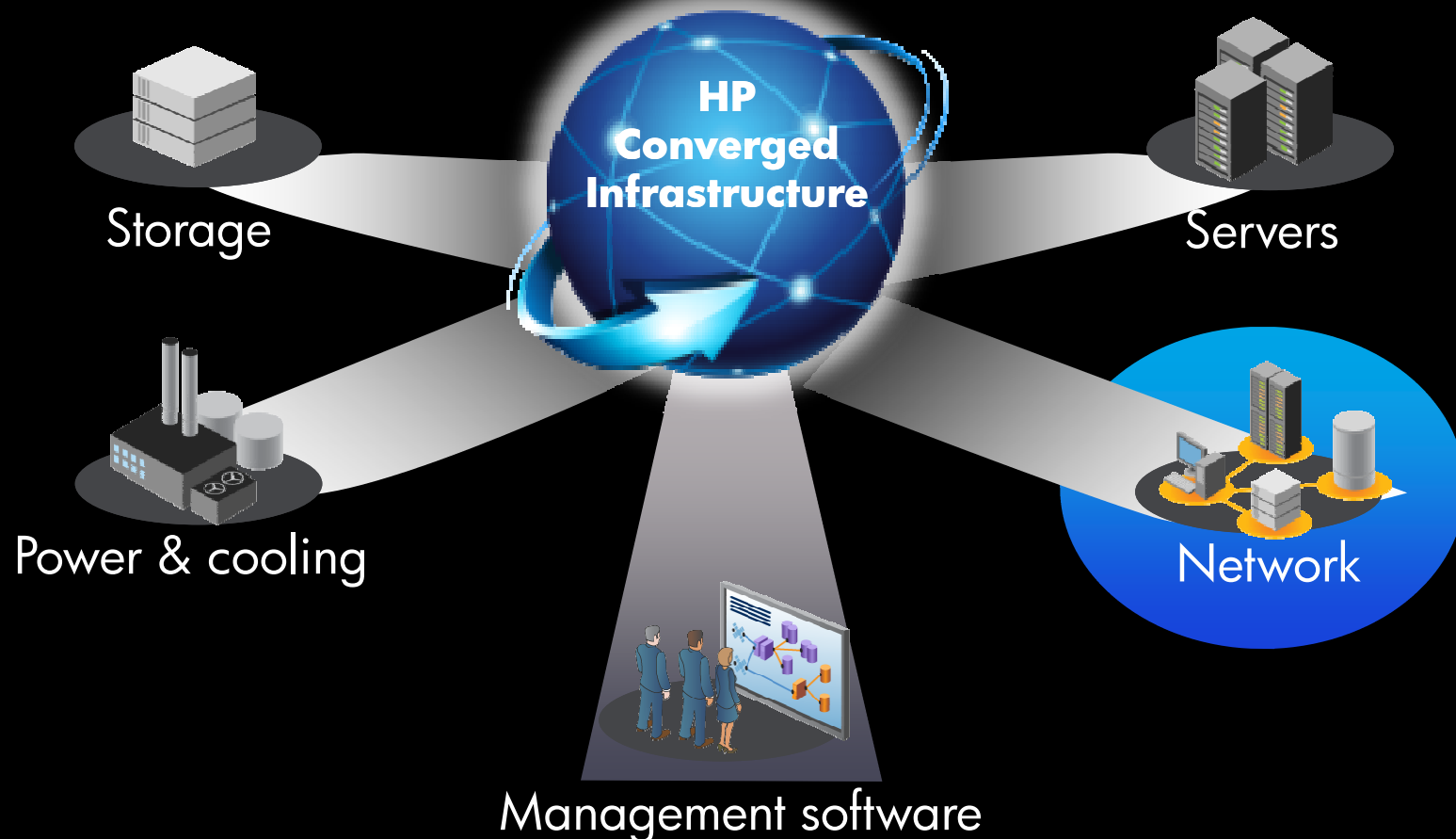
AGENDA

Enabling Cloud Providers with Converged Infrastructure

- ❑ **Converged Infrastructure Vision**
- ❑ Changing the Rules of Networking
- ❑ Next Generation DC Networking
 - ❑ Large Layer 2 Solutions
 - ❑ IRF = Intelligent Resilient Framework
- ❑ Cloud Opportunity for Service Providers
- ❑ Hybrid Delivery: Traditional, Private & Public Cloud

