IT Infrastructure: Poised For Change

Things Change

IT Infrastructure Needs to Change

23% delivering new capabilities

77% "keeping the lights on"

Too much complexity.
Too hard to change.

The business is frustrated.
IT is frustrated.

New thinking is emerging.

Trusted

Control

Reliable

Secure

**Data
Center**

Trusted

Control

Reliable

Secure

Data Center

Flexible

Dynamic

On-demand

Efficient

Cloud Computing

Trusted

Control

Reliable

Secure

Flexible

Dynamic

On-demand

Efficient

Virtualization

Information

Virtualized Data Center

Security

Cloud Computing

Internal Cloud

External Cloud

Private Cloud

Federation

Virtualization

Information

Security

Virtualized Data Center

Cloud Computing

Internal Cloud

External Cloud

Virtual Applications

Virtual Client

Virtual Client

Virtual Client

Virtual Client

Private Cloud

| App Loads | App Loads | **App Loads** | App Loads | App Loads |

Federation

Virtualization

Information

Security

Virtualized Data Center

Cloud Computing

Internal Cloud

External Cloud

Building The Private Cloud

your applications

your information

enterprise IT resources

cloud operating system

cloud internetwork and unified computing

virtual information infrastructure

any device any where

enterprise
infrastructure
server – network - storage

provider
infrastructure
server – network - storage

Building The Private Cloud

your applications

your information

enterprise IT resources

VMware

Cisco

EMC

any device any where

enterprise
infrastructure
server – network - storage

provider
infrastructure
server – network - storage

The Journey Has Started

federate
with compatible
service providers

CHOICE

automate
IT resource and
security management

CONTROL

virtualize
datacenter
and desktops

EFFICIENCY

What is VCE?

vmware

CISCO **EMC²** where information lives

a strategic alliance of three industry leaders

now   **expanding**   **evaluating**
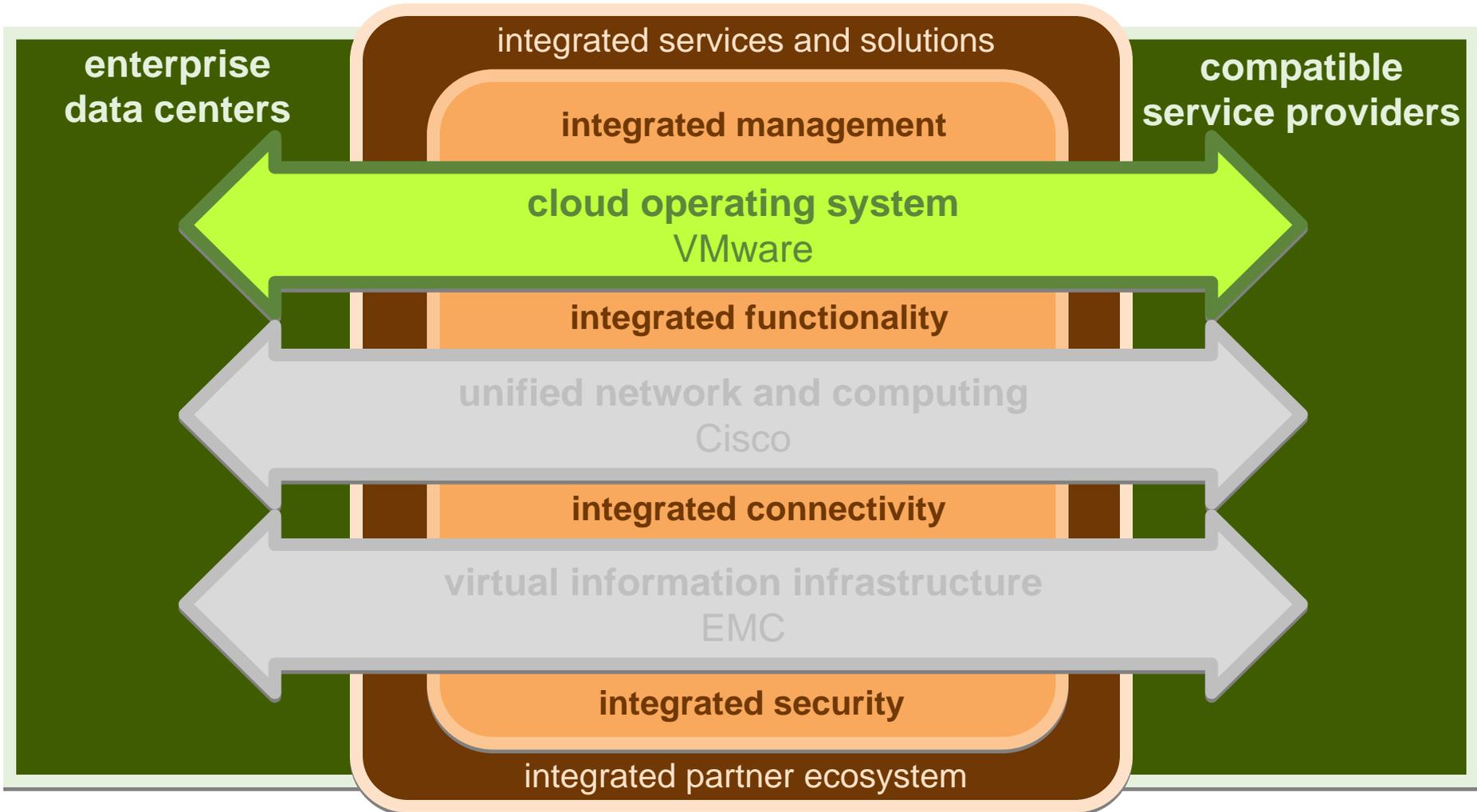
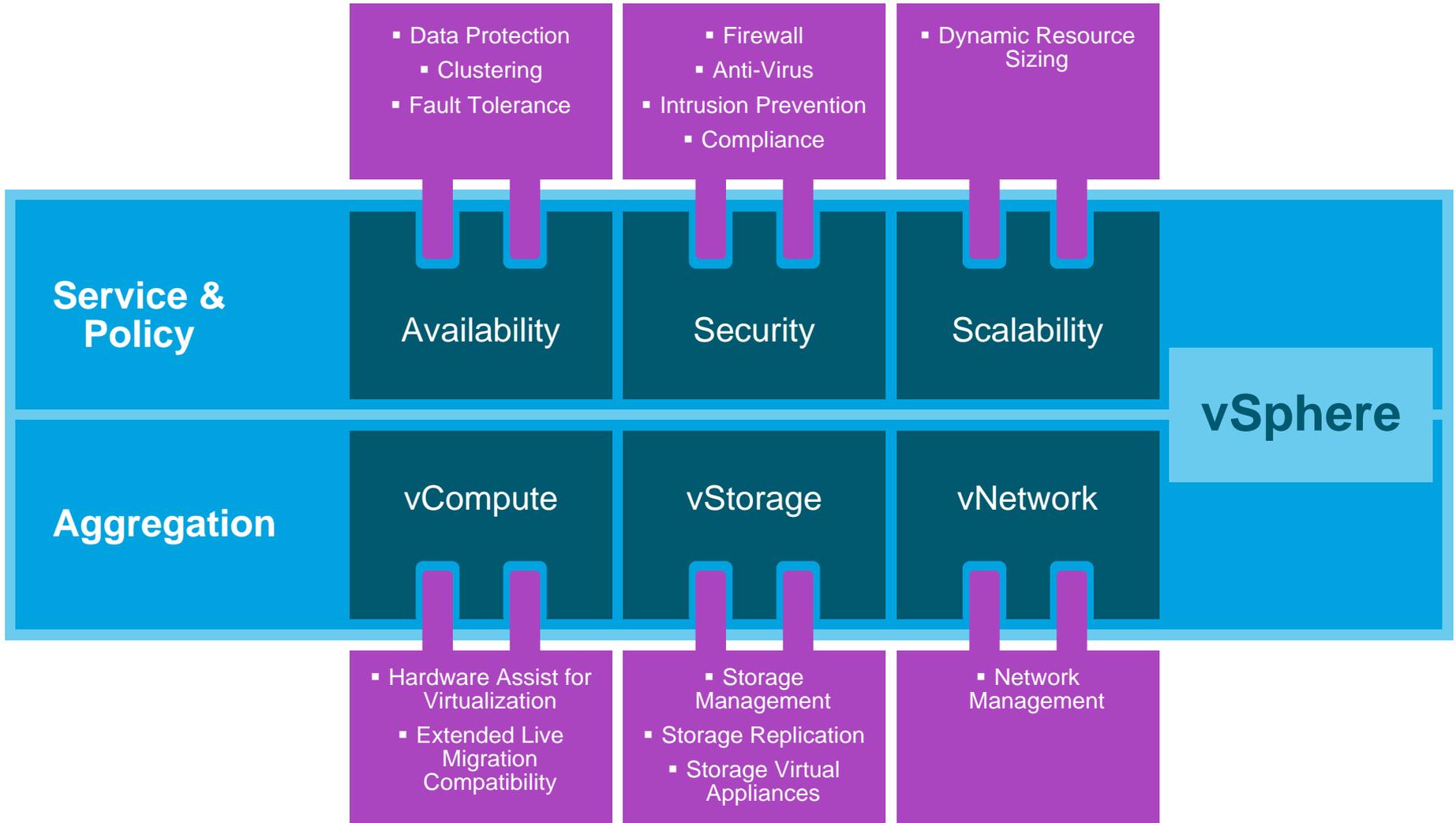shared vision "private cloud" → aligned technologies → reference architectures → blueprints and solutions → joint services
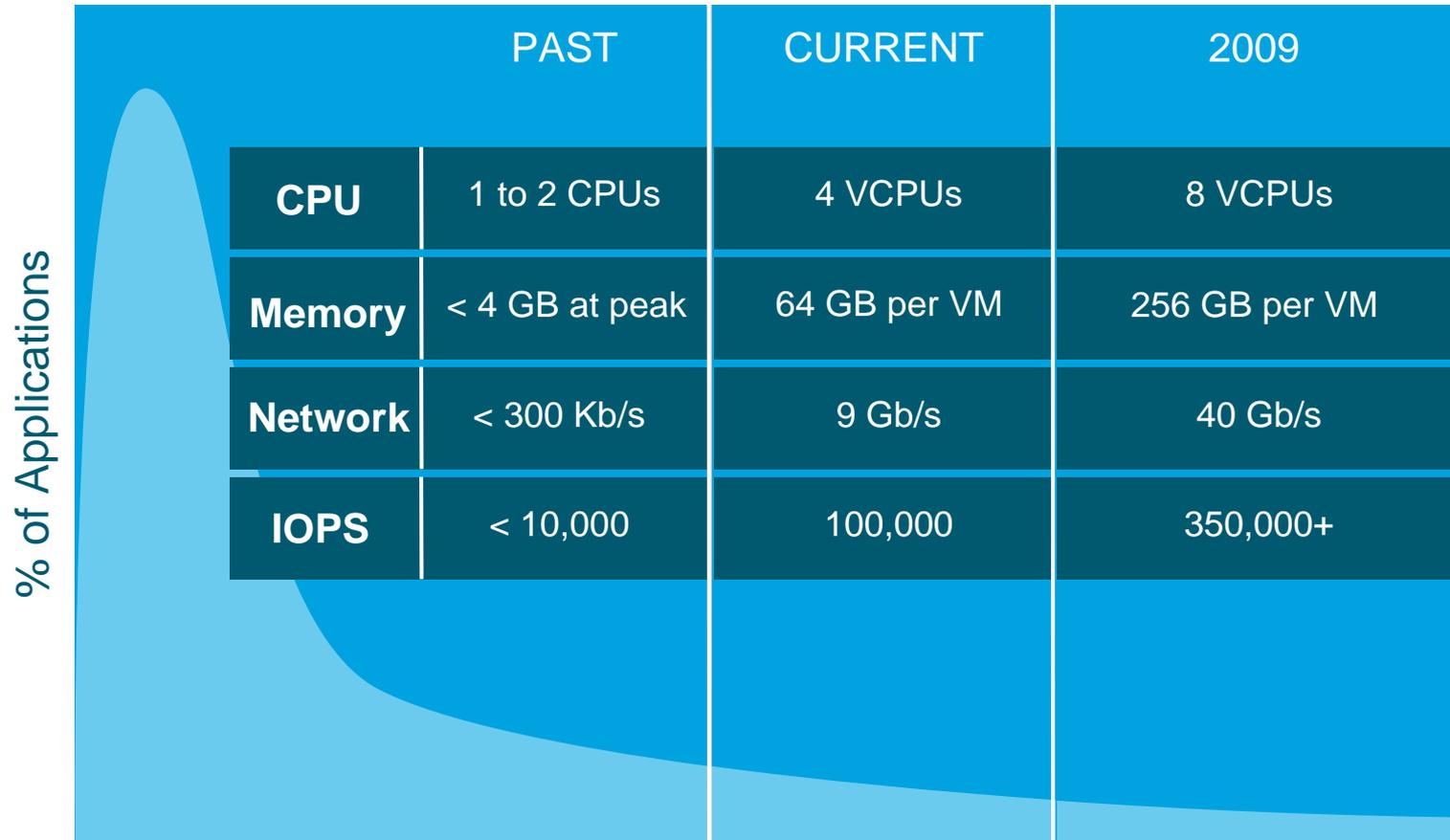
shared partner ecosystem

