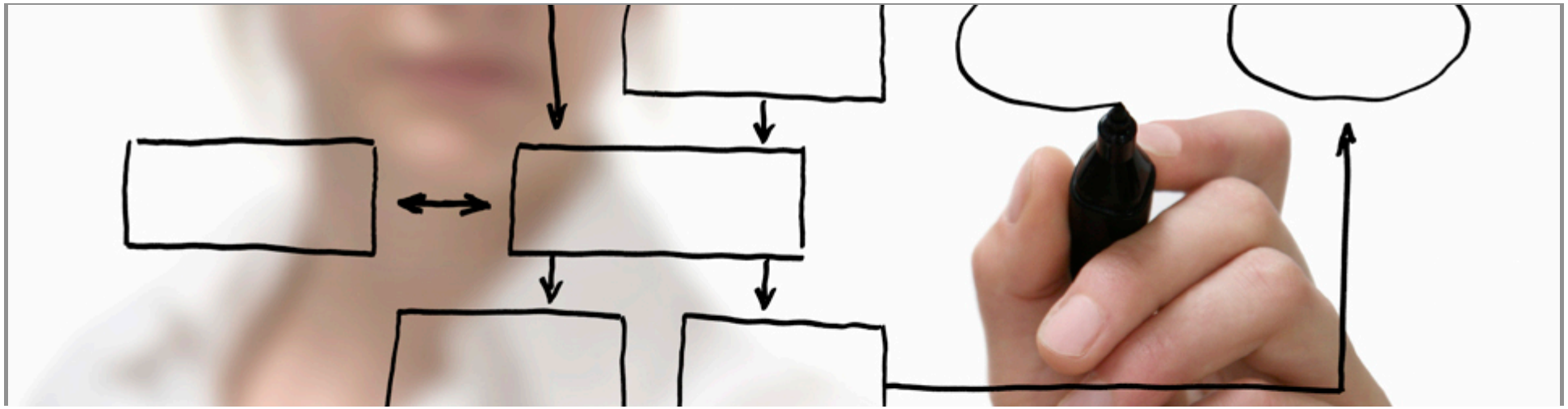


Cisco Desktop Virtualization with UCS: A Blueprint for Success

Agenda

Time		
9.00-9.45	UCS	Hans Donnerborg
9.45-10.15	Intel	Nis Sørensen
10.15-10.30	Break	
10.30-11.15	Netapp	Jens Melhede
11.15-12.00	vmware	Michael Monberg
12.00-13.00	Lunch	
13.00-14.00	UCS Lab	Yann Bouillon
14.00-15.00	Netapp lab	Yann Bouillon
15.00-16.00	vmware lab	Yann Bouillon

What We've Heard From Customers…

Desktop Virtualization Drivers

Flexibility / Business Continuity

Data Security

Total Cost of Ownership

Desktop Virtualization Challenges

Maintaining High Quality for Video, Voice Experience

Fragmented Solution Set

Return on Investment

What Is Cisco Virtualization Experience Infrastructure (VXI)?

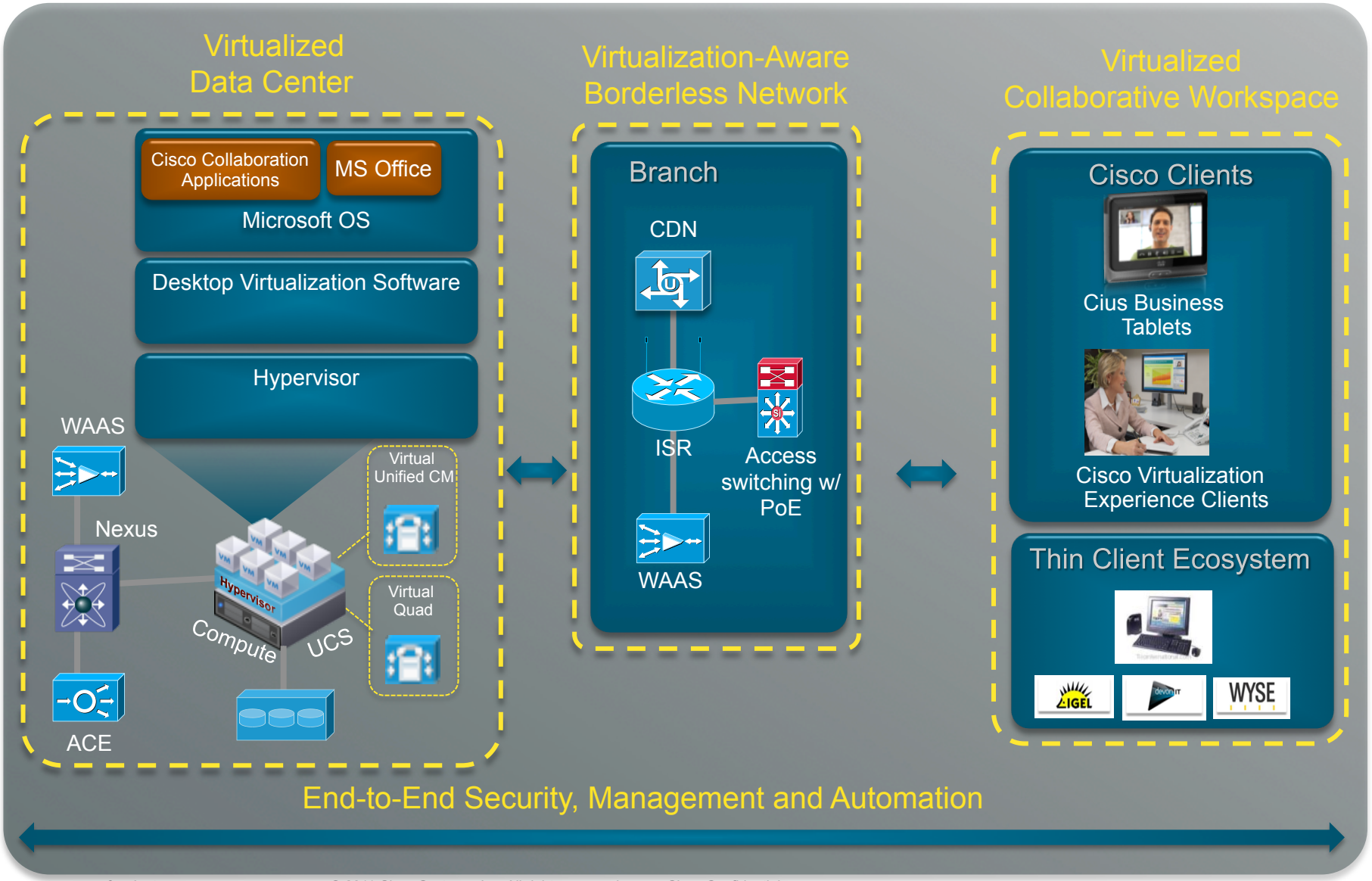
- Deliver a superior collaboration and rich media user experience with best in class ROI in a fully integrated, open and validated desktop virtualization
- Cisco VXI is an end-to-end system for desktop virtualization

  Including virtualized data center, borderless network and endpoint with design guidance (CVD released) and end-to-end validation