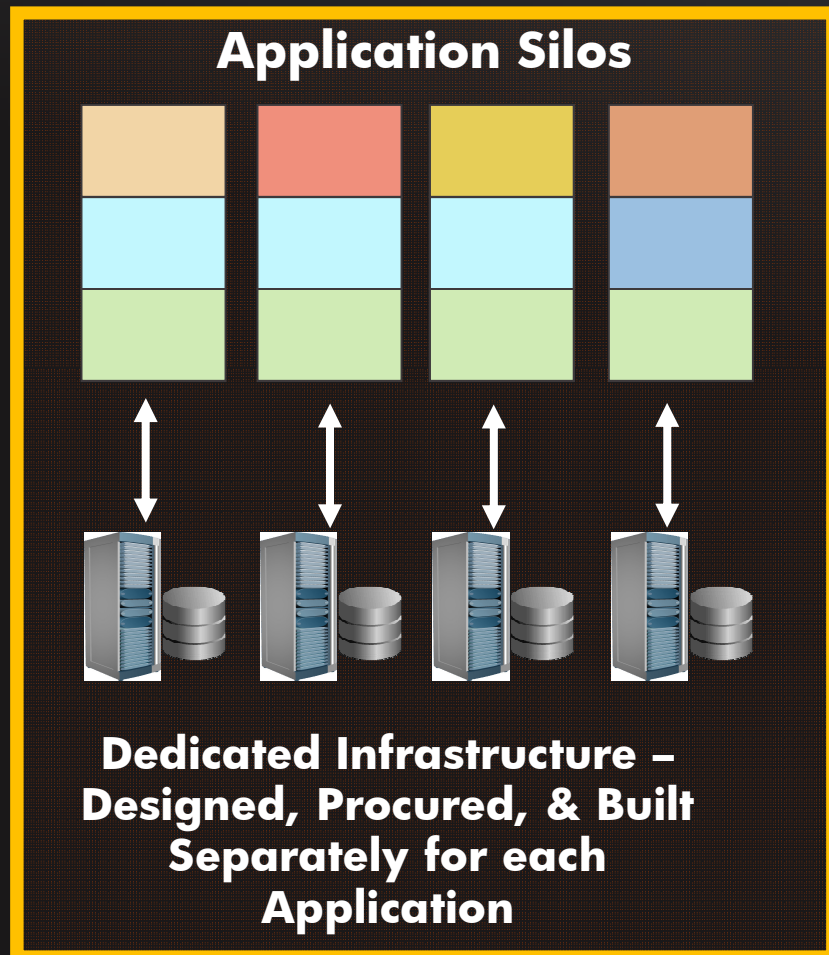


THE DATA CENTER OF THE FUTURE WILL BE BUILT ON A **CONVERGED INFRASTRUCTURE**

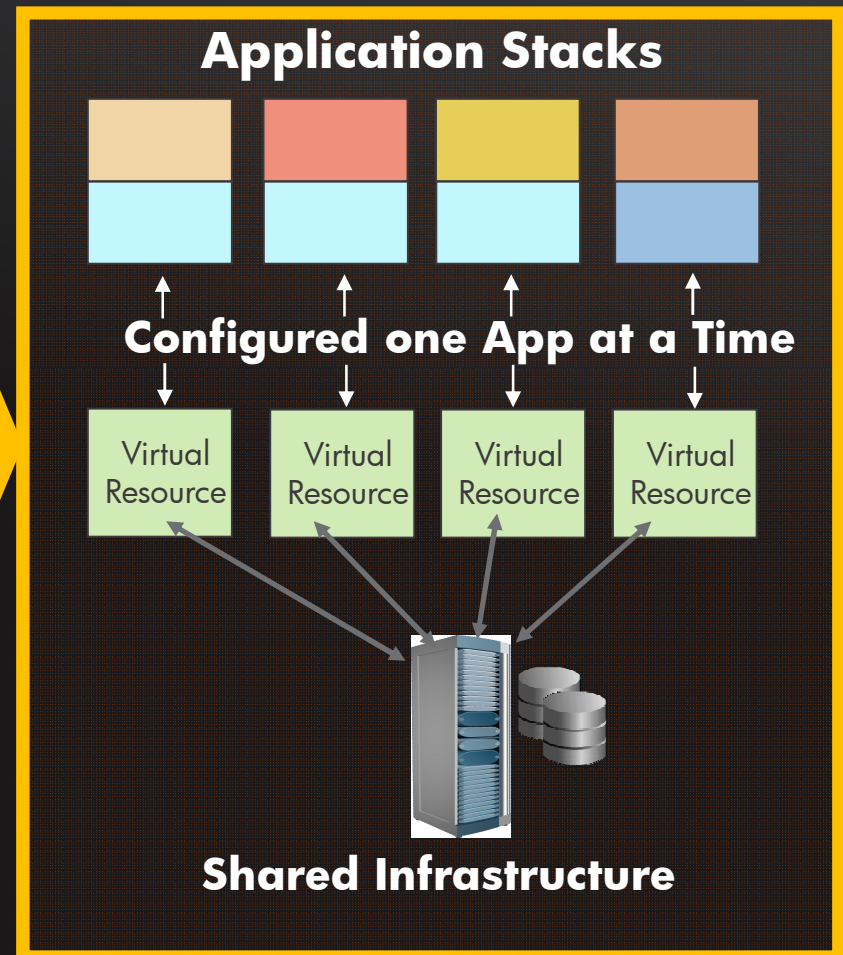


EVOLUTION TO VIRTUALIZATION

Design-to-Order Infrastructure

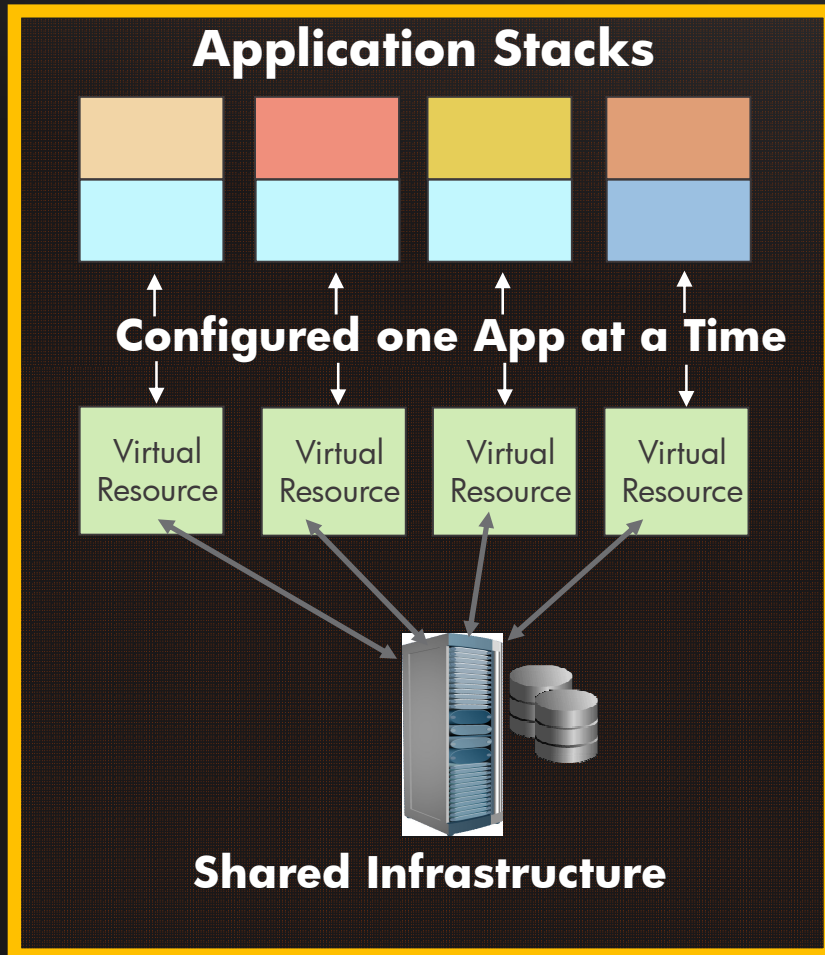


Configure-to-Order Infrastructure

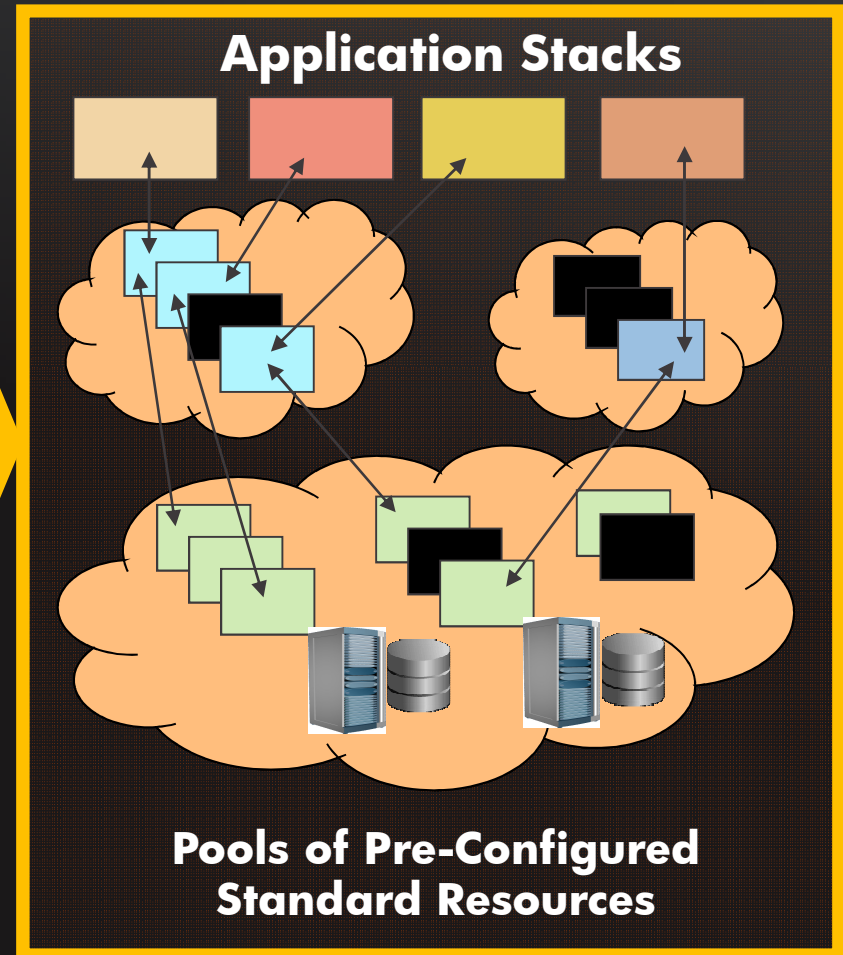


MOVE TO CONVERGED INFRASTRUCTURE

Configure-to-Order Infrastructure



Allocate-to-Order Infrastructure



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HP IS CHANGING THE RULES OF NETWORKING

Extending the benefits of *Converged Infrastructure* with a focused agenda



Drive simpler networking infrastructure
to deliver unified and secure end-to-end network
and service fabric

**Deliver flexible, application-centric
environment**
to seamlessly provide access to business services
to end users anywhere

**Bring open solutions and lower
total-cost-of-ownership**
to enhance innovation, reduce risk and
eliminate vendor lock-in