VMware Enabling Technologies

enterprise data centers

compatible service providers

integrated services and solutions

integrated management

cloud operating system
VMware

integrated functionality

unified network and computing
Cisco

integrated connectivity

virtual information infrastructure
EMC

integrated security

integrated partner ecosystem

VMware vSphere Architecture

Data Protection · Clustering · Fault Tolerance	· Firewall · Anti-Virus · Intrusion Prevention · Compliance	· Dynamic Resource Sizing

Service & Policy

Availability	Security	Scalability

vSphere

Aggregation

vCompute	vStorage	vNetwork

· Hardware Assist for Virtualization · Extended Live Migration Compatibility	· Storage Management · Storage Replication · Storage Virtual Appliances	· Network Management

vCompute:
Powerful Enough for All Applications

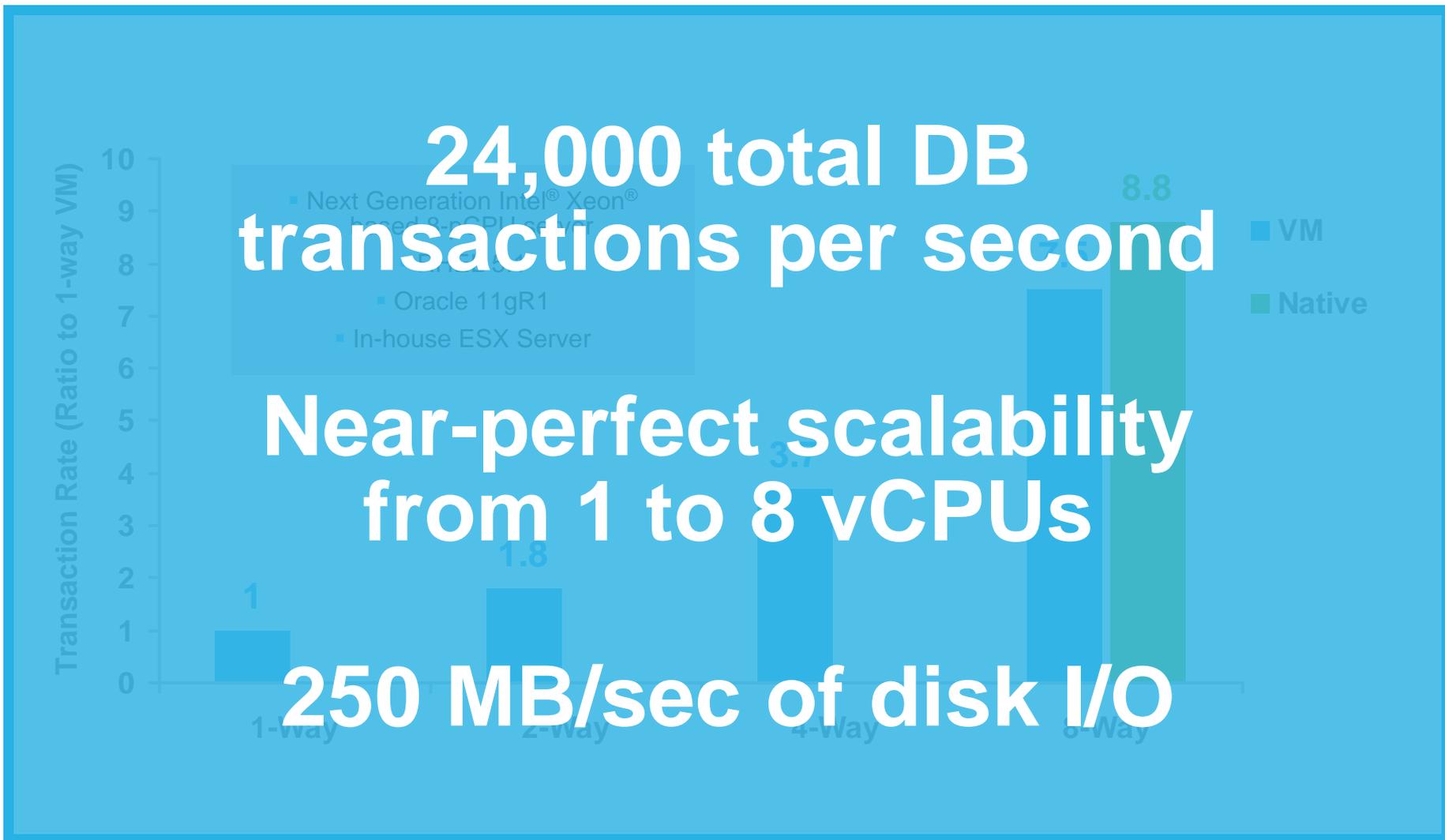|	PAST	CURRENT	2009
CPU	1 to 2 CPUs	4 VCPUs	8 VCPUs
Memory	< 4 GB at peak	64 GB per VM	256 GB per VM
Network	< 300 Kb/s	9 Gb/s	40 Gb/s
IOPS	< 10,000	100,000	350,000+

% of Applications

Application's Performance Requirements

Single VM Performance:
Well-Known Database OLTP Workload*

24,000 total DB transactions per second

Near-perfect scalability from 1 to 8 vCPUs

250 MB/sec of disk I/O

Transaction Rate (Ratio to 1-way VM)

- Next Generation Intel® Xeon® based 8-pCPU server
- Oracle 11gR1
- In-house ESX Server