Desktop Virtualization + Optimized User Experience

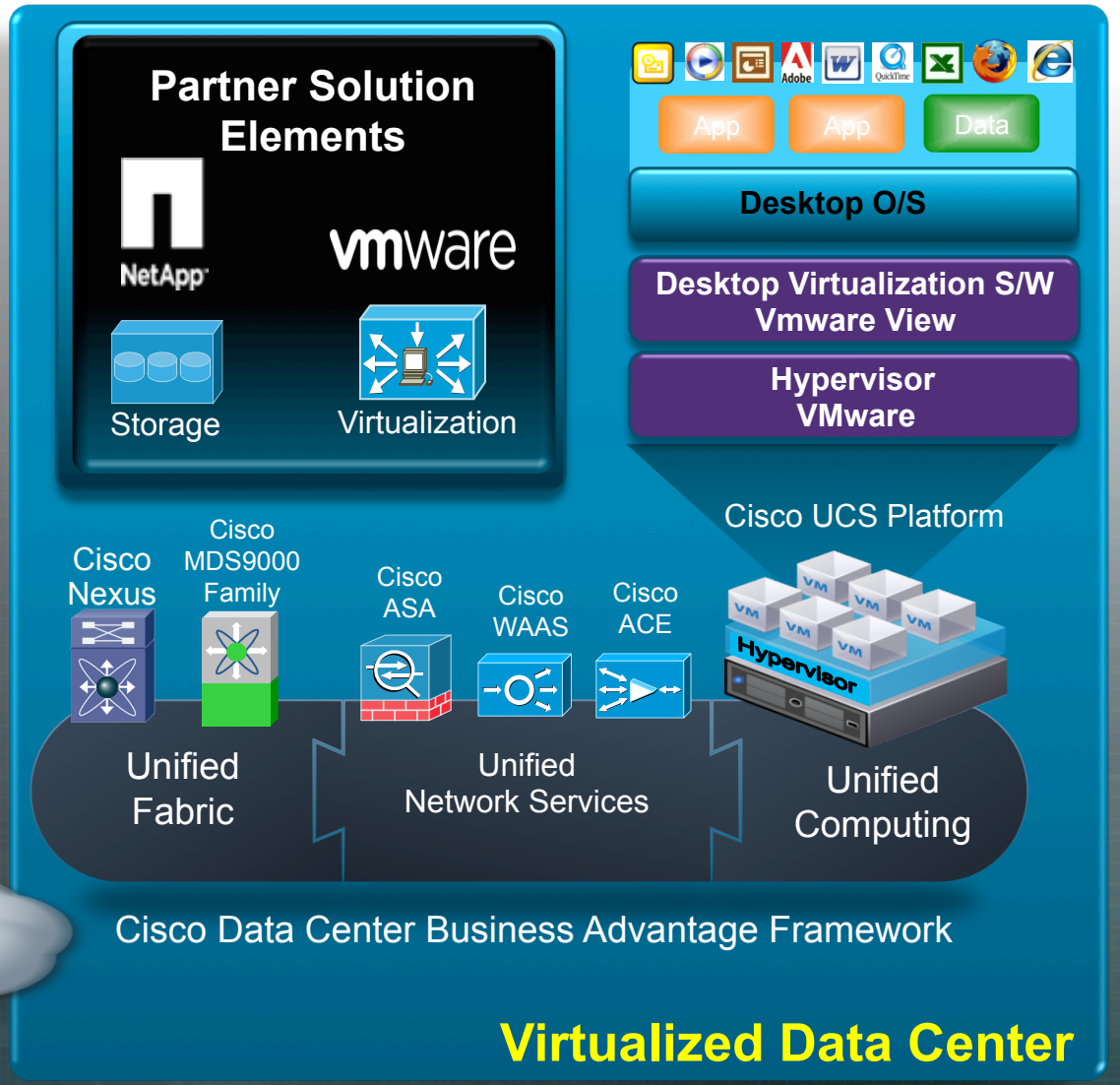
Cisco VXI Vision

Virtualized End-to-End System

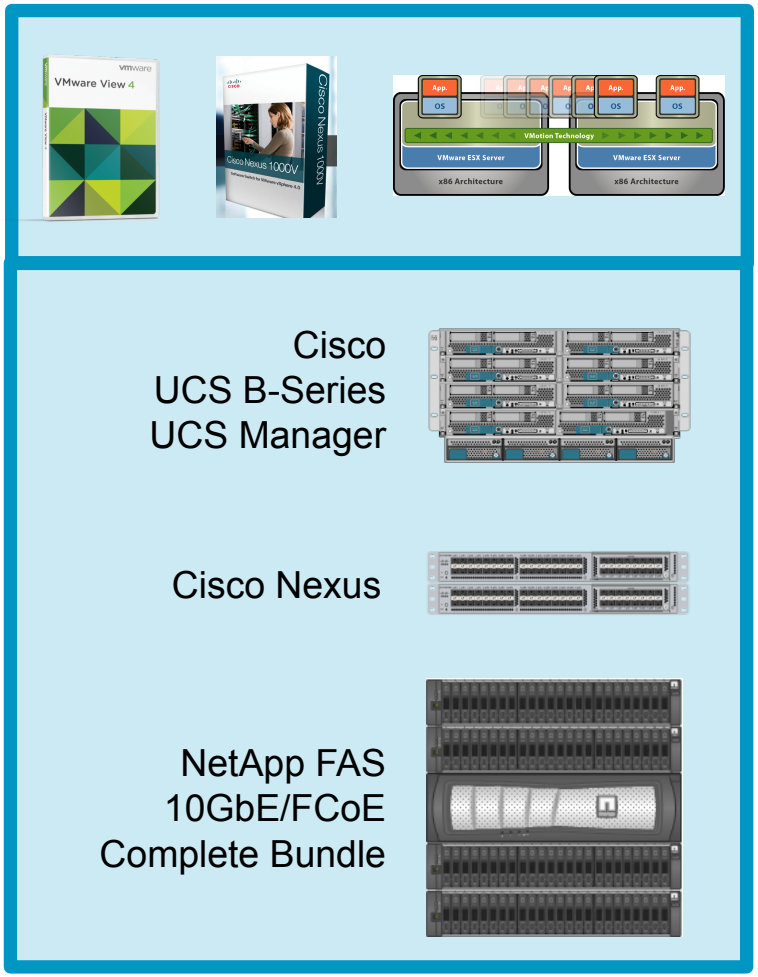


Cisco Desktop Virtualization Solution

- Removes VDI deployment barriers
- Combined joint partner solutions with industry leaders
- Cisco Validated Designs & Services to accelerate customer success



Integrated Compute Stack: FlexPod



Shared infrastructure for wide range of environments and applications

Benefits

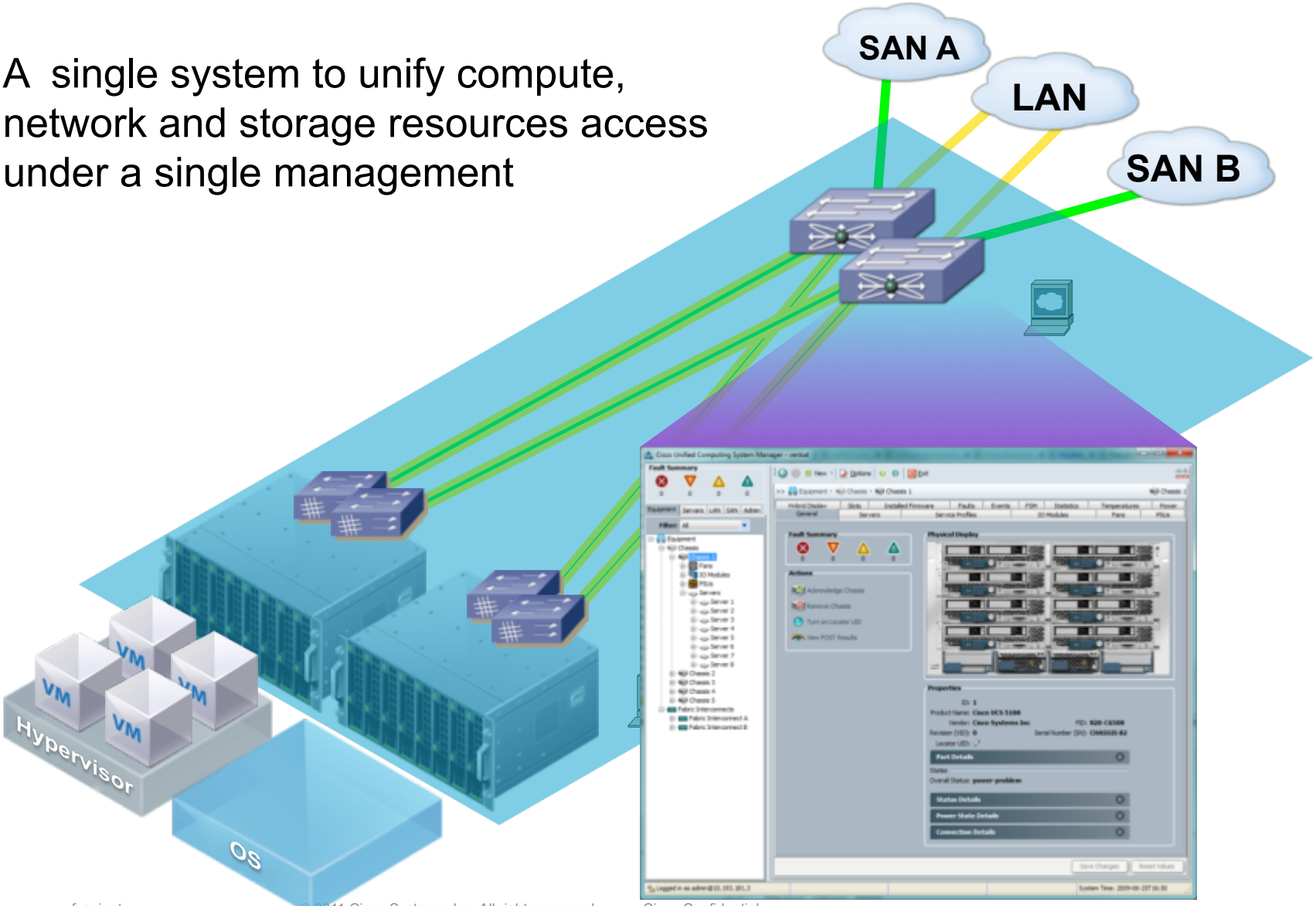
- Low-risk standardized shared infrastructure supporting a wide range of environments
- Highest possible DC efficiency
- IT flexibility giving business agility: scale out or up, but manage resource pools