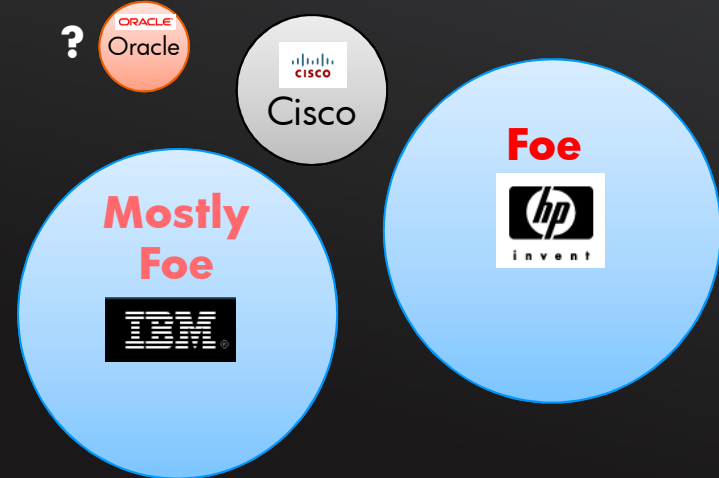


NETWORKING HAS BECOME A BUYERS MARKET SINCE HP ACQUIRED 3COM IN 2010

2001-2008 Cisco is King of the Hill



2009-> From Friends to Foes, From Partners to Competitors



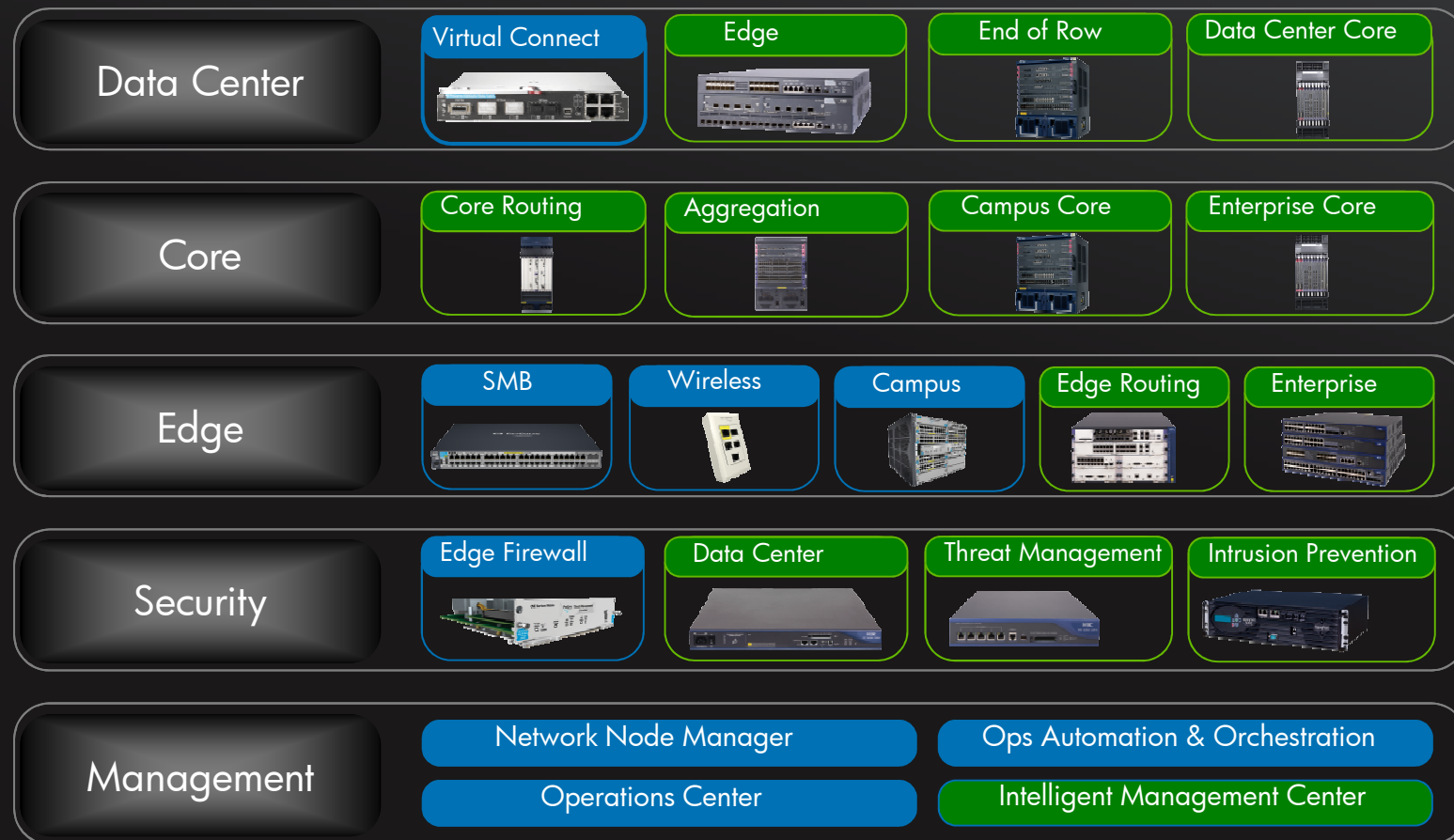
2009 LAN Market share

Cisco	51%
HP+3Com	36%
Juniper	2%
Rest of Market	11%

Gartner



HP NOW HAS LEADERSHIP FROM EDGE TO THE DATA CENTER CORE



COMPREHENSIVE END-TO-END PORTFOLIO



Intelligent Management Center

Resource Management

User Management

Business Management

Data Center to the Edge Networking

Data Center

Campus Core

Aggregation

Access/Edge

Routing

WLAN

A12500
Data Center



A5820X/
A5800
Flex
Chassis



A9500
Core Switch



A7500 Multi-
Service Switch



A5500
GE Series



A3100/
A3600
FE Series



A66/88 Core
Routers



MSR
Branch
Router



WLAN
Controllers



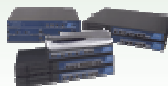
802.11n AP



Defense in Depth Security

VPN Firewall

SecPath
F1000-
S/A/E



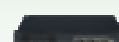
Embedded Security

SecBlade
Modules



Unified Threat Management

U200 –
S/M/A



Intrusion Prevention

Tipping
Point



Security Operations

SecCenter



IP Communications

Unified Communications

IP
Phones



VCX
Connect



VCX
Enterprise



IP Video Surveillance

IP Security

ISC3000



VM8000



Comware



CHANGING THE RULES WITH INNOVATION

Advanced architectures

- Richer feature set
- 40-50% more energy efficient
- Future-proofed for 40GB and 100GG
- x86-based application integration

Higher performance

- 2X faster
- Greater scalability than competing solutions

Reduced complexity

- Common OS across product families
- Single pane-of-glass management
- Unified wired/wireless
- Embedded security

Highly secure

- Integrated by design
- 2.3x more attacks blocked than competitors
- Community-enhanced protection
- Aligned with HP Secure Advantage

Open and interoperable

- Standard and interoperable solutions
- Proven experience in multivendor environments



CHANGING THE RULES WITH EXPERIENCE & EXPERTISE

Long history of success

- 30 years in networking
- Fastest growing vendor since 2001
- #2 vendor in Enterprise Networking

Customer Intimacy

- 60% increase in networking-focused sales specialists
- 5,500 enterprise sales people with Converged Infrastructure focus

Technical expertise

- 5,000 certified network professionals*
- 14,000 networking certifications
- Deep practices in network migration, unified communications, and business transformation

Partner Ecosystem

- 40,000 networking partners
- Global coverage with sales, delivery and support
- Commitment to partner profitability and business

HP runs on HP Networking

- HP networking infrastructure transformed to 100% HP portfolio
- Support 300,000 employees plus partners & suppliers



CASE STUDY: HP IT

HP achieves breakthrough: Data Centers now "Cisco-free"

- **Less than one year** to free six Data Centers at the core from Cisco
- **Trained** Cisco engineers to Open Standards networking **in 4 days**
- **Zero downtime** across 6 data centers (2.4M sq ft of white space) - ~55acres
- **35% - 70% reduction** in power utilization
- **2X** network performance
- **\$1B** in annual cost savings



AGENDA

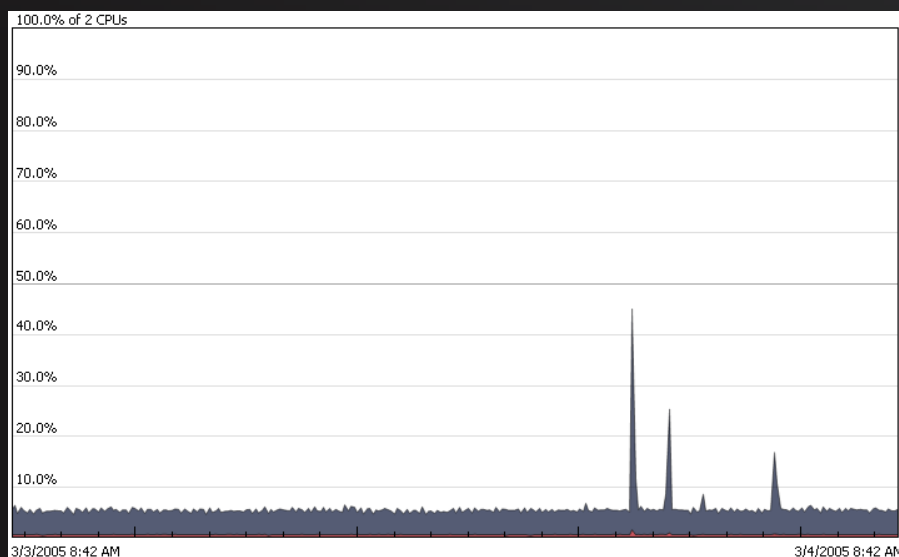
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 - ❑ **Large Layer 2 Solutions**
 - ❑ **IRF = Intelligent Resilient Framework**
- ❑ Cloud Opportunity for Service Providers
- ❑ Hybrid Delivery: Traditional, Private & Public Cloud