■ VM
■ Native

10
9
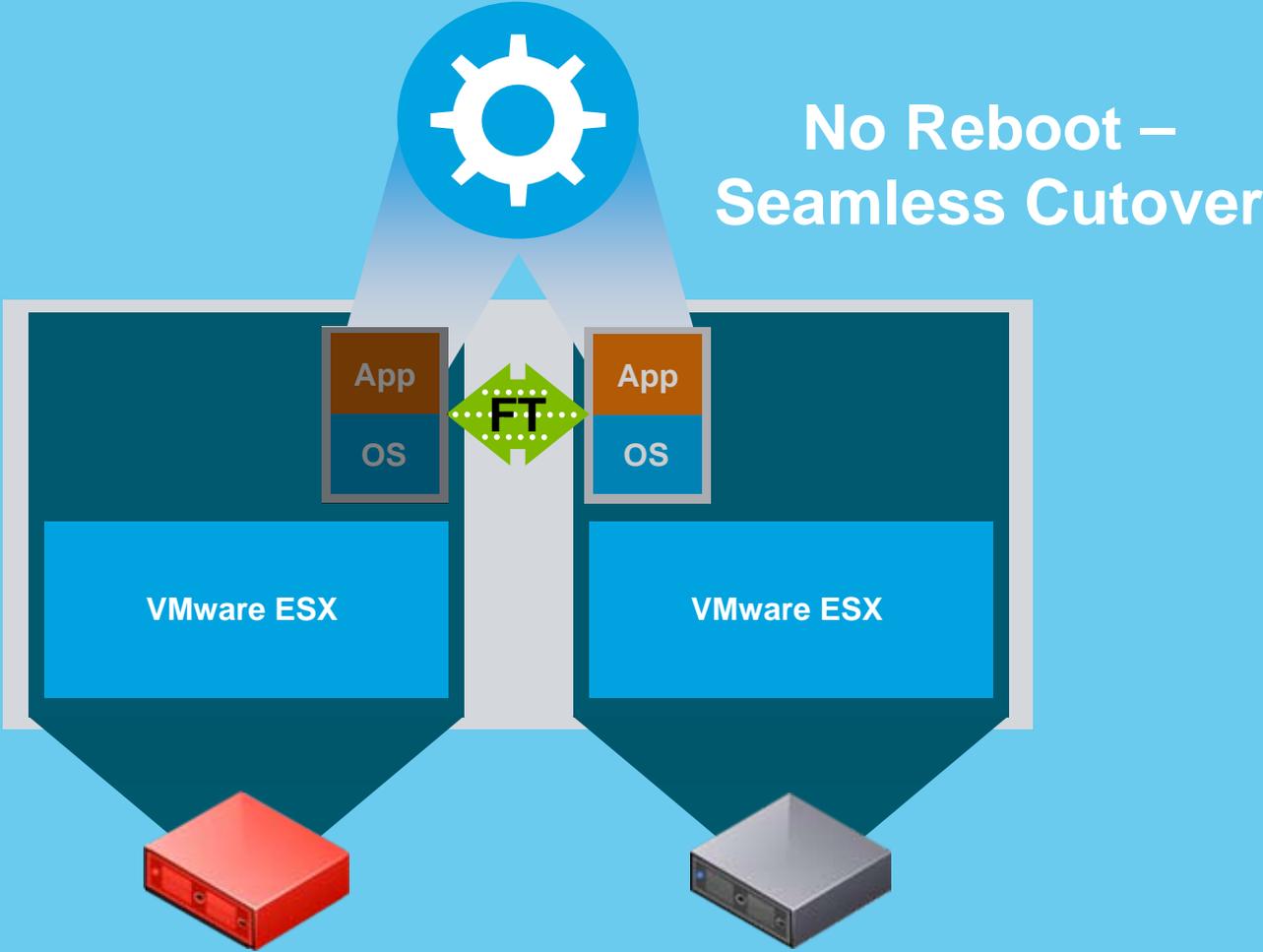8
7
6
5
4
3
2
1
0

1 — 1-Way
1.8 — 2-Way
3.7 — 4-Way
8.8 — 8-Way
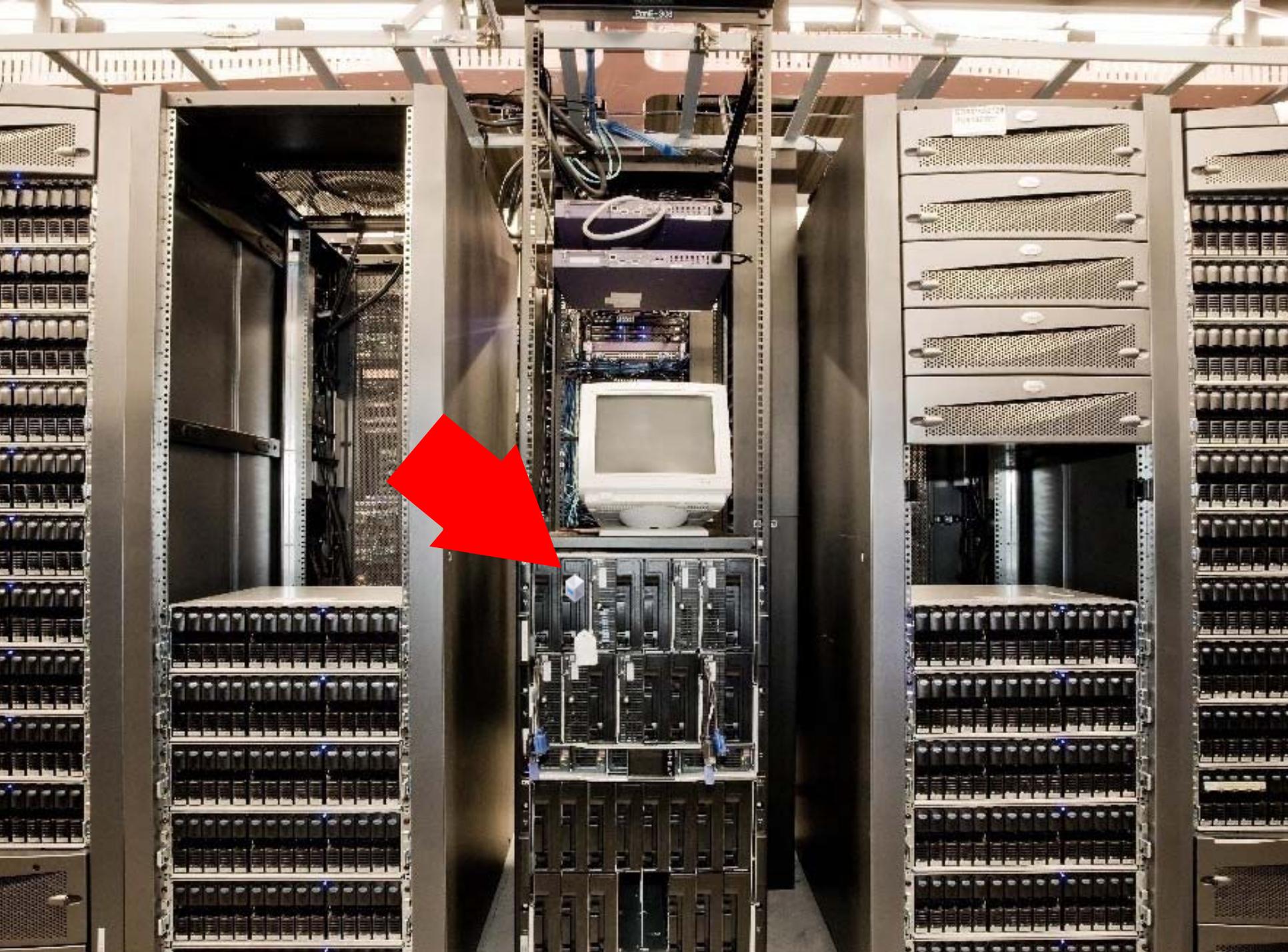
Distributed Power Management :
Make the Giant Computer Power Thrifty
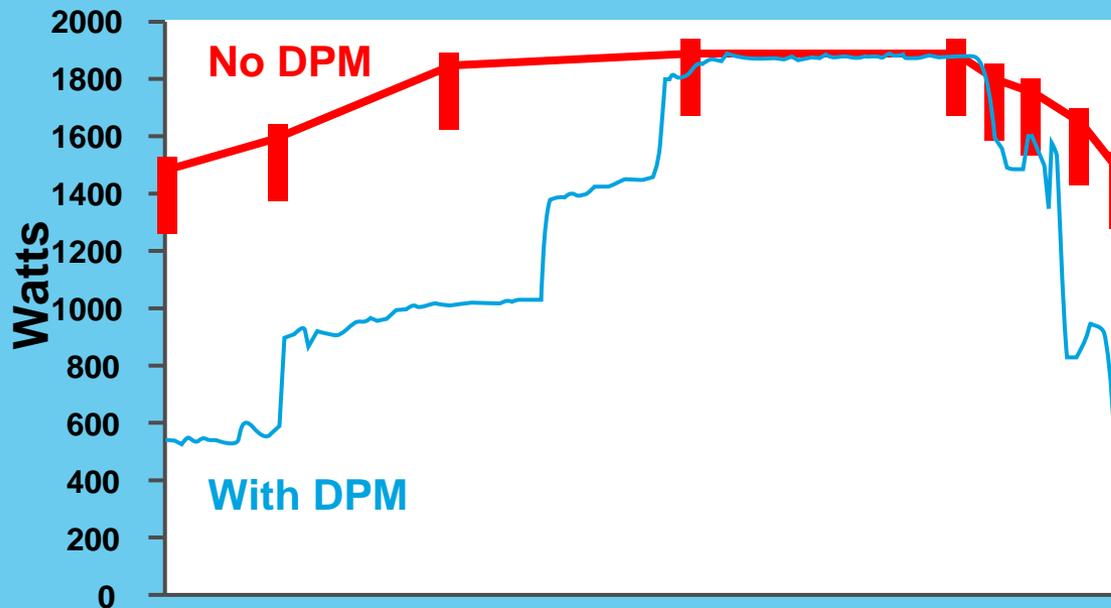
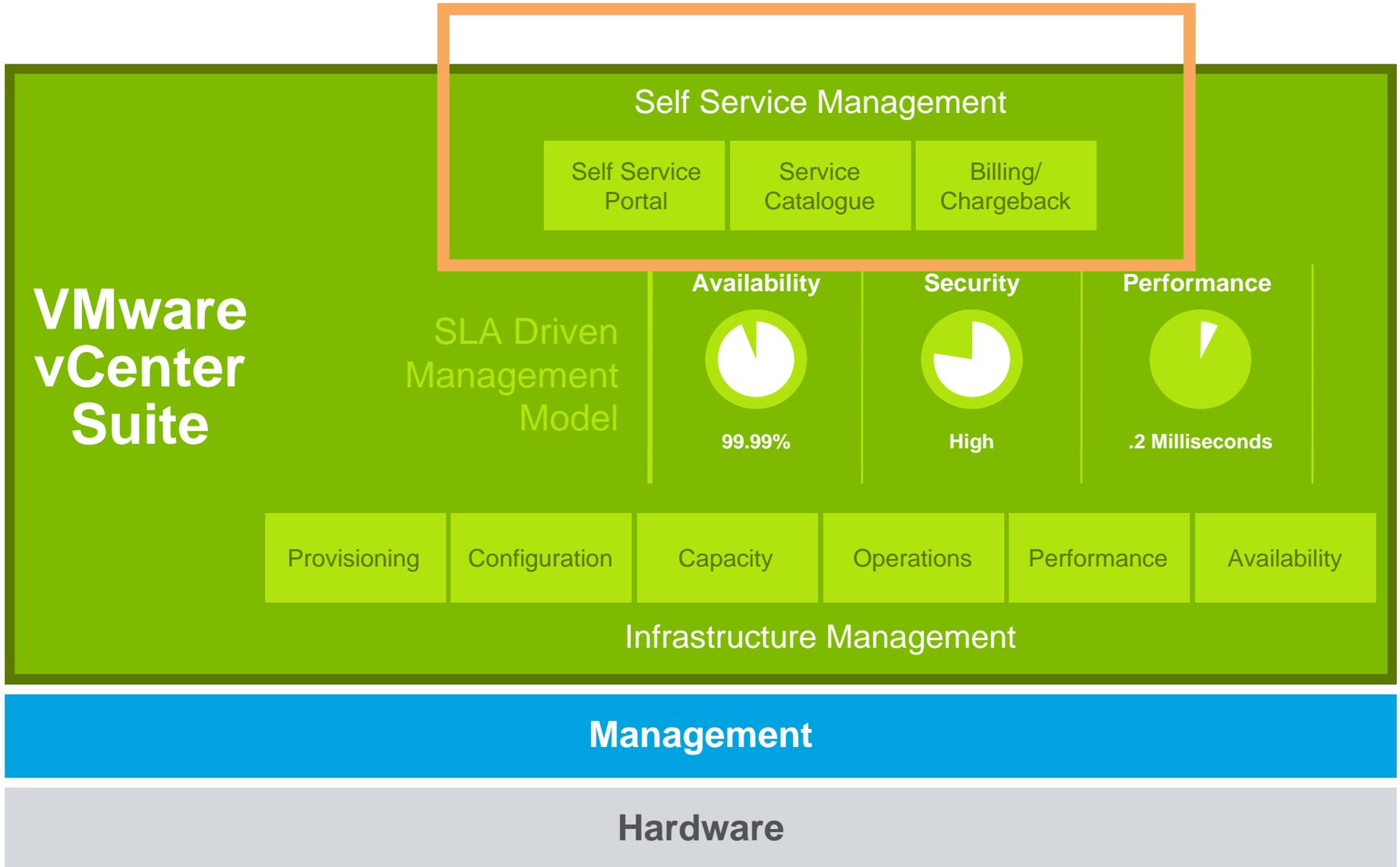**50% Savings During VMmark™**