Features

- Complete DC in a single rack
- Performance-matched stack
- Step-by-step deployment guides
- Solutions guide for multiple environments
- Multiple classes of compute and storage supported in a single FlexPod
- Centralized management: NetApp OnCommand and Cisco UCS™ Manager
- vSphere Hypervisor, Nexus1000v virtual switch and View run on top

Unified Computing

A single system to unify compute, network and storage resources access under a single management



UCS Architecture = TCO Game Changer

UCS is Revolutionary

- **Clean slate design** with virtual machines as the atomic element of the data center
- **Eliminates legacy** of rack and blade server chassis as the building blocks of management and fabrics

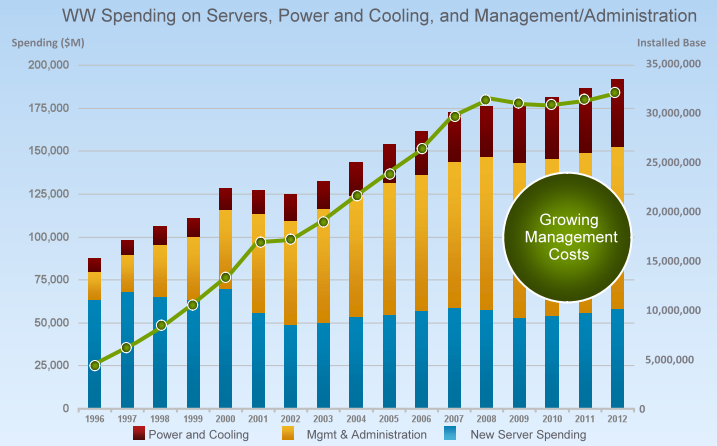
Cisco UCS's Simplified Design Means:

- Fewer overall components, less 'sprawl'
- More reliable, flexible, available, and scalable
- Easier to manage and troubleshoot

Customer Benefits:

- Lower CapEx: up to 30%
- Lower OpEx: up to 30%
- Increased business agility

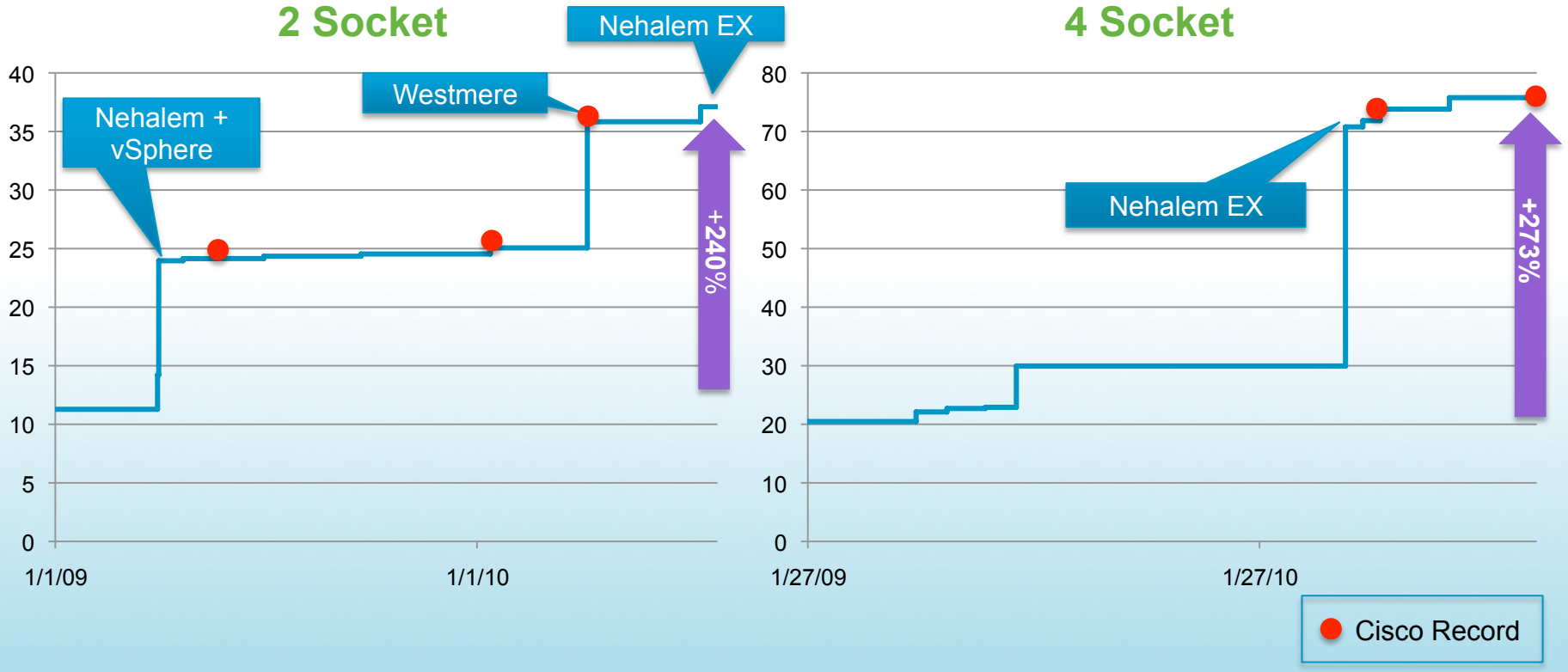
Cisco UCS Uniquely Addresses the Fastest Growing IT Cost: Management



"…the datacenter paradigm shift represented by UCS is beyond anything I could have imagined…*I went into my testing and review of Cisco UCS fully expecting to be underwhelmed and wound up coming away extremely impressed with what Cisco has accomplished"* *– Paul Venezia*
Network World, 11/10/09

Unprecedented Virtualization Density

2-socket and 4-socket VMmark scores have almost **tripled** since 2005



Cisco UCS delivers a balanced system that takes full advantage of Intel CPU trends