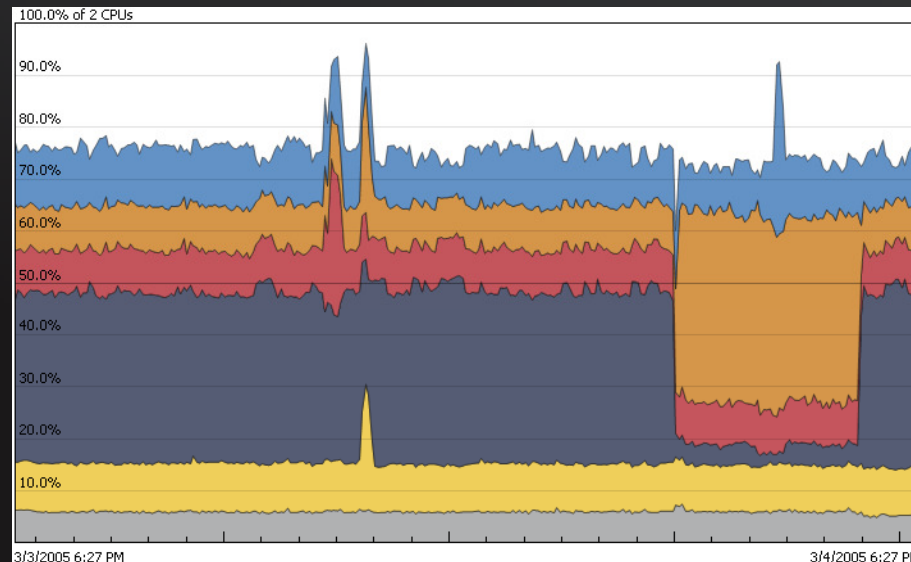


VIRTUALIZATION INCREASES HARDWARE UTILIZATION

Before Virtualization



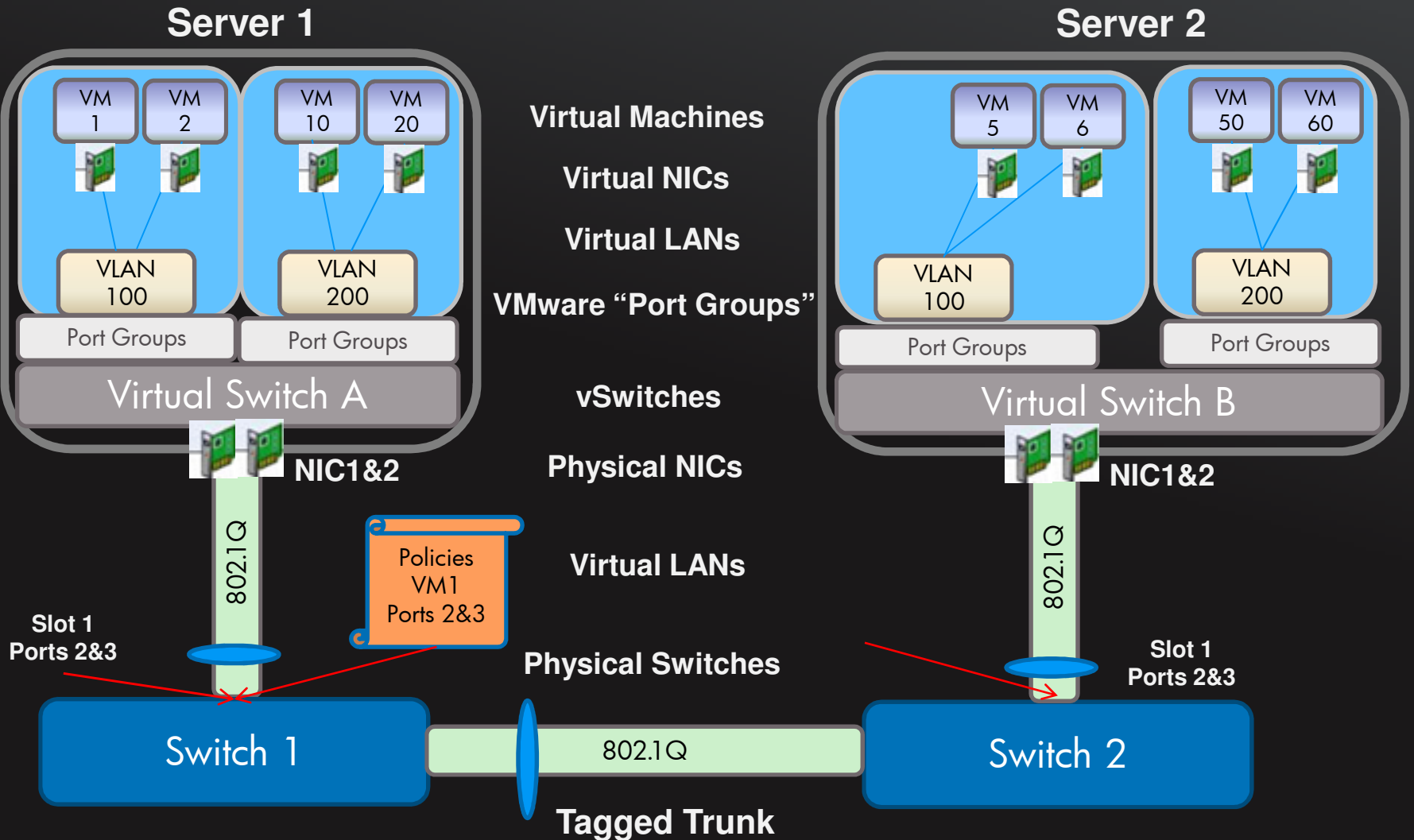
After Virtualization



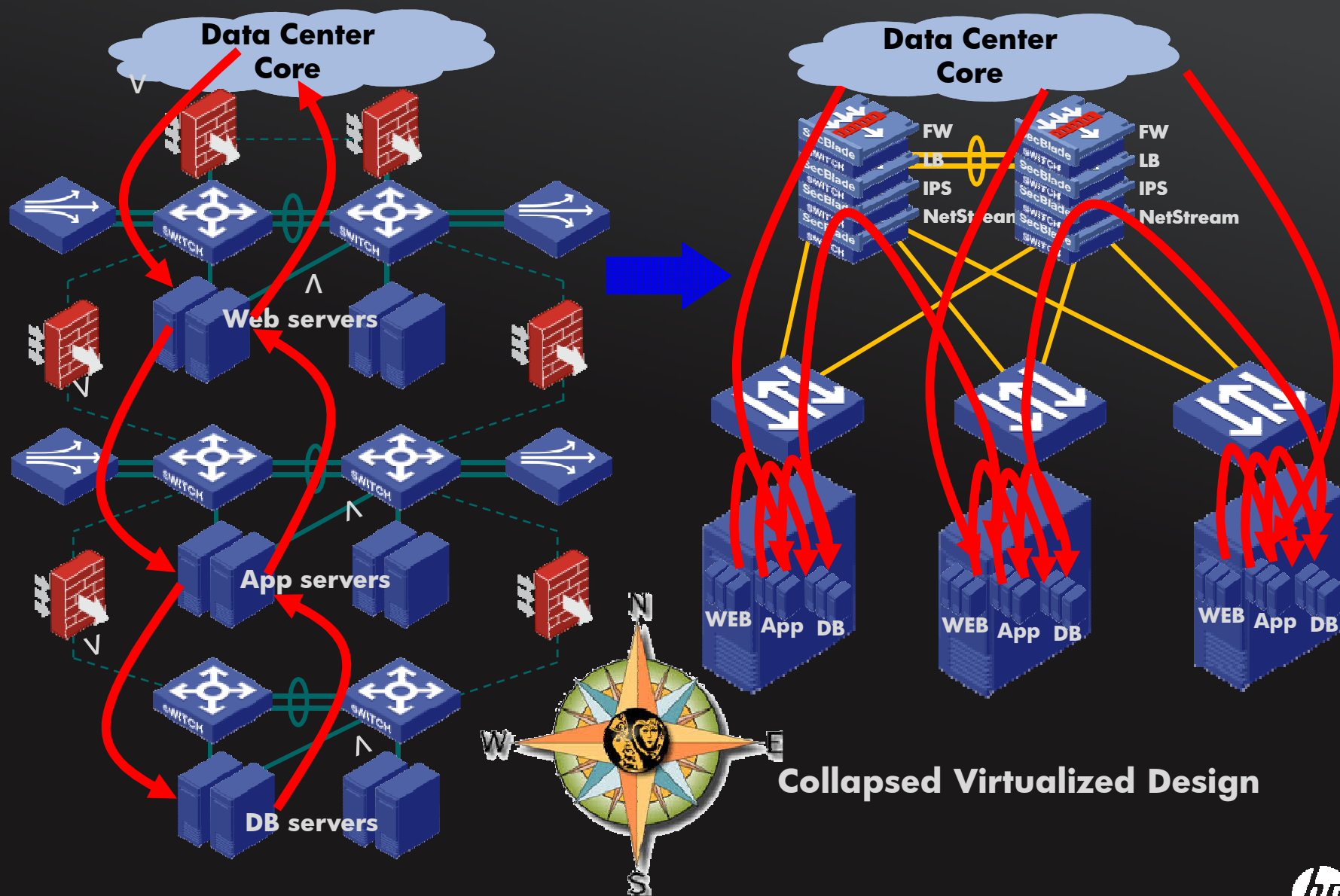
Virtualization enables consolidation of workloads from underutilized servers onto a single server to safely achieve higher utilization

VMOTION/LIVE MIGRATION – THE “KILLER APP”

WHAT IS REALLY REQUIRED?