VMware Fault Tolerance

No Reboot – Seamless Cutover

App
OS

FT

App
OS

VMware ESX

VMware ESX

Provision Users Not Devices

Desktop	Desktop	Desktop
Device	Device	Device
Device	Device	Device
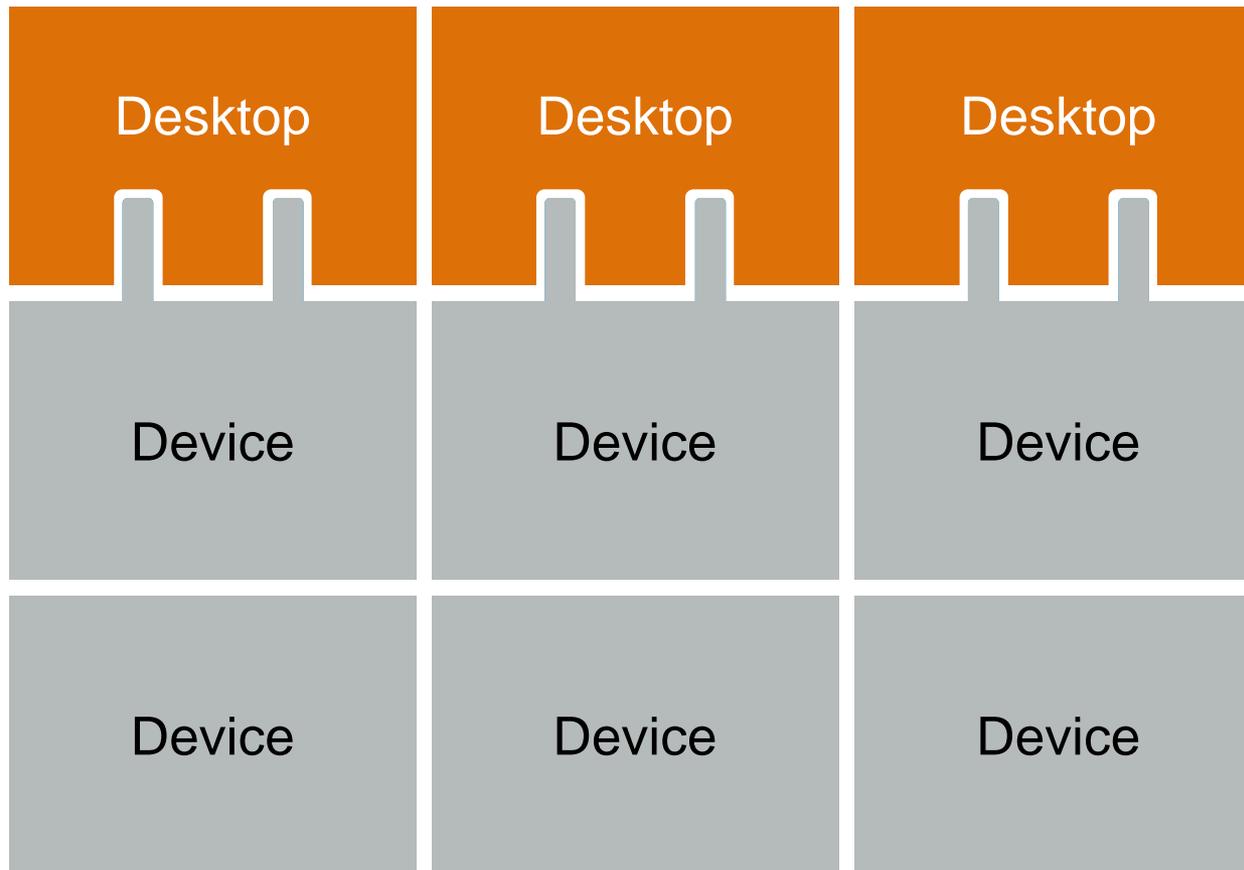
Address All Users

Server Hosted (VDI)

Client Hypervisor (CVP)

Extensible Management Suite

Self Service Management

Self Service Portal	Service Catalogue	Billing/ Chargeback

VMware vCenter Suite

SLA Driven Management Model

Availability

99.99%

Security

High

Performance

.2 Milliseconds

Provisioning	Configuration	Capacity	Operations	Performance	Availability

Infrastructure Management

Management

Hardware

New Security Concerns from Virtualization
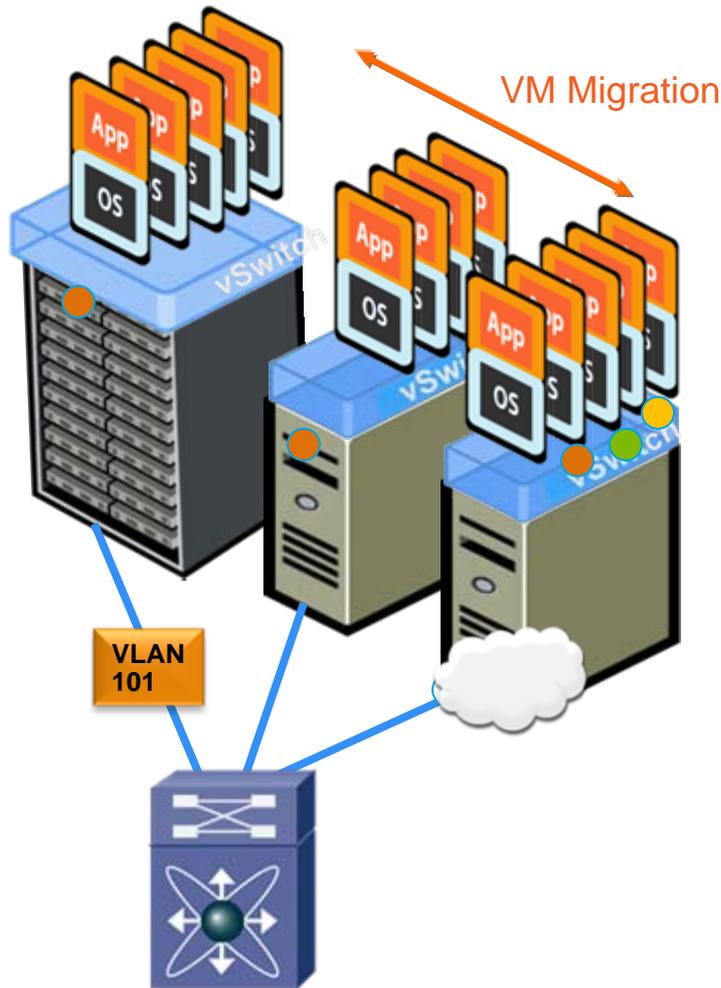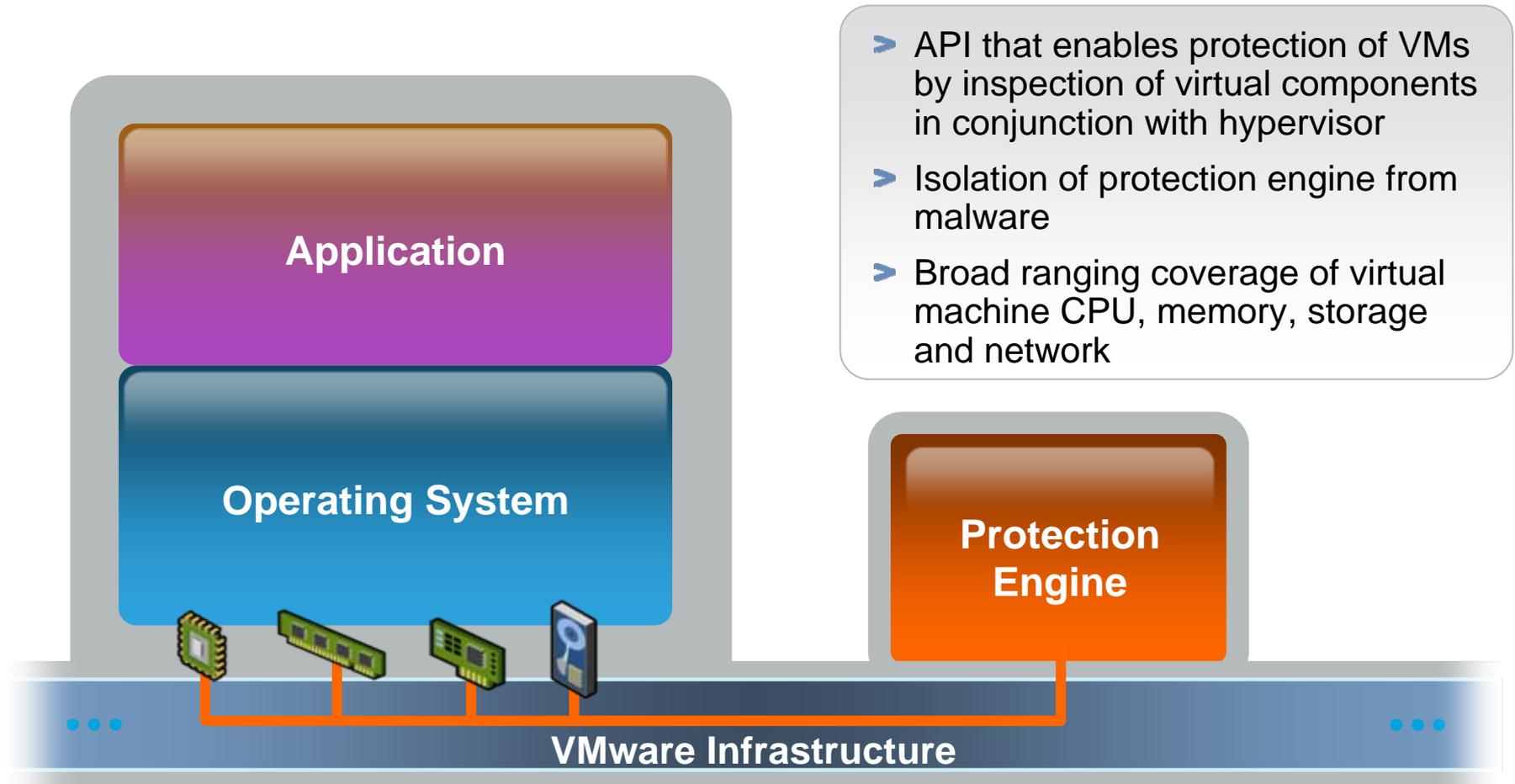
VM Migration