Cisco Unified Computing System
The Success Of Fabric Based Computing

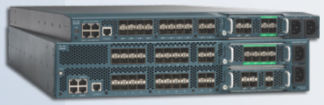
- **Over 4,000** UCS Customers
- **40+** ISVs Developing to UCS via API
- **10s of Thousands** of Supported Apps
- **Over 250** B-Series Certified Partners
- **#3 Market Share** x86 Servers, US/Canada
- **Over 30 World Records** Benchmarks in The 1st Year

Building Blocks of Cisco's UCS

Optimized and Designed as a Integrated System

UCS Manager
Service Profiles
Virtualization integration

UCS Fabric Interconnect
10GE unified fabric switch
One per 320 blades



UCS Fabric Extender
Remote line card
One per chassis

UCS Blade Server Chassis
Flexible bay configurations

UCS Blade and Rack Servers
x86 industry standard
Patented extended memory

UCS I/O Adapters
Choice of multiple adapters

Unified Computing System

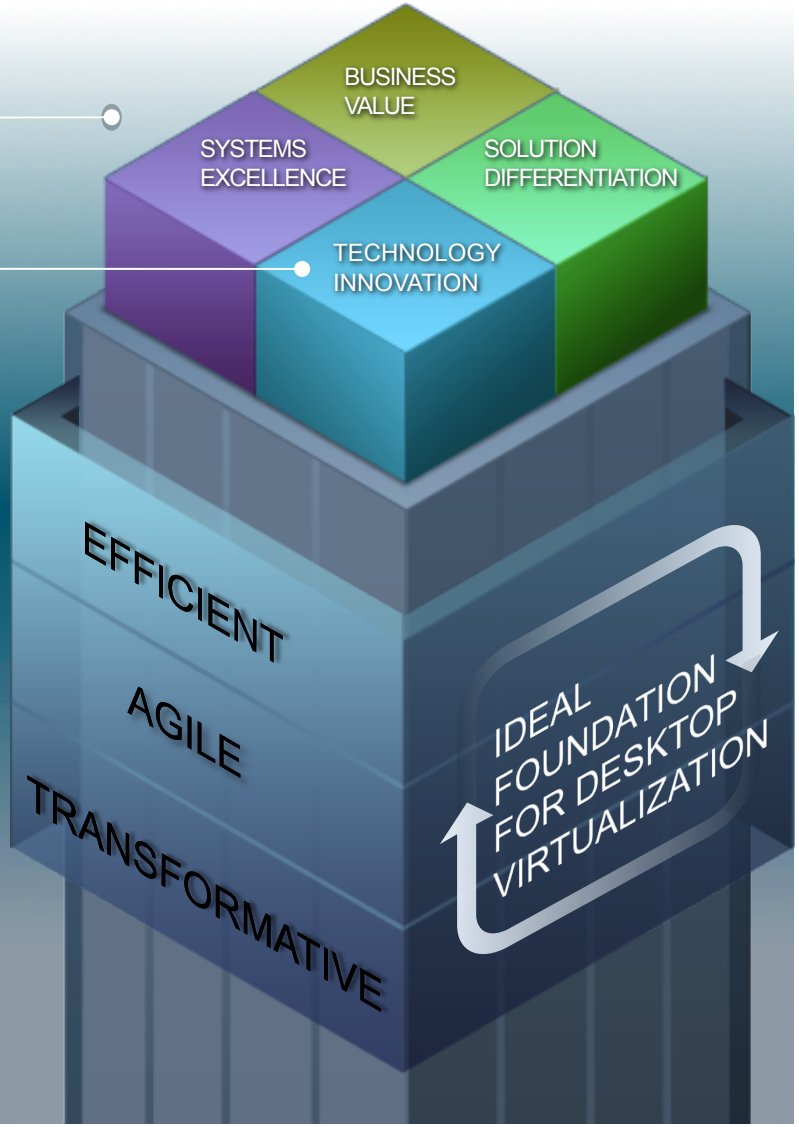
Key Innovations applied to Desktop Virtualization

SYSTEMS EXCELLENCE

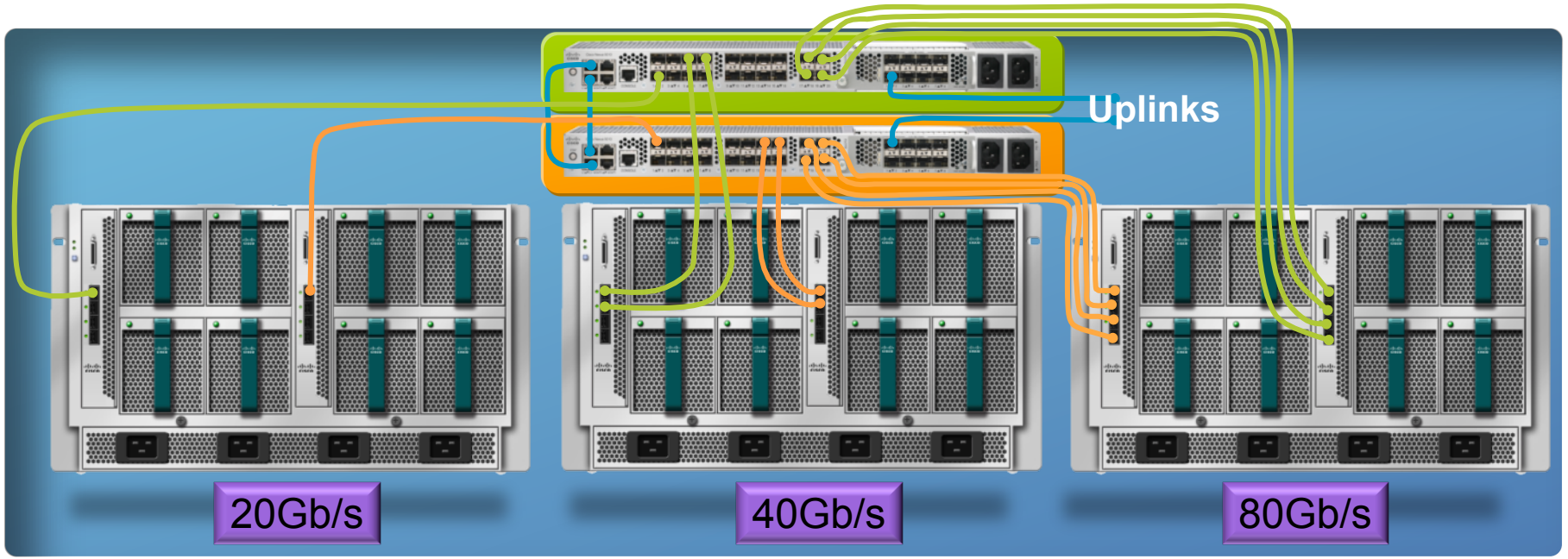
- Rapid Deployment
- Workload Mobility
- Optimized Scaling
- Simplified Operations
- Unified IT Workflows
- Lower TCO

TECHNOLOGY INNOVATION

- Unified Fabric
- Unified Management
- Open API
- Service Profile HW Abstraction
- Virtual Interfaces
- Extended Memory