DATA CENTER NETWORK DESIGN: TRADITIONAL VS. VIRTUALIZED



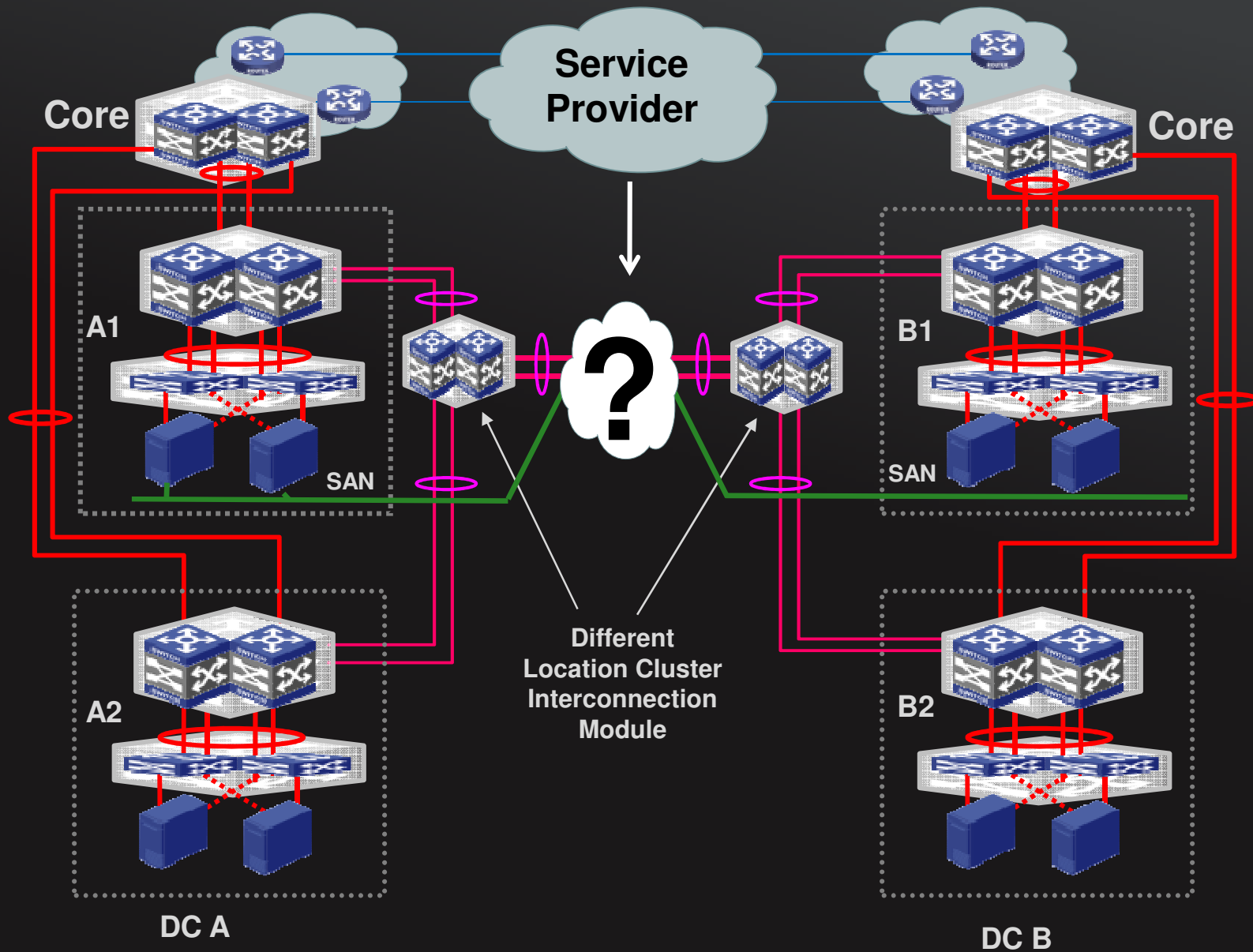
VIRTUALIZATION DRIVES BANDWIDTH THROUGHPUT

VIRTUALIZATION: IMPACT ON THE NETWORK (GARTNER, 2009)







Server Type	# of Physical Servers	# of Virtual Servers	Server Bandwidth	Rack Bandwidth	Bandwidth & Footprint Delta
Rack Servers <ul style="list-style-type: none"> • Single Quad Core Xeon • (10) VMs per Server 					
No Virtualization	36	0	300Mbps	10.8Gbps	
Virtualized	36	360	3Gbps	108Gbps	+900%
Blade Servers <ul style="list-style-type: none"> • Single Quad Core Xeon • 16 Blades per Chassis • (10) VMs per Blade • 3 Chassis per Rack 					
No Virtualization	48	0	300Mbps	14.4Gbps	
Virtualized	48	480	3Gbps	144.0Gbps	+900%



THE BIGGER PICTURE – MULTI-SITE EXTENSION



LARGE LAYER 2 SOLUTIONS

STP	Been Around for Years. Very developed protocol	Slow Convergence time Wastes Redundant Links	
SPB/PBB 802.1aq/h)	IEEE solution Leverages IS-IS as Layer 2 MAC-in-MAC Learning	Manual implementation in merchant silicon. Dynamic aspect still being developed.	
TRILL	IETF solution Based upon IS-IS MAC Learning	Version 1 ratified, Still working on Multi-tenant	
FabricPath	Cisco Proprietary solution Based upon IS-IS MAC Learning	Cisco Nexus 7K Only Has significant differences from the proposed TRILL standard	
OpenFlow	Open Standard mechanism developed at Stanford University and HP Labs	Early stages in development. Holds significant promise!	
VPLS	MPLS based standardized solution.	Requires label switched infrastructure. Still developing standardized support for multicast	

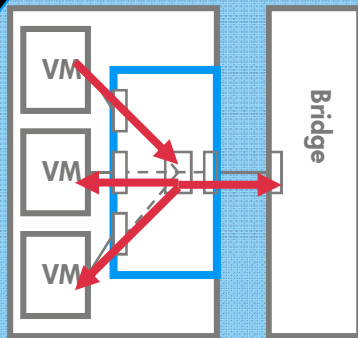
HP Is a Standards Based Company!



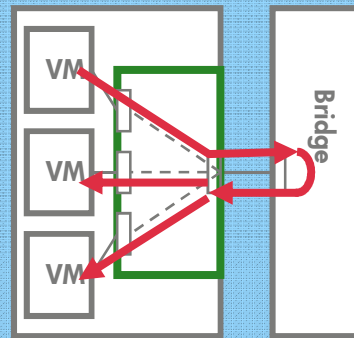
LARGE LAYER 2 STANDARDIZATION DIRECTIONS

Commodity of industry

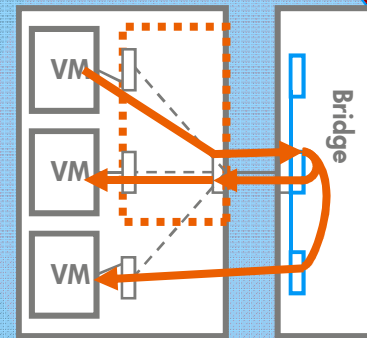
Some vendors



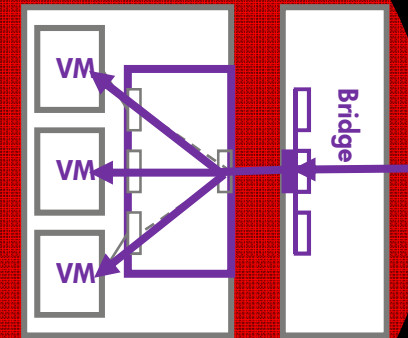
Virtual Ethernet Bridge (VEB)



Virtual Ethernet Port Aggregation (VEPA)