Problems:

- VMotion may move VMs across physical ports—policy must follow
- Impossible to view or apply policy to locally switched traffic
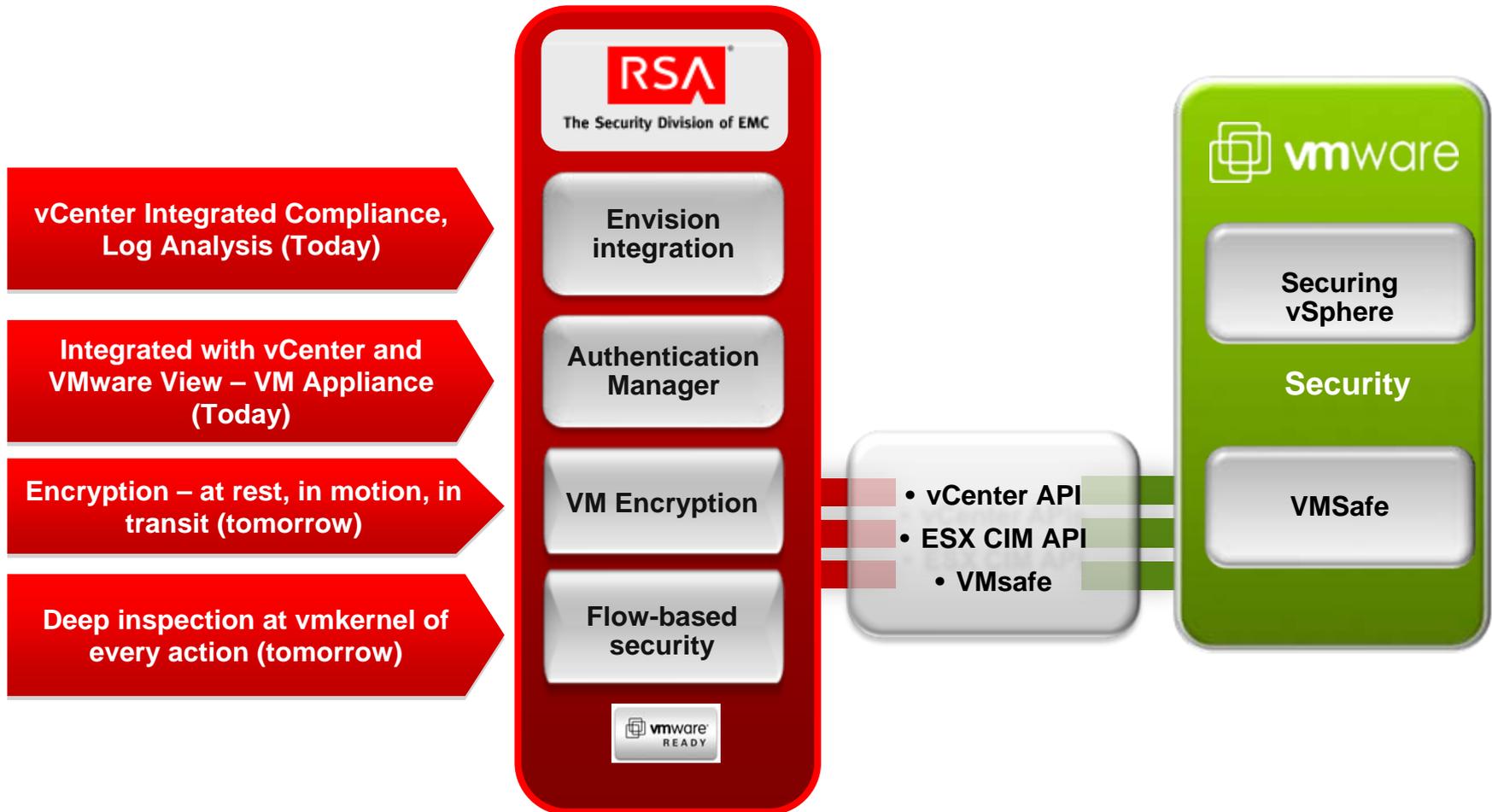- Cannot correlate traffic on physical links—from multiple VMs

Solution

- RSA security solutions imbedded in infrastructure solutions

VLAN 101

VMware VMsafe

Application

Operating System

VMware Infrastructure

Protection Engine

> API that enables protection of VMs by inspection of virtual components in conjunction with hypervisor

> Isolation of protection engine from malware

> Broad ranging coverage of virtual machine CPU, memory, storage and network

How we are Building our Security Suite for the 100% Virtualized Datacenter

RSA
The Security Division of EMC

vmware

vCenter Integrated Compliance, Log Analysis (Today)

Integrated with vCenter and VMware View – VM Appliance (Today)

Encryption – at rest, in motion, in transit (tomorrow)

Deep inspection at vmkernel of every action (tomorrow)

Envision integration

Authentication Manager

VM Encryption

Flow-based security

vmware
READY

- vCenter API
- ESX CIM API
- VMsafe

Securing vSphere

Security

VMSafe

Building the Giant Computer
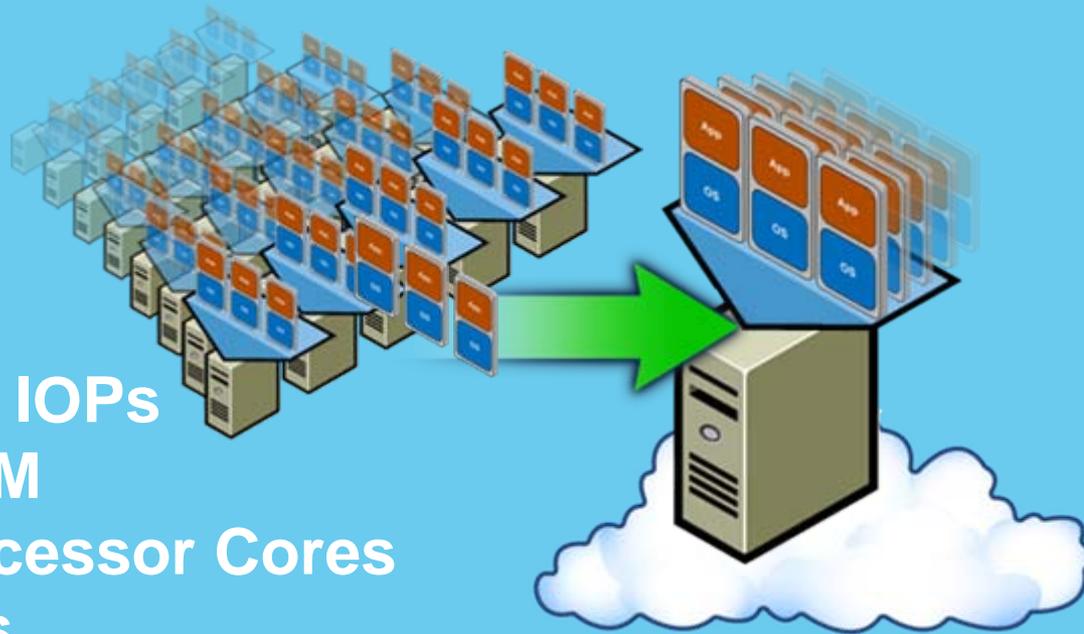
3 Million+ IOPs
32 TB RAM
2,048 Processor Cores
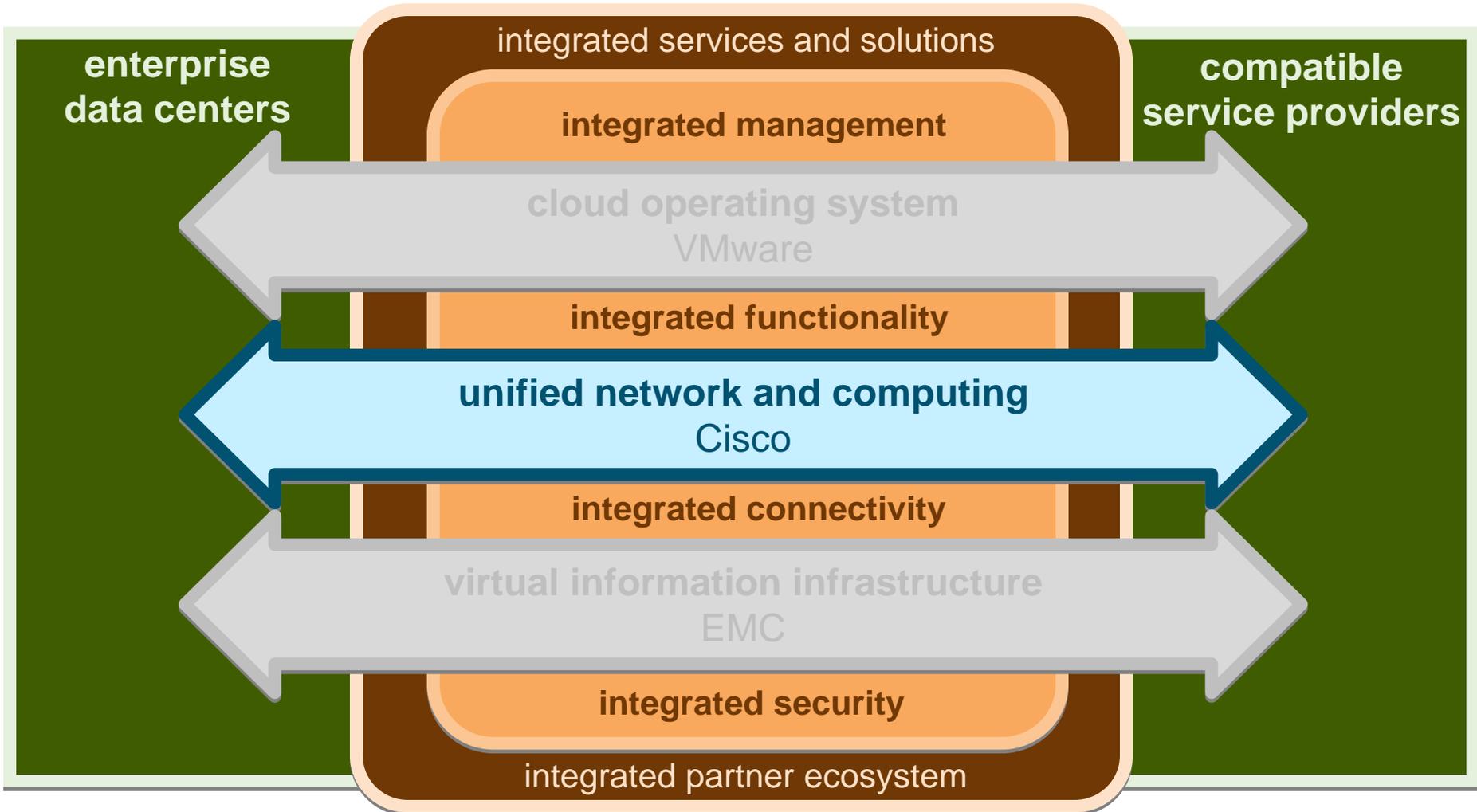1,280 VMs
32 Nodes per Cluster
16 PB of storage
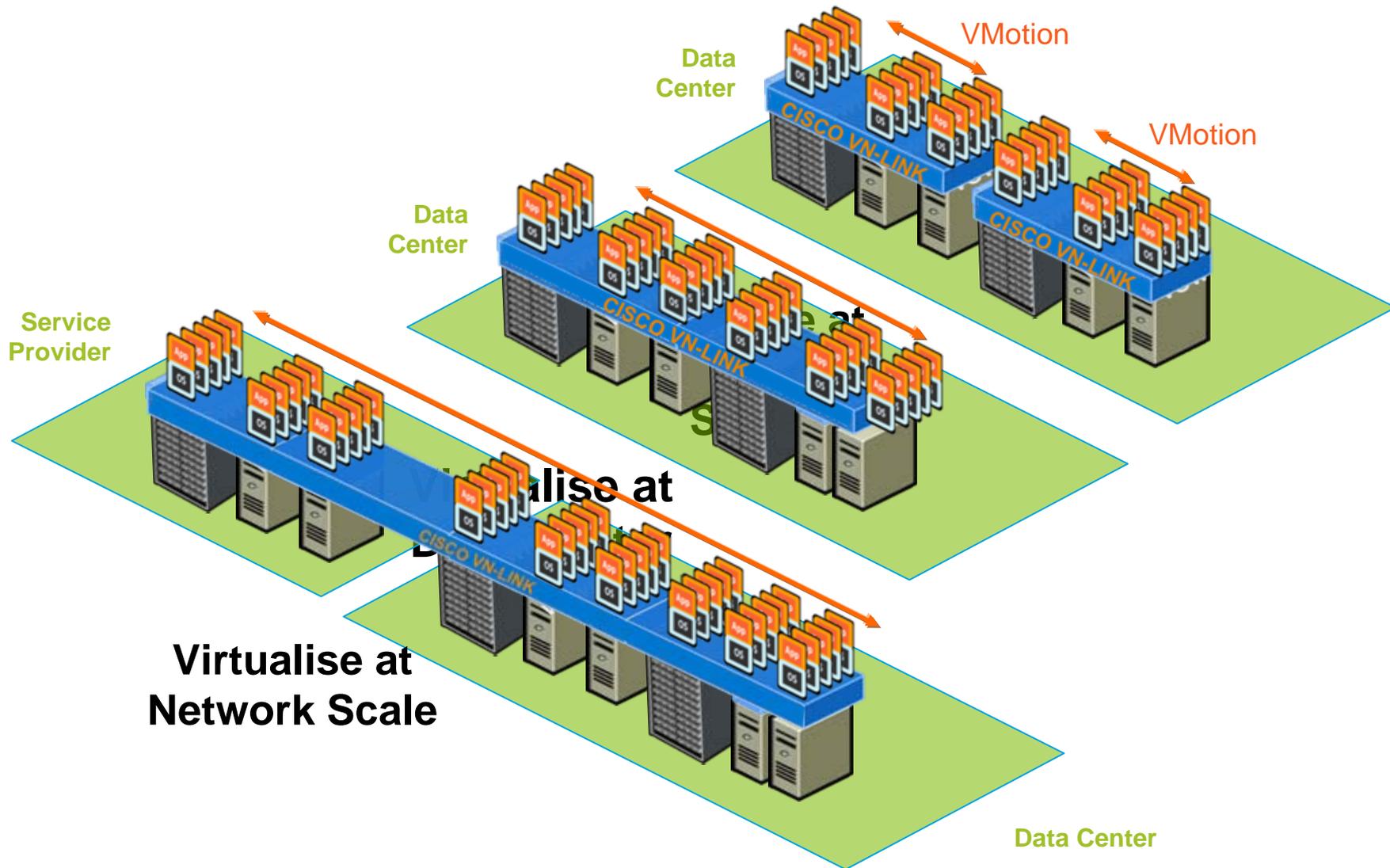VMware DRS Automatically Balances VMs