Wire for Bandwidth, Not Connectivity



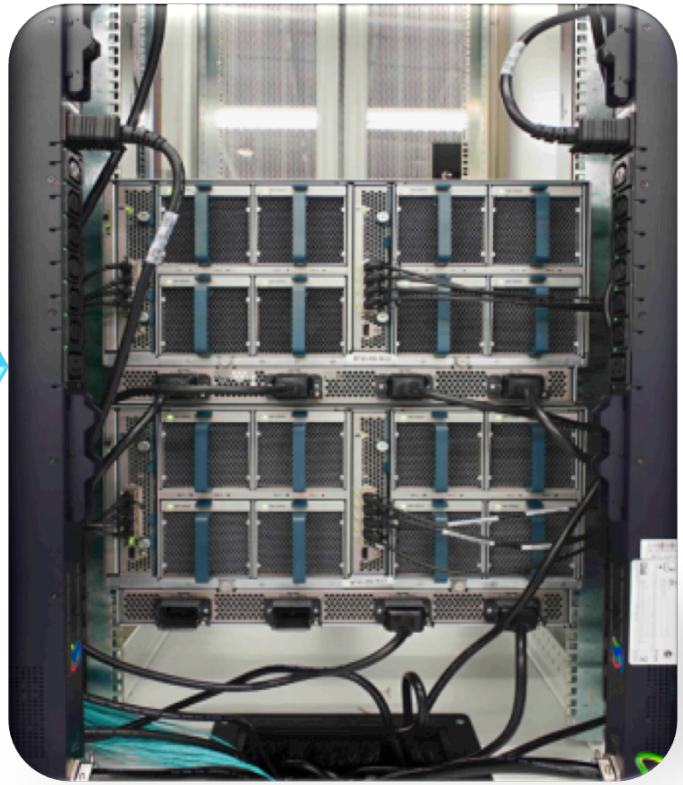
- I/O On-Demand via Service Profile
- Wire Once Architecture
- Policy-driven bandwidth allocation
- Virtual interface granularity

Result: Dramatic Cable Reduction

More Efficient Power and Cooling

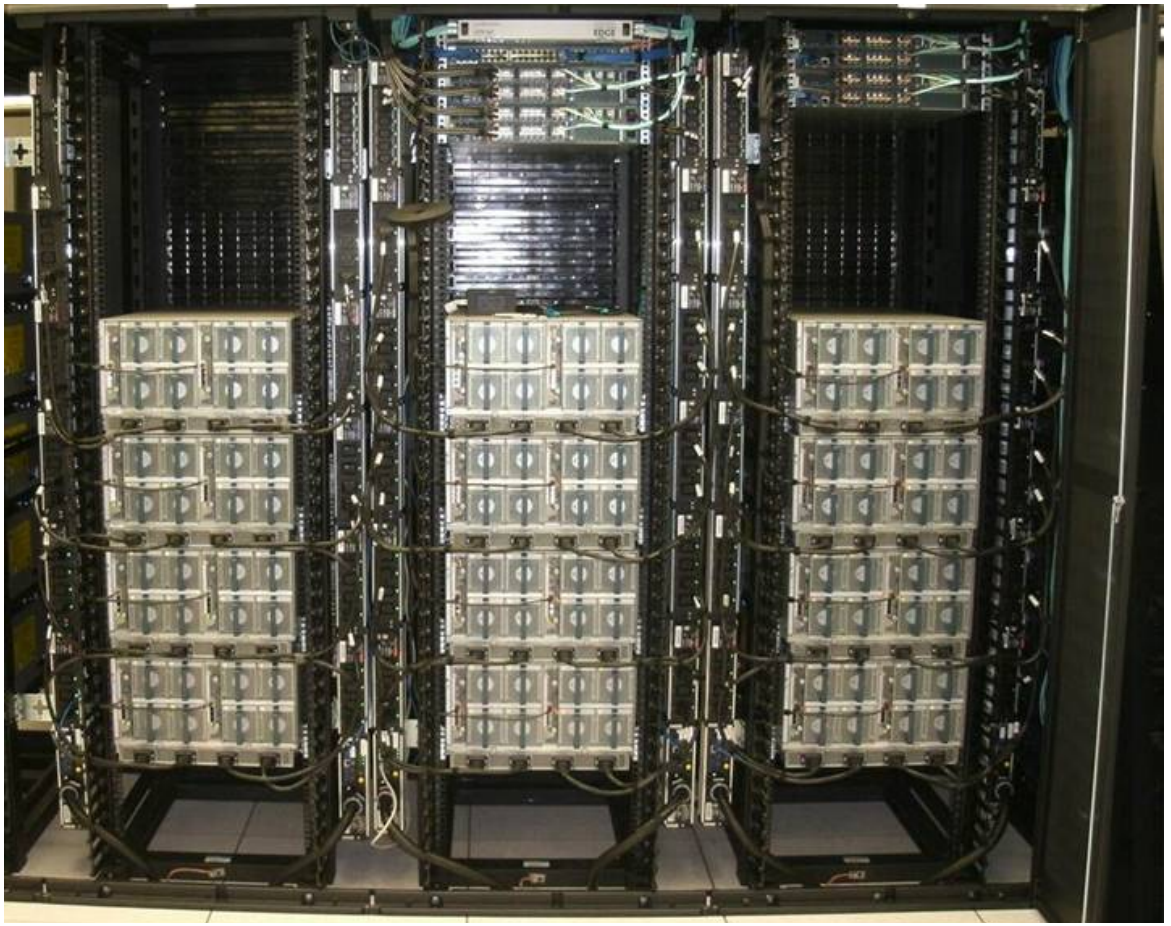
Traditional Blade Server

Cisco Unified Computing System



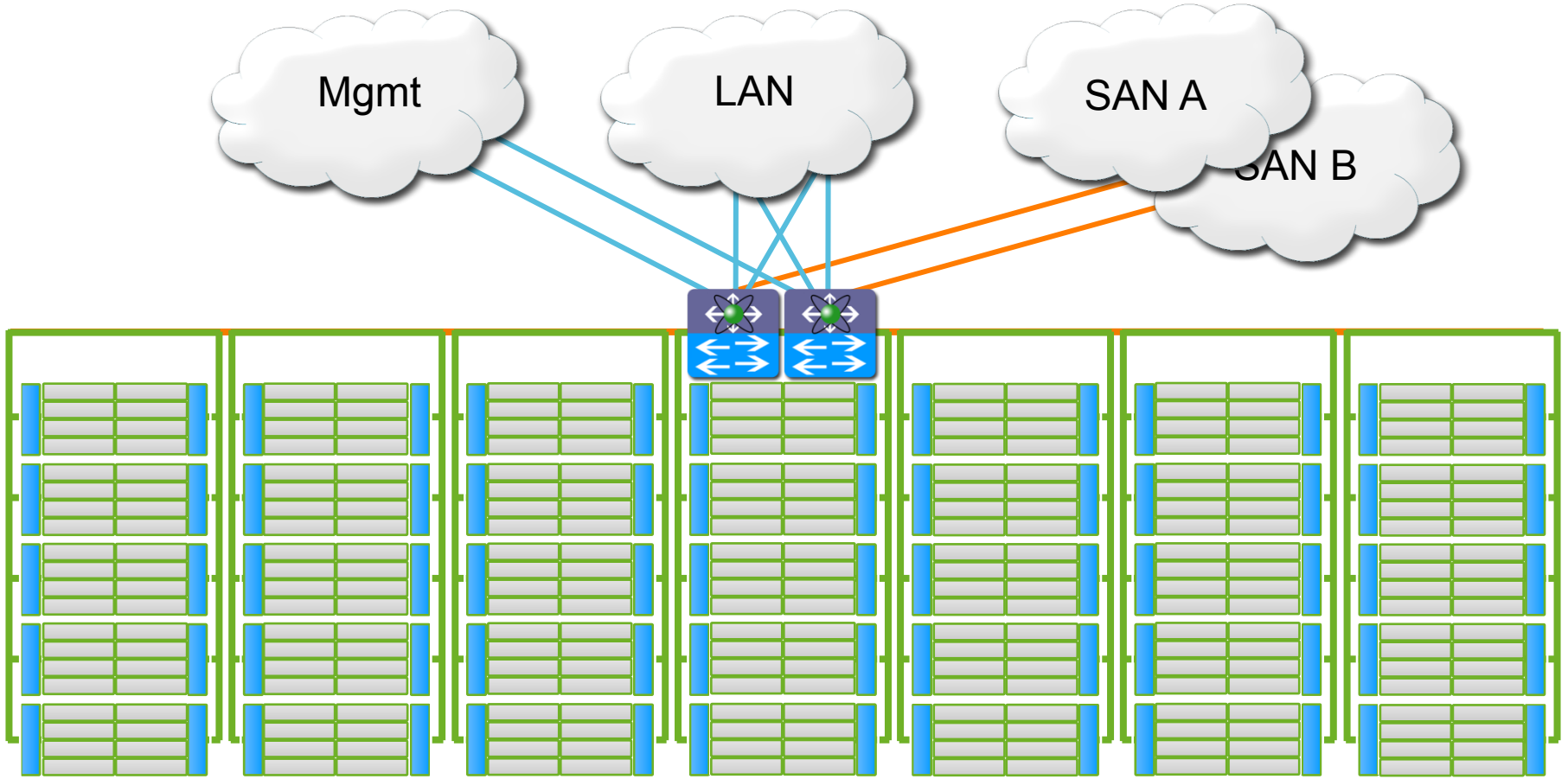
Unified Computing System In Action

Low cable count, wire once architecture



- Single UCS Systems
- 48x B230 blades, expandable in service to 96 blades

Efficient Scaling of Desktop Virtualization



- Single, scalable integrated system up to **320** blades
- Network and compute virtualization
- Dynamic resource provisioning