Multichannel



Remote Replication

802.1Qbg
Edge Virtual Bridging

802.1Qbh
Bridge Port Extension

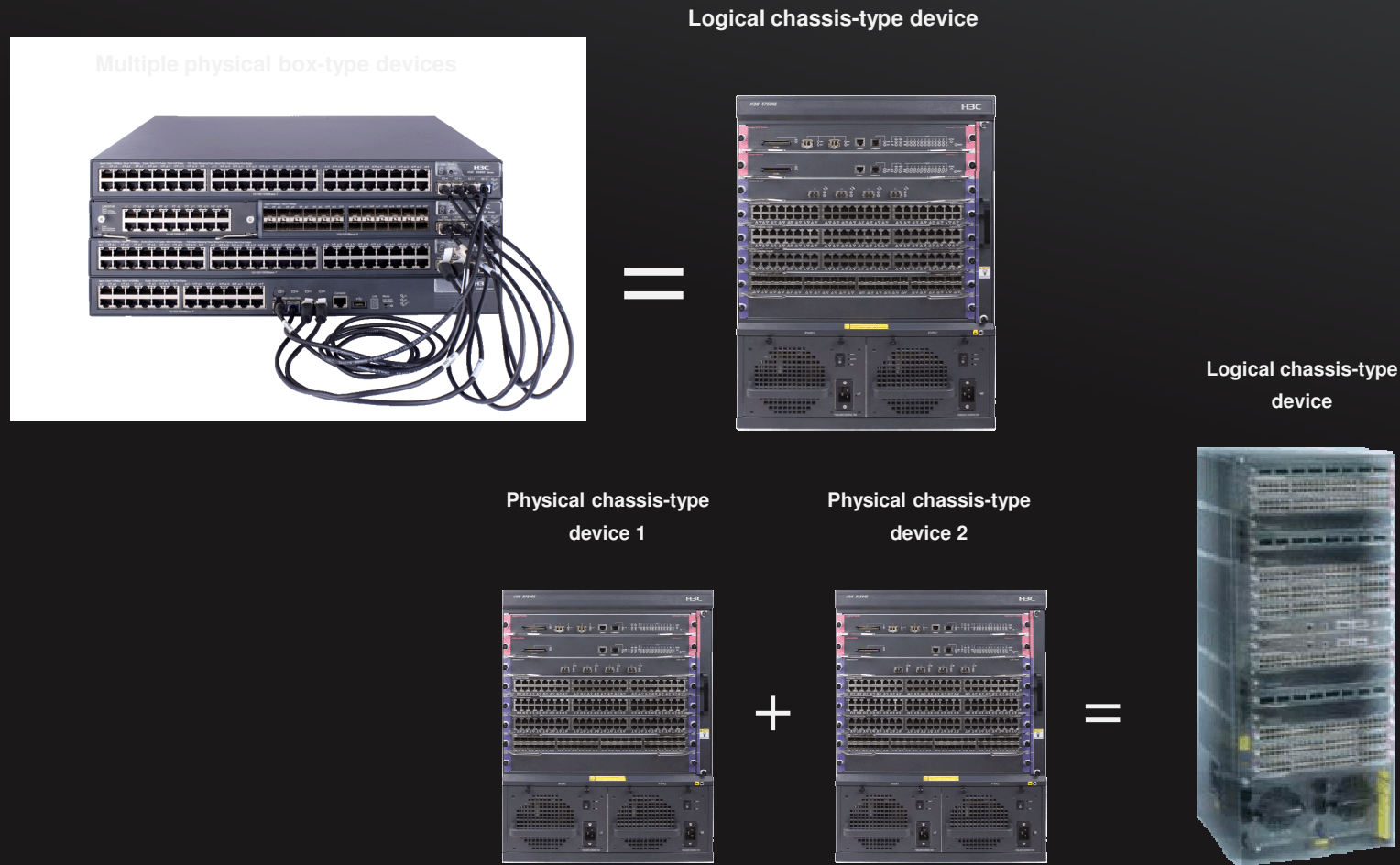
EVB = VEB/VEPA + Flex-10

Port Expanders = VN-Tag Rip and Replace

Flex-10: Allocating 10G NIC/HBA to multiple VMs in 100k steps

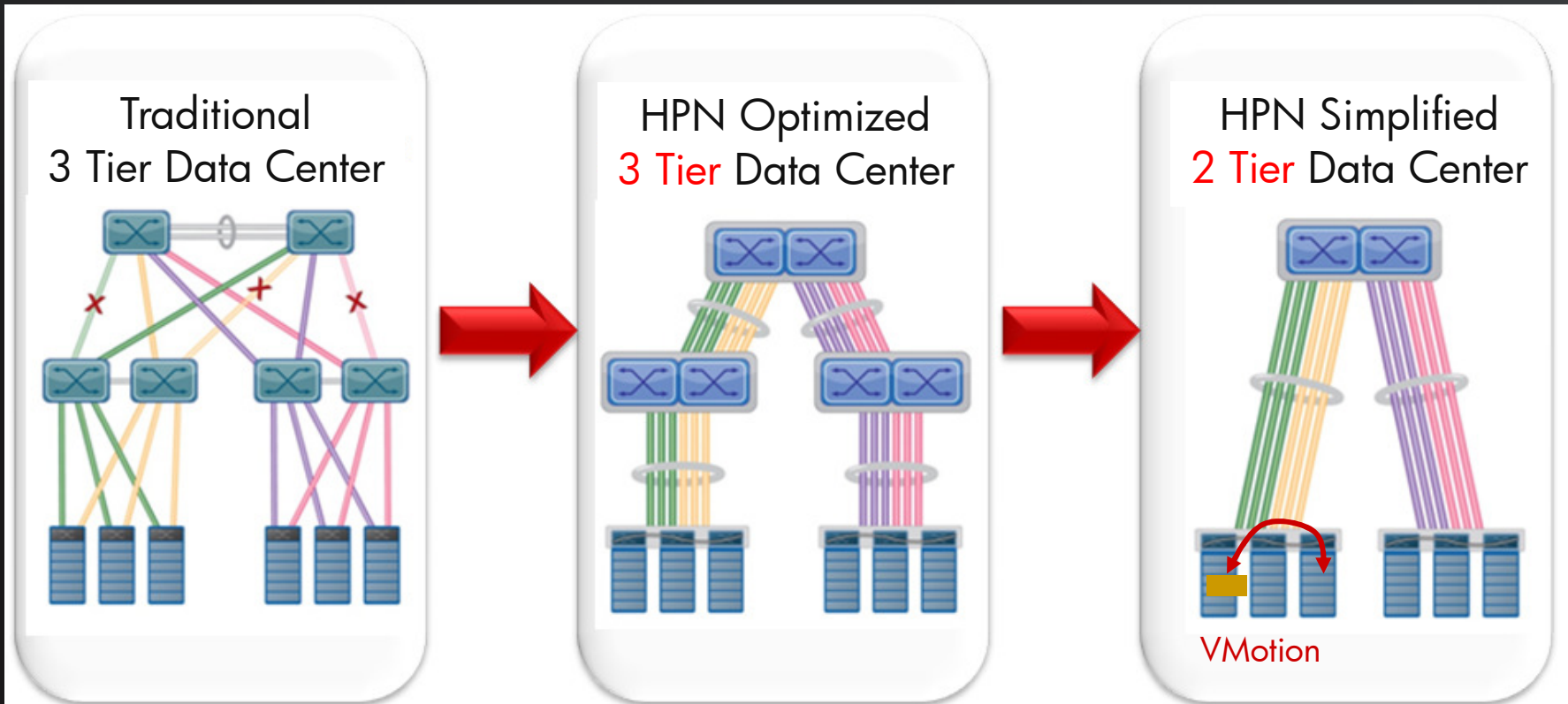
WHAT IS INTELLIGENT RESILIENT FRAMEWORK (IRF)

Multiple devices are virtualized as a logical chassis-type device



DATA CENTER SIMPLIFICATION WITH IRF

HPN Optimized 3-Tier to Simplified 2-Tier Network Architecture



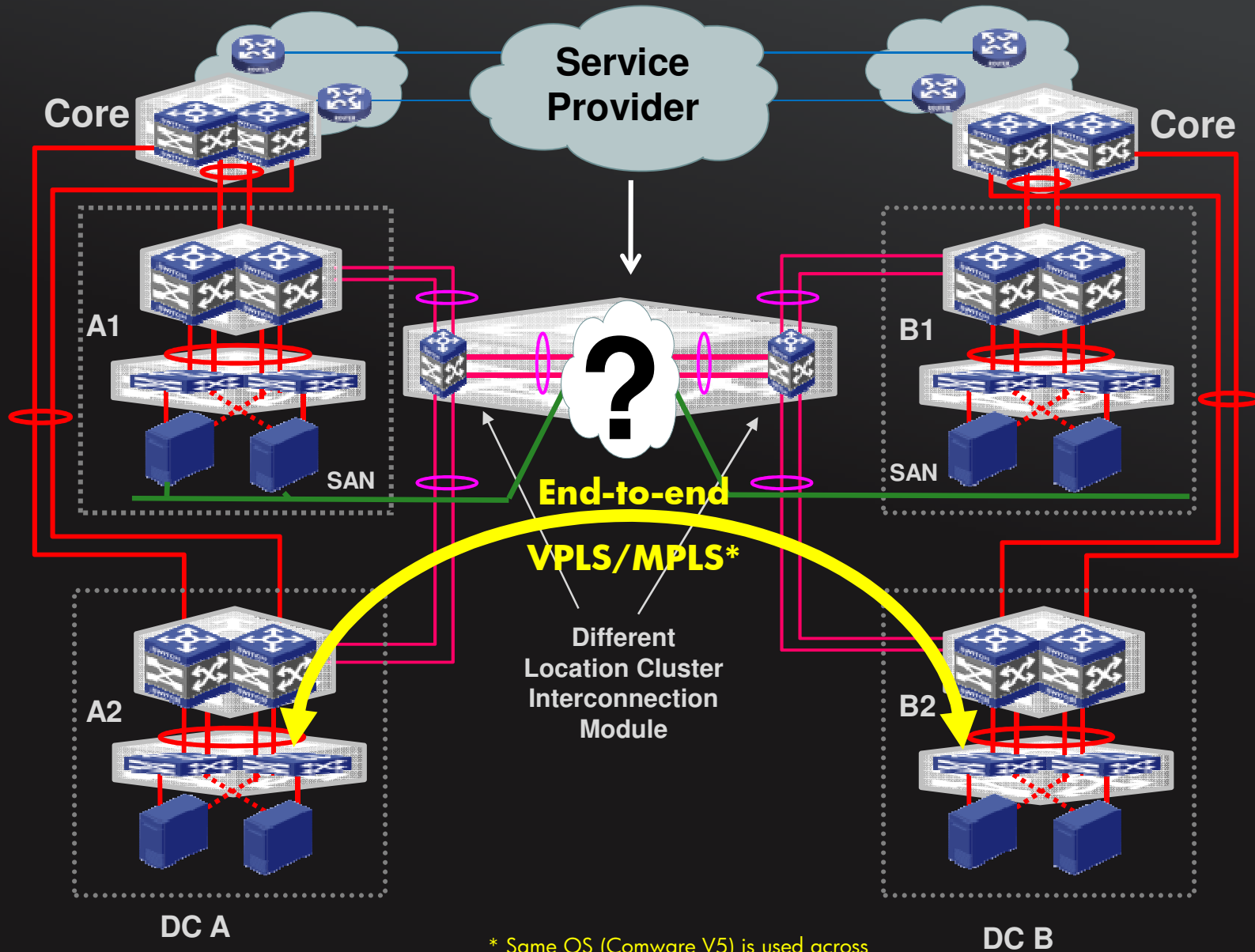
Higher port densities and IRF simplify DC network designs, providing much better network performance for server virtualization (VMotion)