Cisco Enabling Technology

enterprise data centers

compatible service providers

integrated services and solutions

integrated management

cloud operating system
VMware

integrated functionality

unified network and computing
Cisco

integrated connectivity

virtual information infrastructure
EMC

integrated security

integrated partner ecosystem

Data Center Evolution
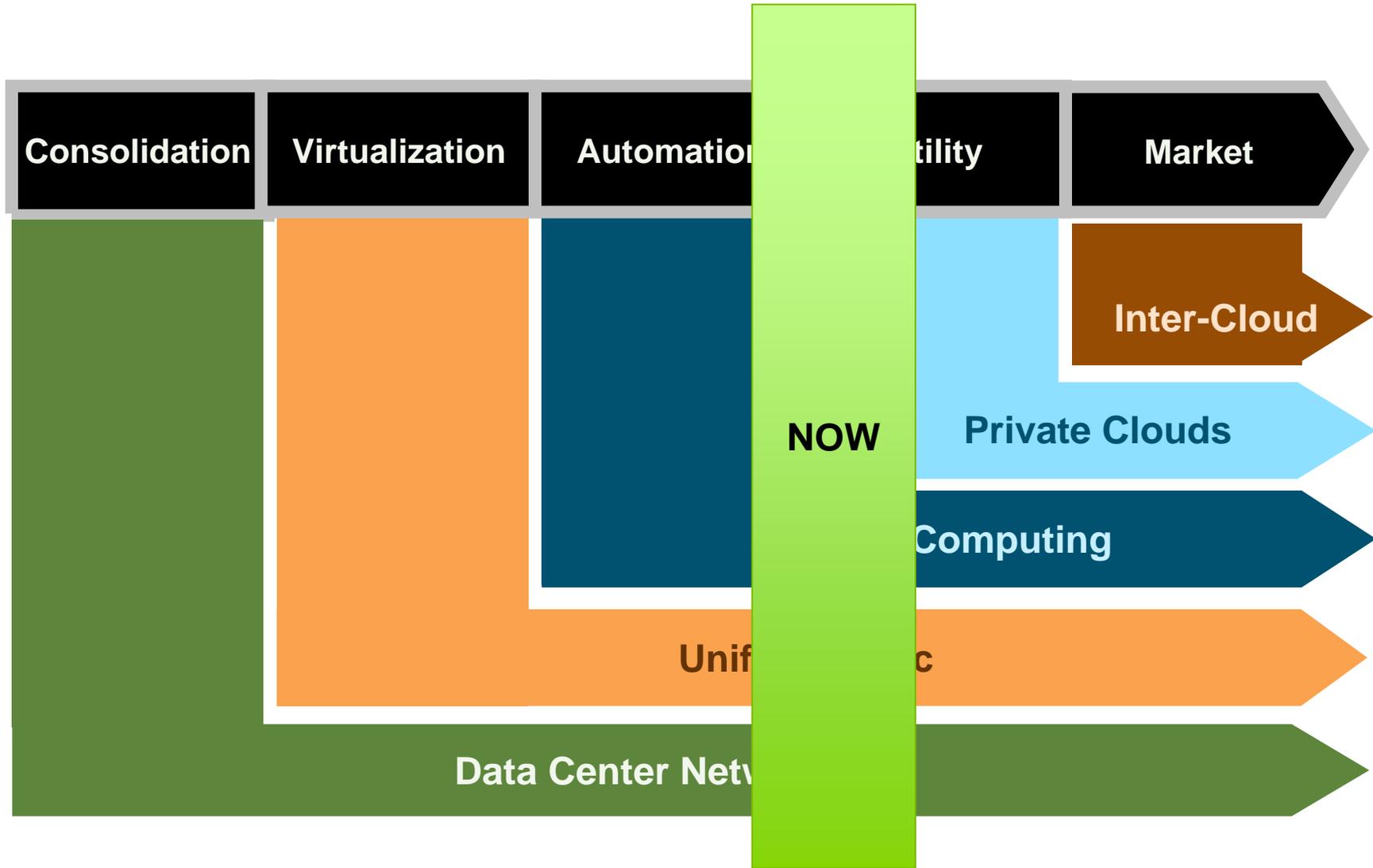
Network Scale Virtualisation

VMotion

VMotion

Data Center

Data Center

Service Provider

Virtualise at Network Scale

Data Center

Networking the Cloud

Cost — Back to Capex, Less Scale Economy

Flexibility

Security — Traffic Isolation, Data On-Site, Wire-Speed Inspection, Security Appliances

Performance — Data Center Ethernet, Controlled BW/Latency, QoS, IP SLA, WAAS, Load Balancing