Zero Touch Integration

Decouple Complexity & Scale

Physical Inventory
Name: UCS 12
Class: System
ID: 77449-32
Chassis: 1
- IOM 1: UCS 2104
- IOM 2: UCS 2104
- Blade slots occupied: 8

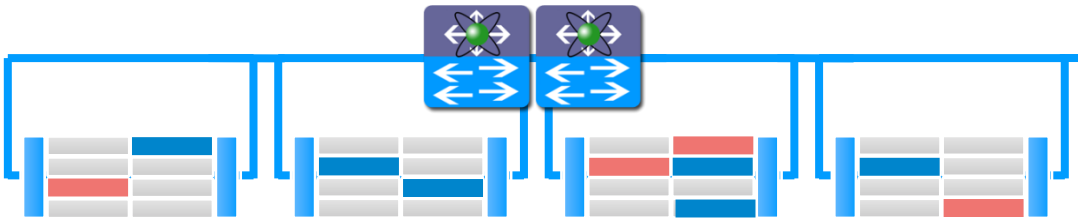
Chassis: 2
- IOM 1: UCS 2104
- IOM 2: UCS 2104
- Blade slots occupied: 8

Chassis: 3
- IOM 1: UCS 2104
- IOM 2: UCS 2104
- Blade slots occupied: 8

Chassis: 4
- IOM 1: UCS 2104
- IOM 2: UCS 2104
- Blade slots occupied: 8

Chassis: 5
- IOM 1: UCS 2104
- IOM 2: UCS 2104
- Blade slots occupied: 8

- Increase capacity, not complexity
- New equipment self integrates



Name: UCS 5108
Class: Chassis
ID: 234222-33
IOM 1: UCS 2104
IOM 2: UCS 2104
Blade slot occupied: 8
Fans: 8

Zero Touch Integration

Decouple Complexity & Scale

Physical Inventory
Name: UCS 12
Class: System
ID: 77449-32
Chassis: 1
- IOM 1: UCS 2104
- IOM 2: UCS 2104
- Blade slots occupied: 8

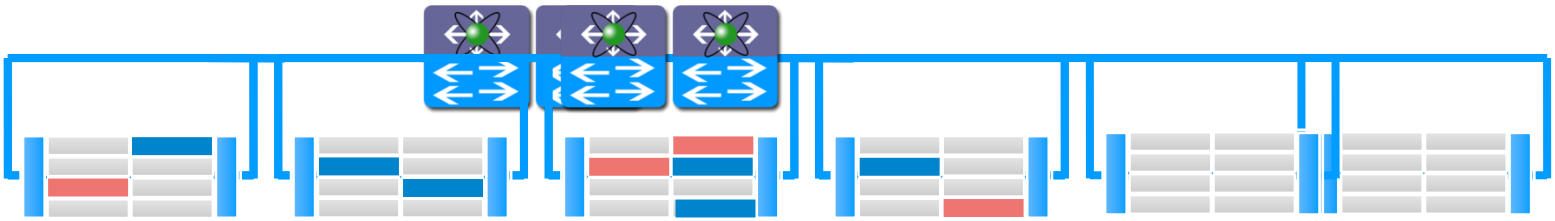
Chassis: 2
- IOM 1: UCS 2104
- IOM 2: UCS 2104
- Blade slots occupied: 8

Chassis: 3
- IOM 1: UCS 2104
- IOM 2: UCS 2104
- Blade slots occupied: 8

Chassis: 4

Policy Inventory
Service Profile: Default 1
Service Profile: HR-App1
- Blade slots occupied: 8

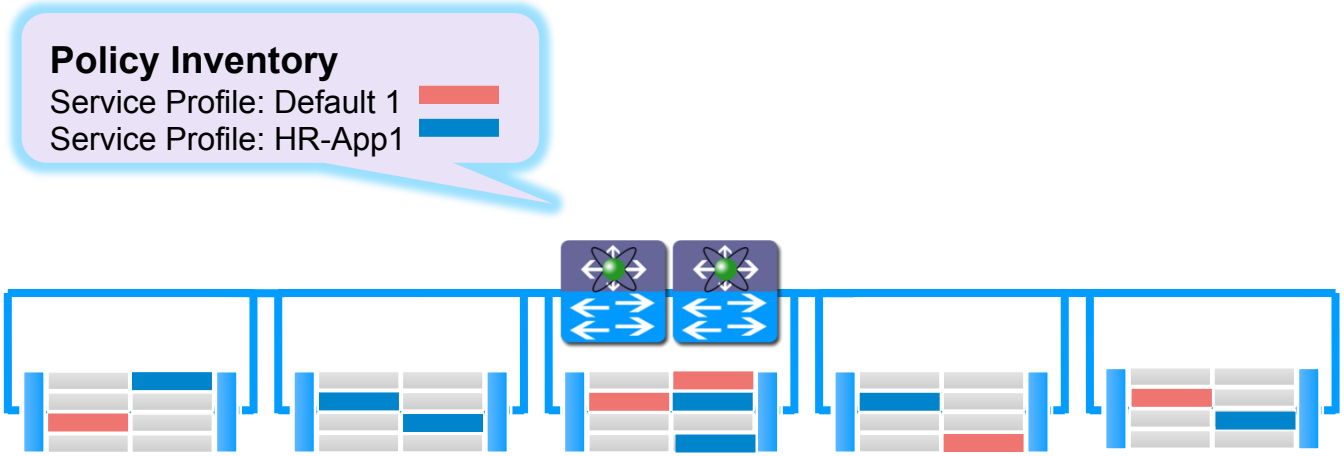
- Increase capacity, not complexity
- New equipment self integrates
- Inventory & status updated



Zero Touch Integration

Decouple Complexity & Scale

- Increase capacity, not complexity
- New equipment self integrates
- Inventory & status updated
- Immediately apply existing policies