IRF

- Very simple to configure: few clicks or commands
- Across all layer: core, aggregation, edge
- 10 G



THE BIGGER PICTURE – MULTI-SITE EXTENSION



* Same OS (Comware V5) is used across whole family of networking systems



ULTRA RESILIENT DATA CENTER NETWORKS

TEST RESULTS WITH S12500/S5820X

Test Results

Scenario	Failover Time
Link Aggregation: Port removal/insertion	2 ms / 0.7 ms
Link Aggregation: Board removal/insertion	2 ms / 1 ms
Chassis off/on	2 ms / 0.14 ms
Software Upgrade	2 ms



Demo
on HP
stand

Best In Class Resiliency:

- No STP / RSTP / MSTP, No VRRP
- All Links Active
- 2 cores switching & routing at the same time



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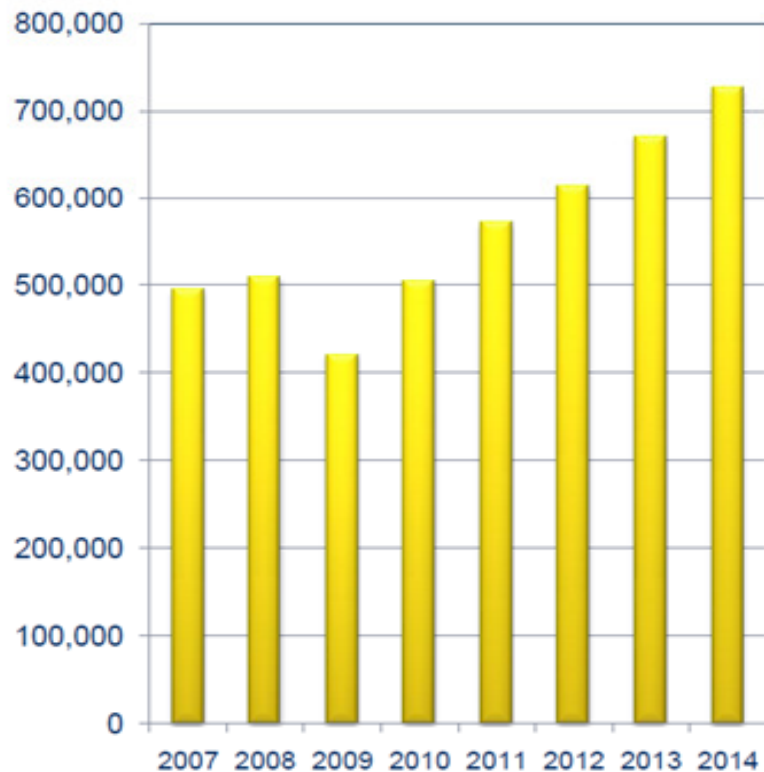


IDC TOP 10 PREDICTIONS FOR 2011

#9 – Service Providers Will Lead in the Emergence of the “Enterprise-Cloud” Datacenter

Worldwide Hosted Server Shipments, 2007-2014

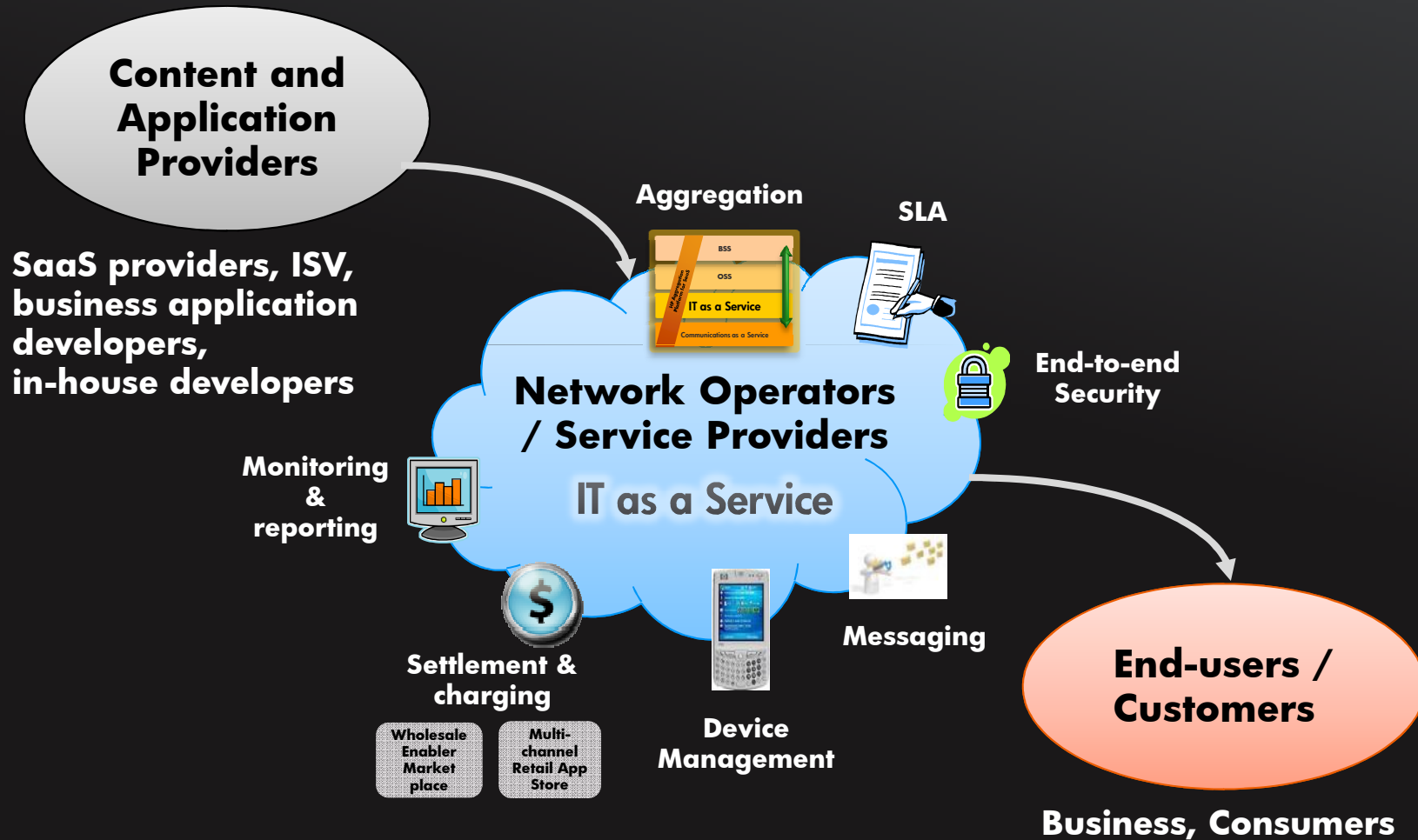
2009-2014 CAGR =12%



- As cloud computing moves from nascent to mainstream, the requirement for **enterprise-ready infrastructure** will be a tablestakes for further adoption
- Service Providers have the expertise, datacenters, and business models to **disintermediate traditional IT** and provide a robust on-ramp to multi-tenant infrastructure
- Providers eager to offer higher value services will increasingly look to “**buy**” vs “**build**” their infrastructure; virtualization, convergence, and standardization play an important role
- This market is an open playing field for both hardware and software companies; very few companies can offer a “full-stack” solution so **the right partnerships will be critical to success**
- Hosted Server shipments are predicted to **grow at twice the rate of the overall market**