Interoperability — Protocols, Standards

Cisco Enablement

Private Cloud
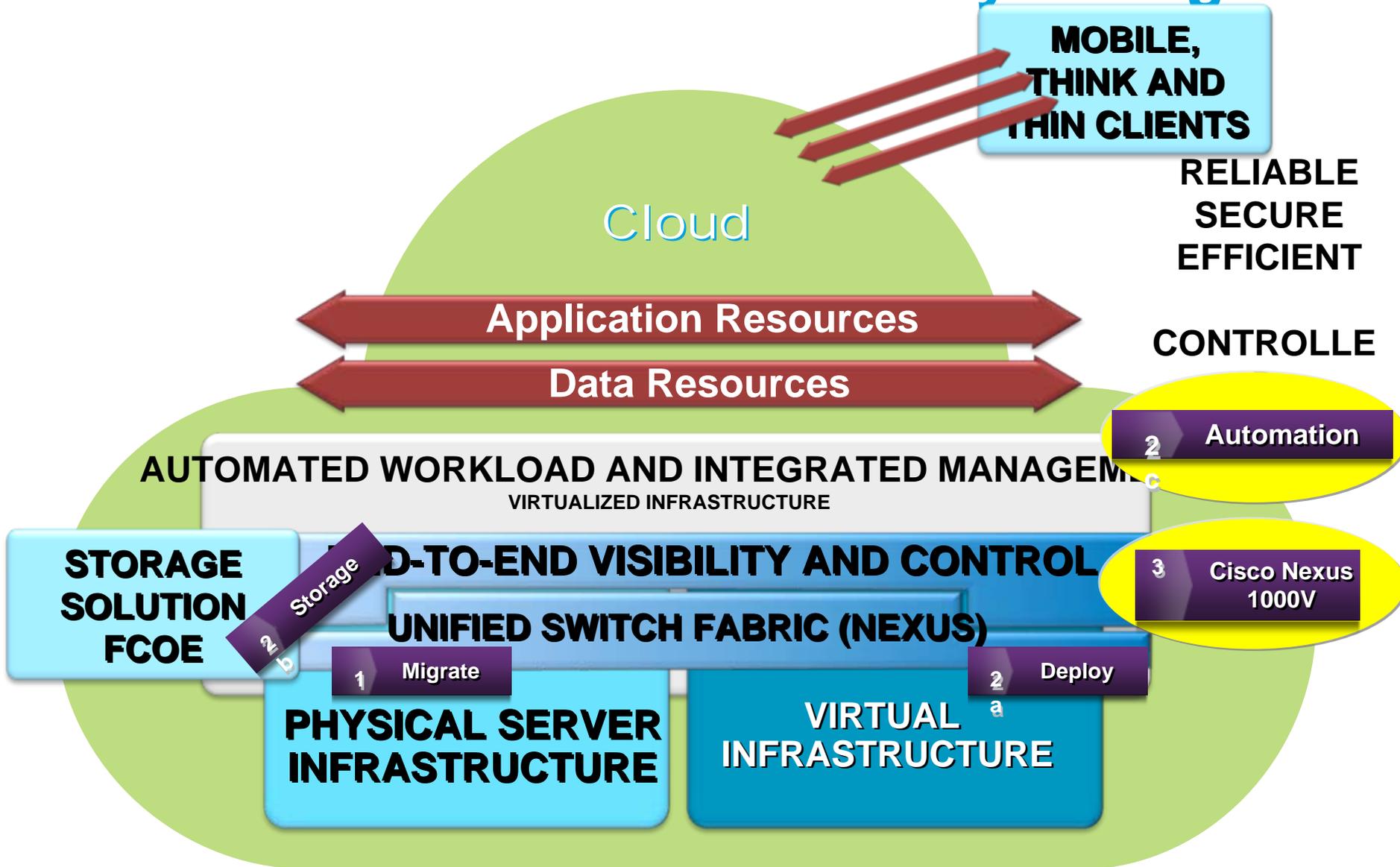
Exploring One of the Security Issues
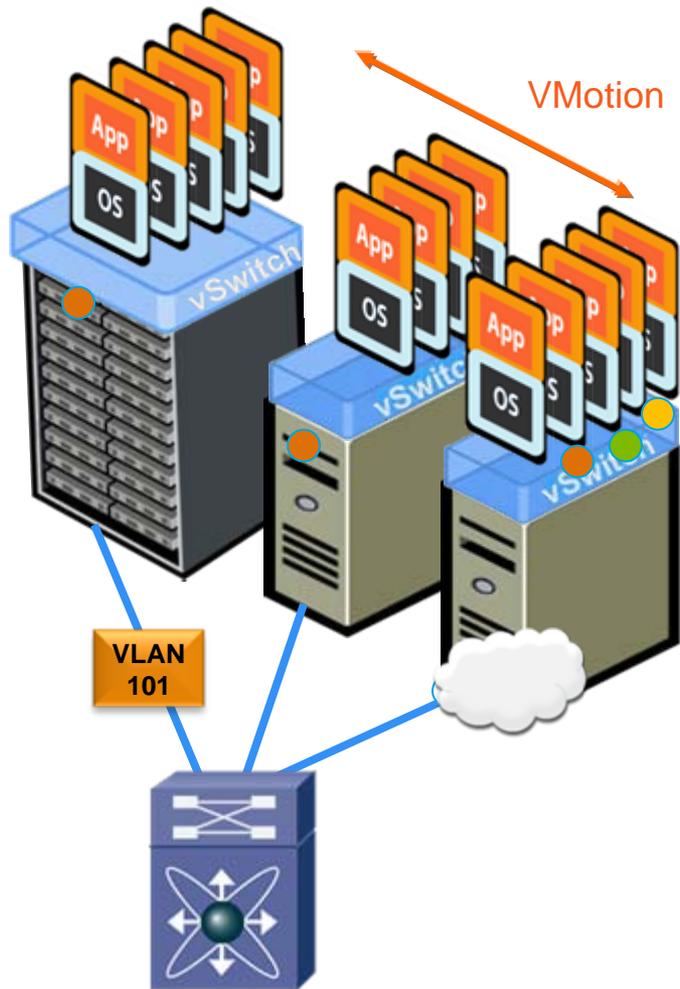
VMotion

Problems:

- VMotion may move VMs across physical ports—policy must follow
- Impossible to view or apply policy to locally switched traffic
- Cannot correlate traffic on physical links—from multiple VMs

VN-Link:

- Extends network to the VM
- Consistent services
- Coordinated, coherent management

VLAN 101

Cloud Automation and Security Thoughts

MOBILE, THINK AND THIN CLIENTS

Cloud

RELIABLE SECURE EFFICIENT

Application Resources

Data Resources

CONTROLLE

AUTOMATED WORKLOAD AND INTEGRATED MANAGEM
VIRTUALIZED INFRASTRUCTURE

2 c Automation

STORAGE SOLUTION FCOE

END-TO-END VISIBILITY AND CONTROL

3 Cisco Nexus 1000V

2 b Storage

UNIFIED SWITCH FABRIC (NEXUS)

1 Migrate

2 a Deploy

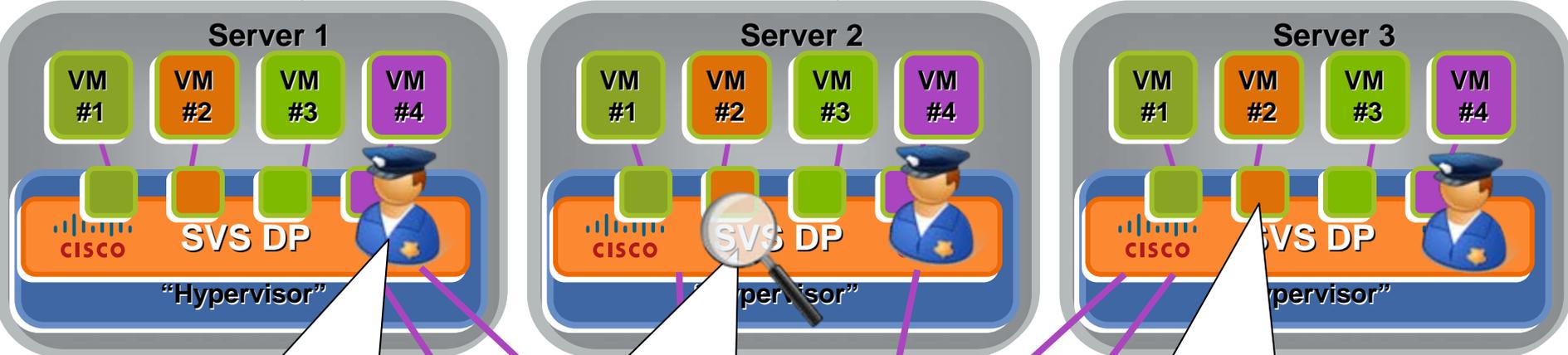PHYSICAL SERVER INFRASTRUCTURE

VIRTUAL INFRASTRUCTURE

Proposing a Security Policy Enforcement Place

Consistent Network Security

Inter-VM traffic Visibility

Consistent policy enforcement

Server 1

| VM #1 | VM #2 | VM #3 | VM #4 |

CISCO — SVS DP

"Hypervisor"

Server 2

| VM #1 | VM #2 | VM #3 | VM #4 |

CISCO — SVS DP

"Hypervisor"

Server 3

| VM #1 | VM #2 | VM #3 | VM #4 |

CISCO — SVS DP

"Hypervisor"

Consistent security for virtual & physical servers

ERSPAN, NetFlow, Cisco CLI provide transparency

Port Profiles enable consistent policy enforcment

Network & Server Admin Cooperate

VM MGMT

CISCO — **SVS Centralized Control Plane**

Enforcing Security Policy at the Control Plane Level
Cisco Nexus 1kV for Simple, Consistent Policy Definition & Enforcement

Server 1

VM #1 | VM #2 | VM #3 | VM #4

Server 2

VM #1 | VM #2 | VM #3 | VM #4

Server 3

VM #1 | VM #2 | VM #3 | VM #4

Nexus 1000V Distributed Data Plane

Hypervisor | Hypervisor | Hypervisor

Web Apps
- VLAN 101
- ACL "WEB"
- QoS "GOLD"
- NETFLOW
- Rate - 10MBps

Nexus 1000V Centralized Control Plane

Port Profiles

WEB Apps

HR

Payroll

Compliance
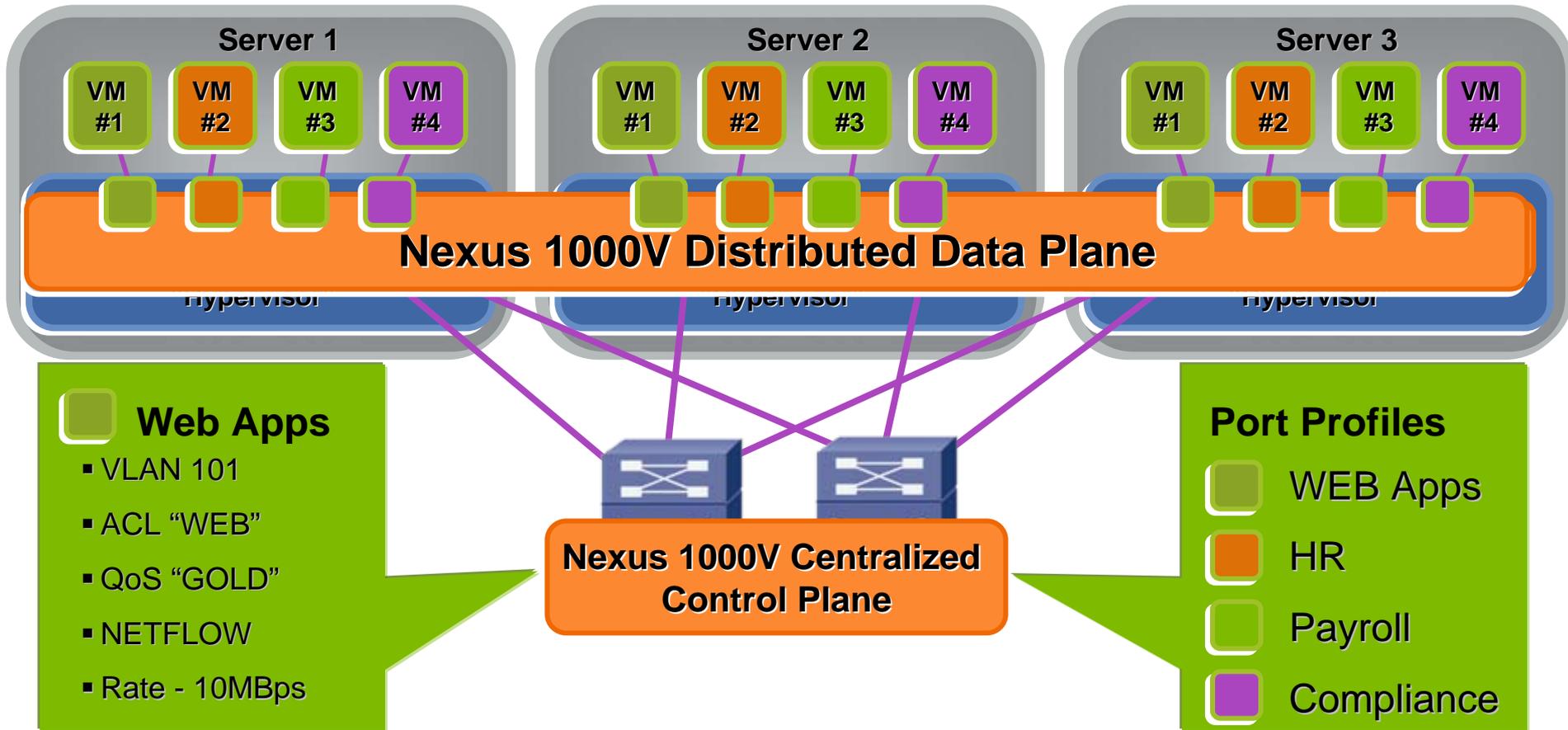
- **Port profiles abstract network policy, Simplifies VM deployment**