Innovating with Embedded Unified Management

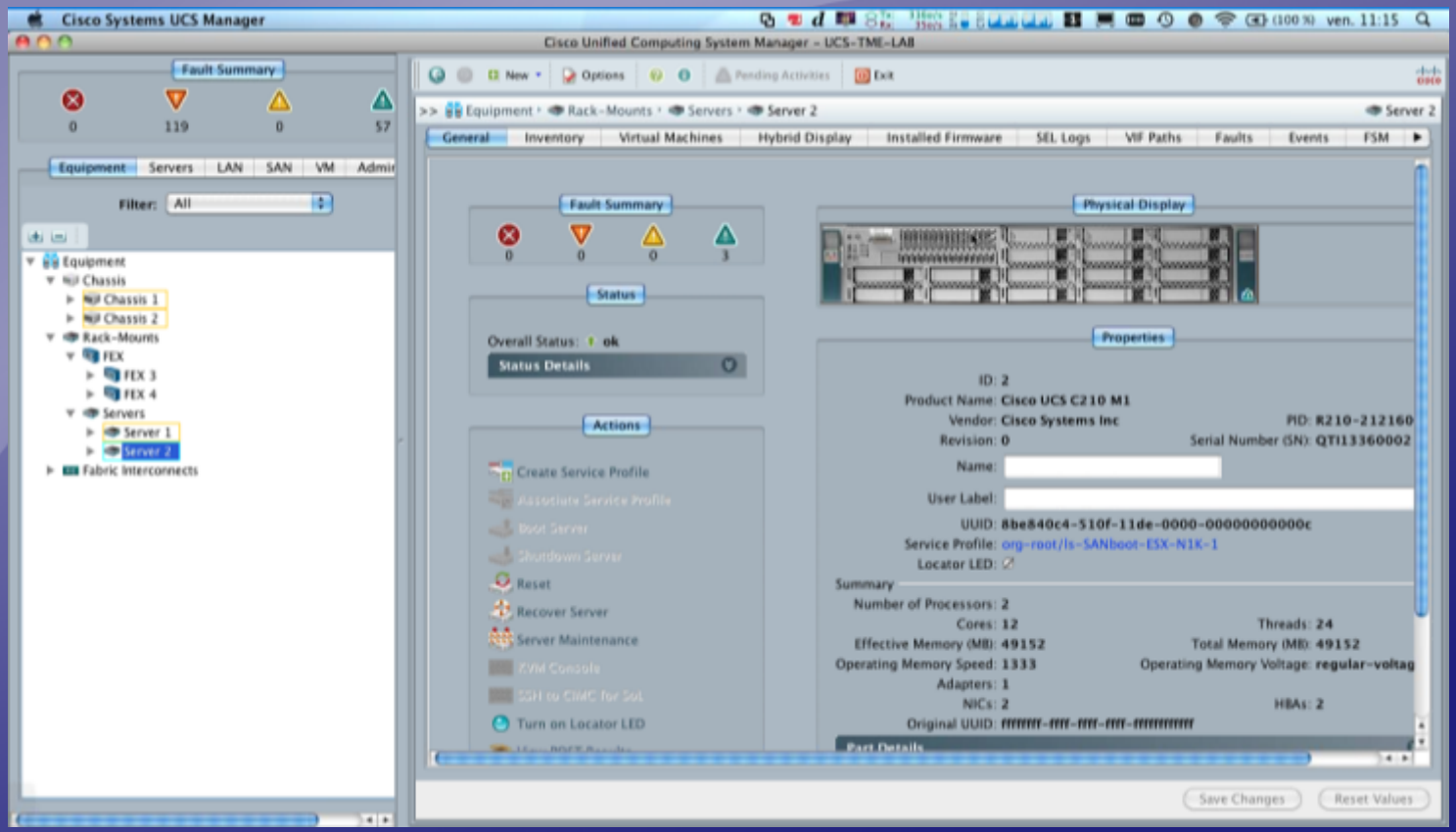
Reduced Points of Management

- **Unified Management Domain**
  - Automatic discovery
  - Dynamic Provisioning
- **Building Blocks of Resources for rapid provisioning**
- **Simplify infrastructure management for datacenters**

Service Profile: HR-App1
Network: HR-VLAN
Network QoS: High
MAC: 08:00:69:02:01:FC
WWN: 20:65:32:25:B5:00:A4:28
BIOS: Version 1.03
Boot Order: SAN, LAN

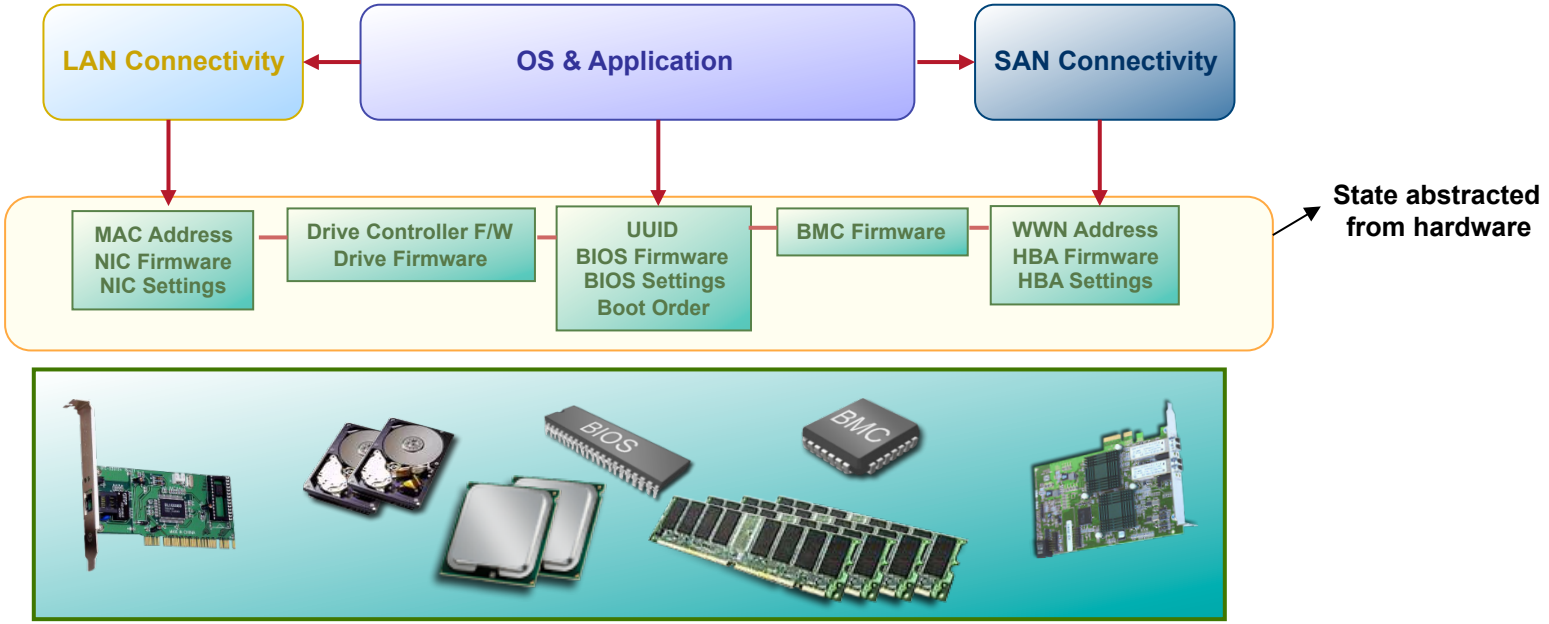
Single-click configuration of LAN, SAN and firmware parameters

Embedded Unified Management



- Integrated Management of blades and rack mount servers
- Enables stateless computing via Service Profiles
- Efficient scale: Same effort for 1 or *N* blades
- APIs for integration with new and existing data center infrastructure

UCS Service Profiles
Hardware "State" Abstraction



- Separate firmware, addresses, and parameter settings from server hardware
- Separate access port settings from physical ports
- Physical servers become interchangeable hardware components (stateless)
- Easy to move OS & applications across server hardware