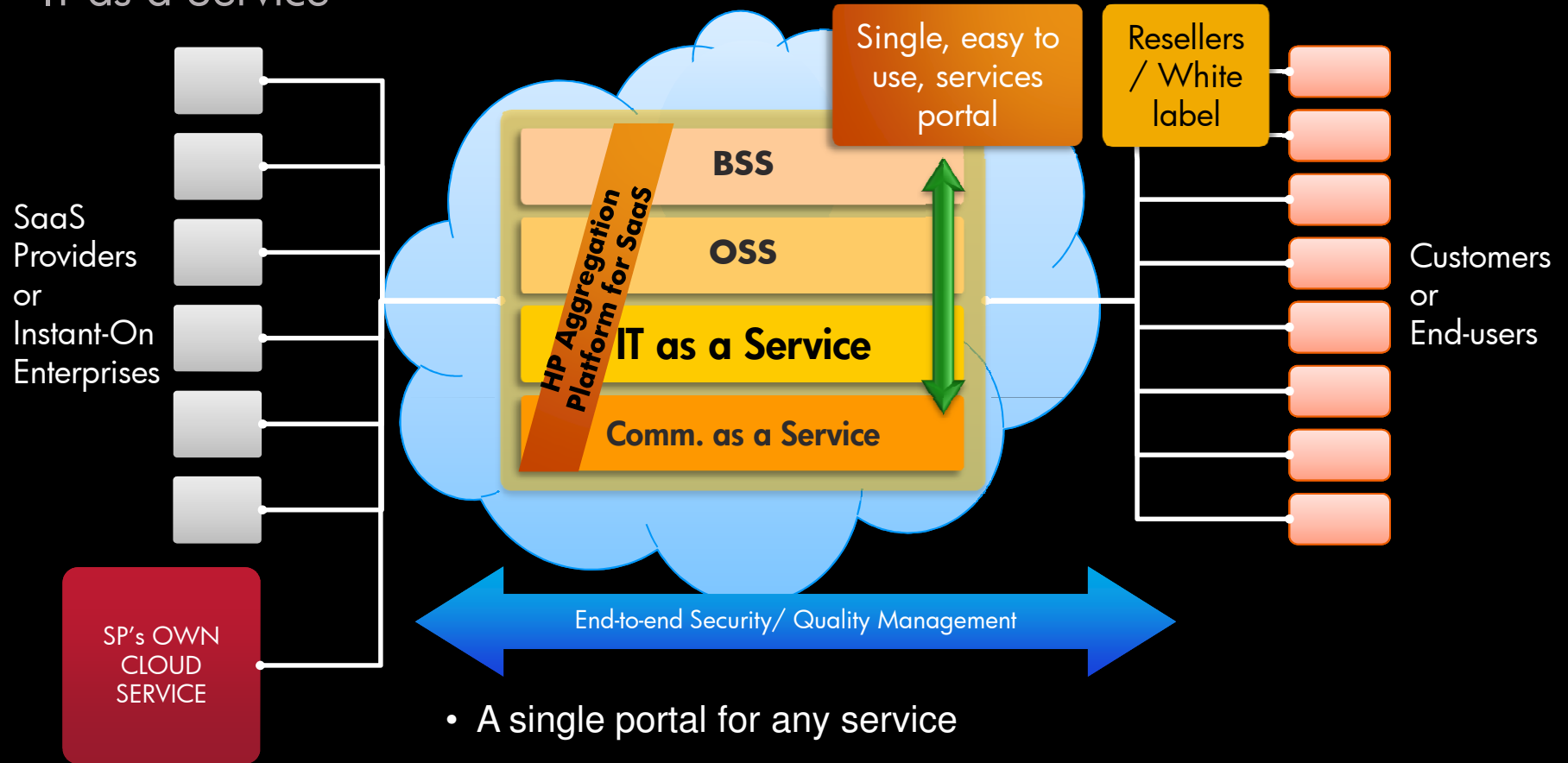


THE CLOUD OPPORTUNITY FOR SERVICE PROVIDERS



FLEXIBLE CLOUD OFFERINGS

IT as a Service



- A single portal for any service
- Aggregate valuable cloud services into bundles
- Provision, track, and monetize service usage
- Allow for 'Hybrid Delivery'

HP Cloud Leadership

Powering the world's largest **cloud infrastructures**

3 most popular social media properties in the U.S.

4 out of 5 of the world's **largest search engines**

8 out of 10 of the world's **most trafficked web sites**

7 out of 10 of the world's **largest cloud service providers**

Examples



150,000 user IaaS Cloud:

- Service on demand
- Predictable OPEX
- Lower CAPEX



Large SAP SaaS Cloud:

- Up in 1 week
- Increased agility
- Unparalleled price/performance



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Cloud**



INSTANT-ON ENTERPRISE

Everything and everyone's connected

Everyone expects immediate gratification and instant results

Business & IT one and the same

Respond to continuous opportunity and competition

Anywhere, Any time, Any way



HYBRID DELIVERY IS THE FOUNDATION FOR THE INSTANT-ON ENTERPRISE



FASTER REVENUE GROWTH
Business and IT aligned

INCREASED AGILITY
Respond to opportunity
immediately

INVESTMENT PROTECTION
Integrate traditional IT and
new cloud services

LOWER COST
Reduce CAPEX and OPEX

CIO BARRIERS TO CLOUD ADOPTION

SECURITY AND COMPLIANCE

70% CIOs HAVE SECURITY
TOP OF MIND¹

SERVICE LEVEL AGREEMENTS FOR
AVAILABILITY AND PERFORMANCE

75% CIOs DEMAND HIGH SLA
GUARANTEES FOR PERFORMANCE
AND AVAILABILITY²

INTEGRATION ACROSS ENVIRONMENTS

63% REQUIRE
INTEGRATION OF INTERNAL
& EXTERNAL SERVICES²

OPEN AND FLEXIBLE DELIVERY

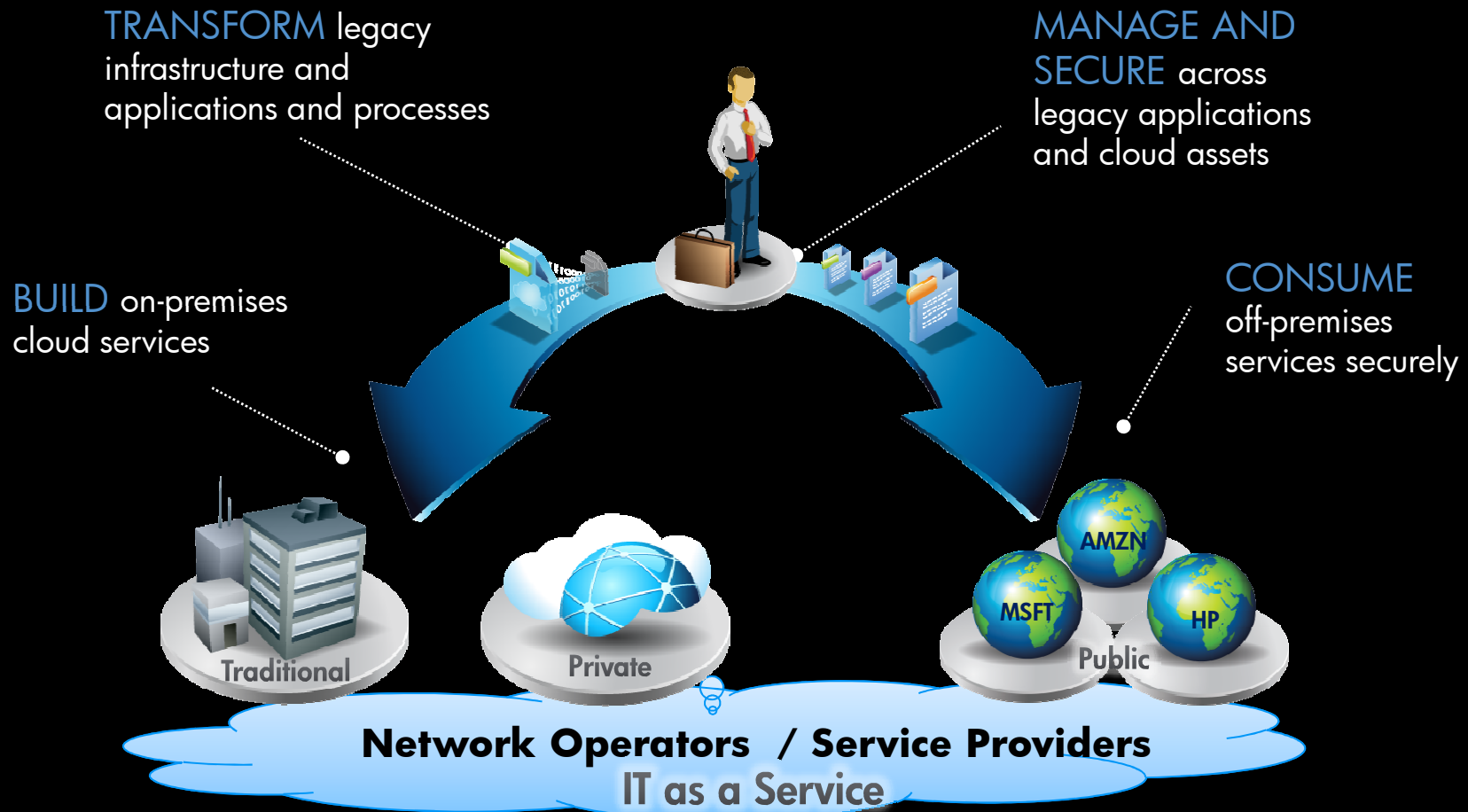
79% CONCERNED
ABOUT LOCK-IN²

Source: 1. Goldman Sachs Equity Research, January 2011; 2. IDC, Enterprise Panel Survey, November 2010

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OPPORTUNITY FOR SERVICE PROVIDERS

Help CIO to become builder and broker of services





So, if you are planning DC or Cloud,
call **HP**
or meet the specialists at our stand
QUESTIONS?

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