Cisco Virtual Machine Networking

Security & Policy Enforcement

Enable consistent VM-level security & network policy

Scale VMotion & DRS deployments

Operations & Management

Simplify VM-level management & troubleshooting

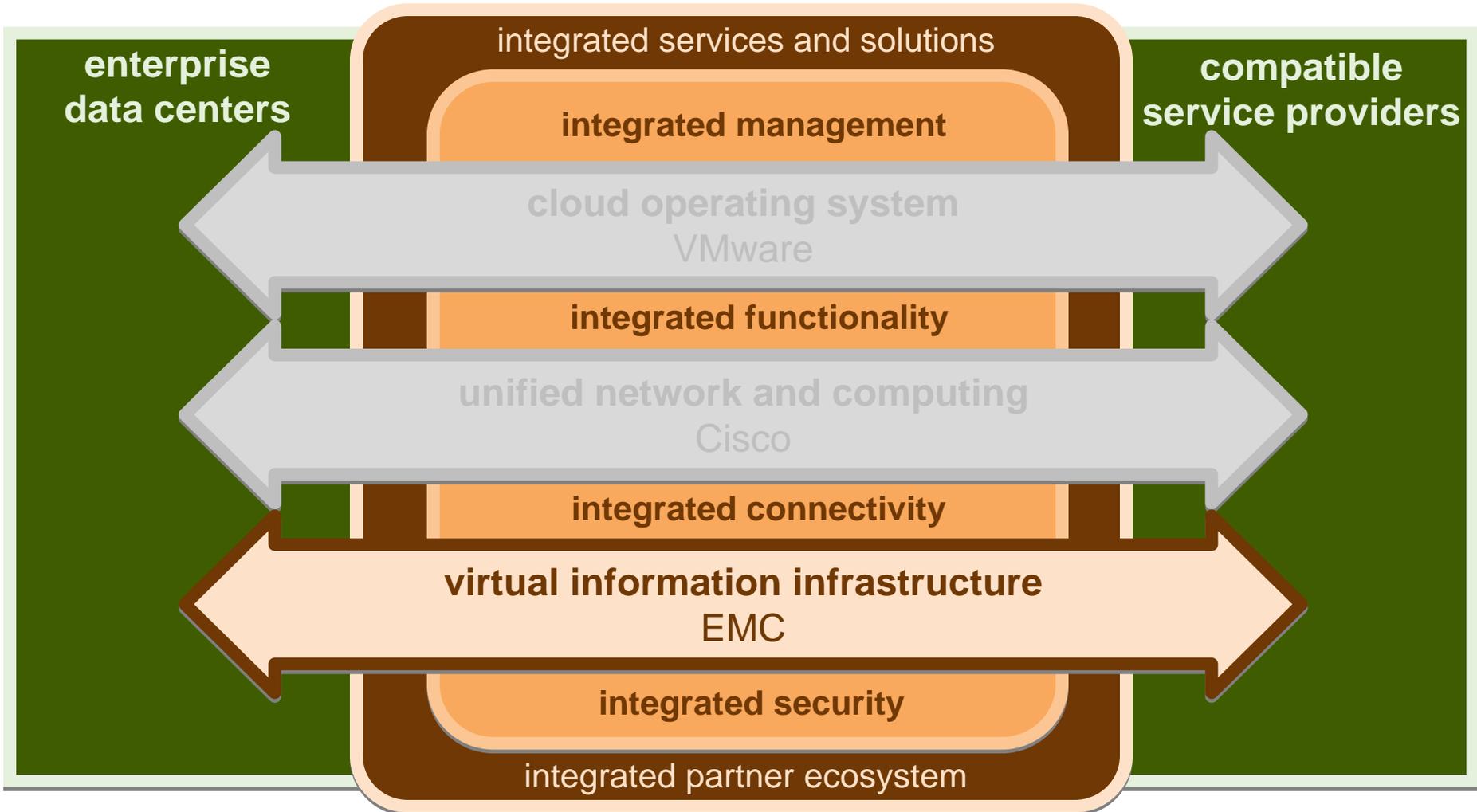**Scale with automated server & network provisioning**

Organizational Structure

Enable flexible collaboration with individual team autonomy

Simplify and maintain existing VM management model

EMC Enabling Technology

enterprise
data centers

compatible
service providers

integrated services and solutions

integrated management

cloud operating system
VMware

integrated functionality

unified network and computing
Cisco

integrated connectivity

virtual information infrastructure
EMC

integrated security

integrated partner ecosystem

EMC Enabling Technology

intelligent storage

widest set of storage choices

full VMware integration

"single giant array"

fully automated storage tiering

information management

deduplication for VMware

SRM-integrated business cont.

archiving of virtualized data

optimized vClient solutions

resource management

vCenter plug-ins

VM-aware discovery

VM-aware ITIL workflows

VM-aware IT compliance
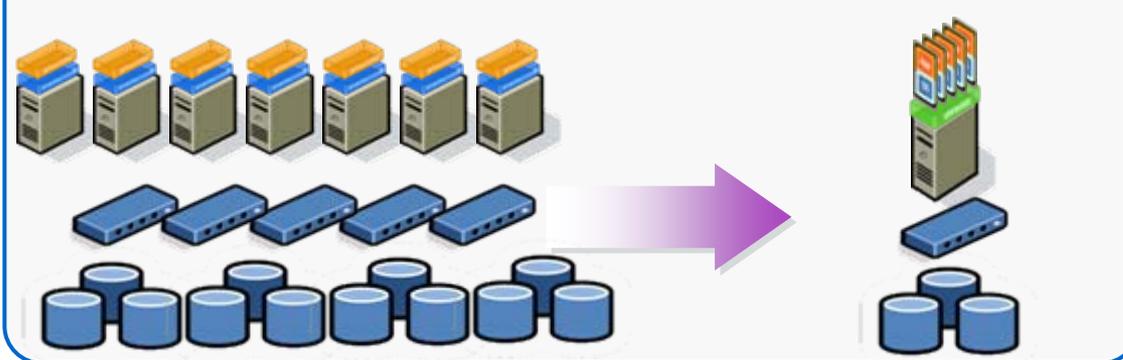
information security

encryption and key mgmt

advanced authentication

data loss prevention

auditing and compliance

Comprehensive Transformation Savings

|	*BEFORE*		*AFTER*
Servers	200	→	16
Storage	50 TB DAS	→	20 TB SAN
Network	600 ports	→	64 ports
Backups	2TB	→	200GB
Facilities	20 server racks	→	2 server racks
	100 KVA power		10 KVA power

Technology & Strategies

> **Consulting - analysis, planning and implementation of IT Strategy**

> **Server Virtualization**

> **Storage Area Network, Tiering and Management**

> **Disk Library and Data Dedupe**

> **Data Replication & Simplified DR**

Impacts

> **70-80% reduction on data centre space, power, cooling**

> **40% reduction of server TCO**

> **70% Improved server utilization**

> **52% reduction in required storage capacity**

> **Tape eliminated**

Corporate Express

EMC Internal IT Transformation Snapshot

	BEFORE	*AFTER*
Servers	**1252** →	**250** *
Server Racks	**60** →	**24** *
Storage Utilization	**50%** →	**69% (+ 38%)**
SAN Fabrics	**63** →	**12**
Storage Systems	**205** →	**104**

* Phase One Virtualization

EMC²
where information lives®
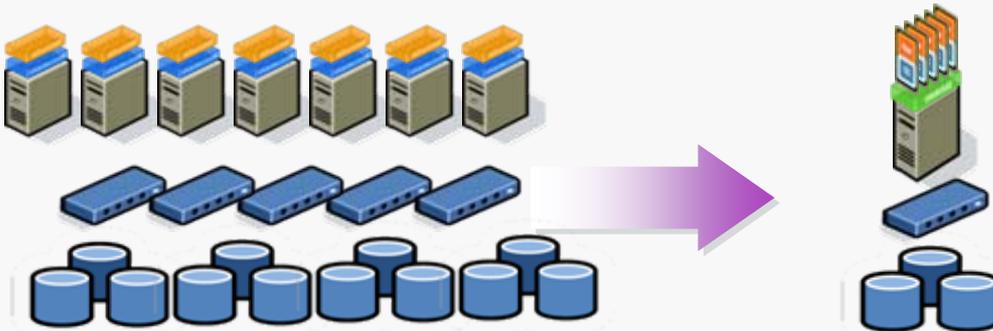
Technology & Strategies

> **Executive Support of IT Strategy**

> > **Server Virtualization**

> **SAN Consolidation and Tiering**

> **Cooling and Airflow Improvements**

> > **Tiered Data Centers**

Impacts

> **$10M** reduction in data centre space, power, cooling **(5 yrs)**

> **$80M** infrastructure cost avoided

> > **Reduced 59,821,624 lbs CO2**

> > **$30M** Data Center Upgrade delayed 4 years

> **Tape reduced $1M/yr to $25k/yr**

> **Half the number of storage systems & triple the capacity**

The Change Is Coming Fast

Private clouds will transform how we think about IT

As a service

The impact to businesses will be considerable

Exploit new economics with confidence

Clear and logical pathway

Preserve existing investment in applications and information

Each step delivers immediate value, and builds for the next

Mission:
turn IT infrastructure into a
low-cost, high-performance and flexible
<u>service</u>

IT Infrastructure: Poised For Change