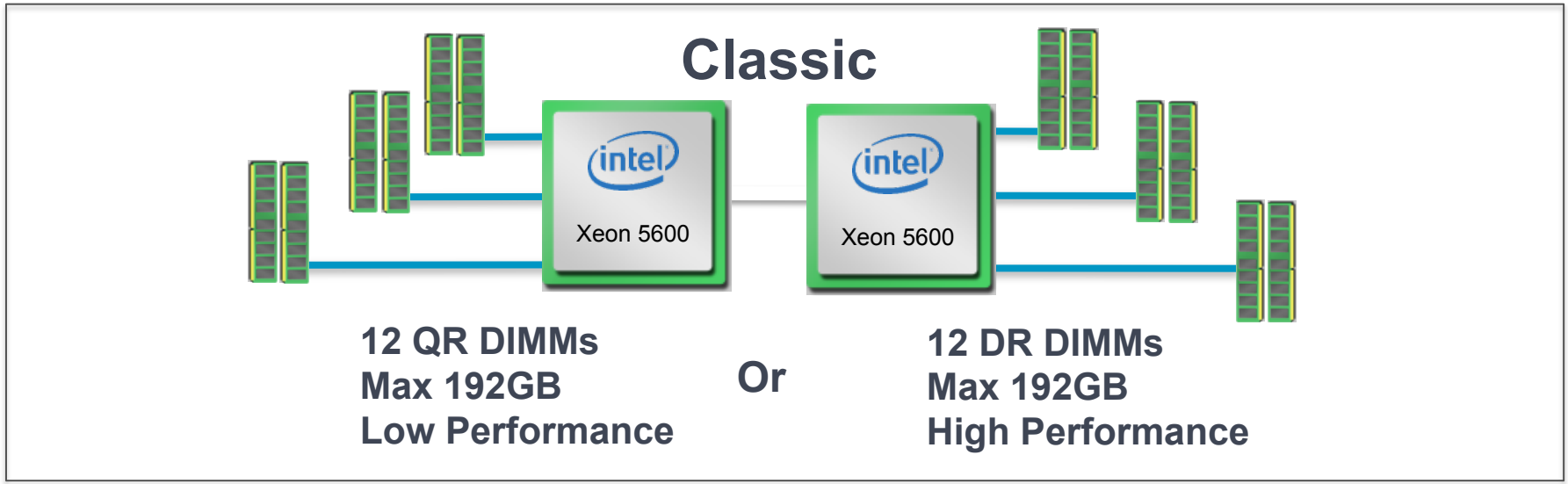
Innovating with Service Profiles
Decouple Complexity and Scale

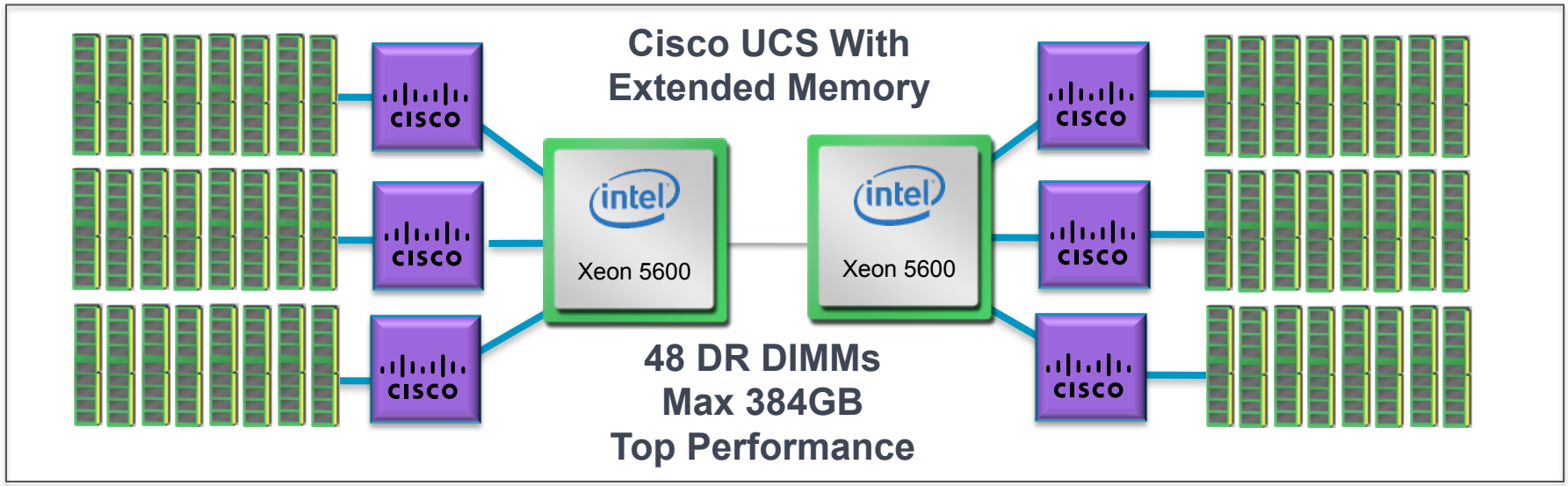
- Massive scalability made simple
- Wire-once, integrated, redundant system
- In advance creation of policies from templates
- New equipment self integrates
- Inventory & status automatically updated
- Immediately apply existing policies

Service Profile: HR-App1
Network: HR-VLAN
Network QoS: High
MAC: 08:00:69:02:01:FC
WWN: 20:65:32:25:B5:00:A4:28
BIOS: Version 1.03
HDD controller firmware: 1.1
Boot Order: SAN, LAN

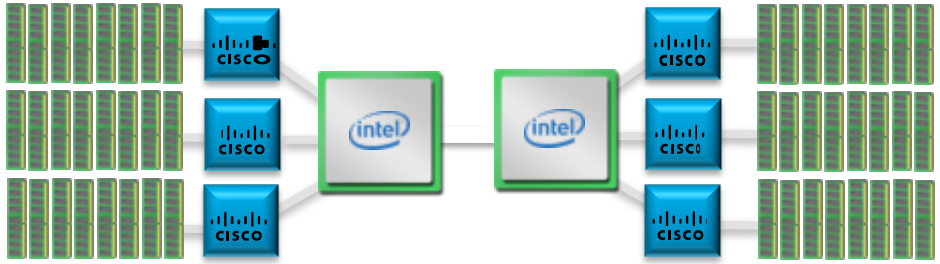
Policy Inventory
Service Profile: Default 1
Service Profile: HR-App1

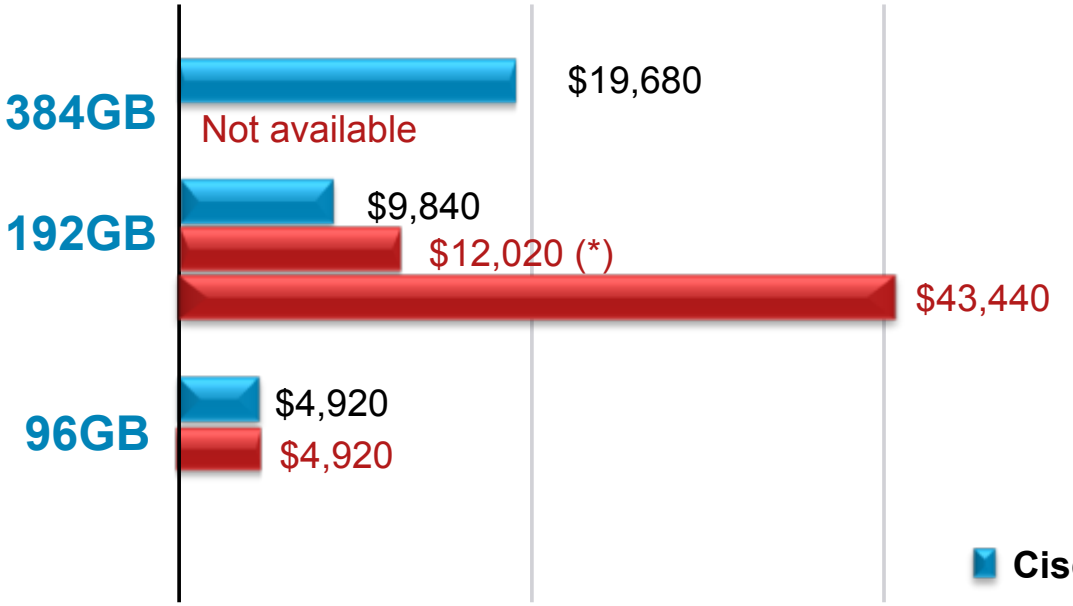
Innovating with Extended Memory
Low Cost Large Memory Configurations





Potential Savings – Extended Memory





(*) 16GB Quad Rank DIMMs operate at only 800MHz

Cisco Extended Memory Technology allows a cost-effective 4x scalability in memory with popular Intel X5600 Westmere processors and industry standard DDR3 DIMMs

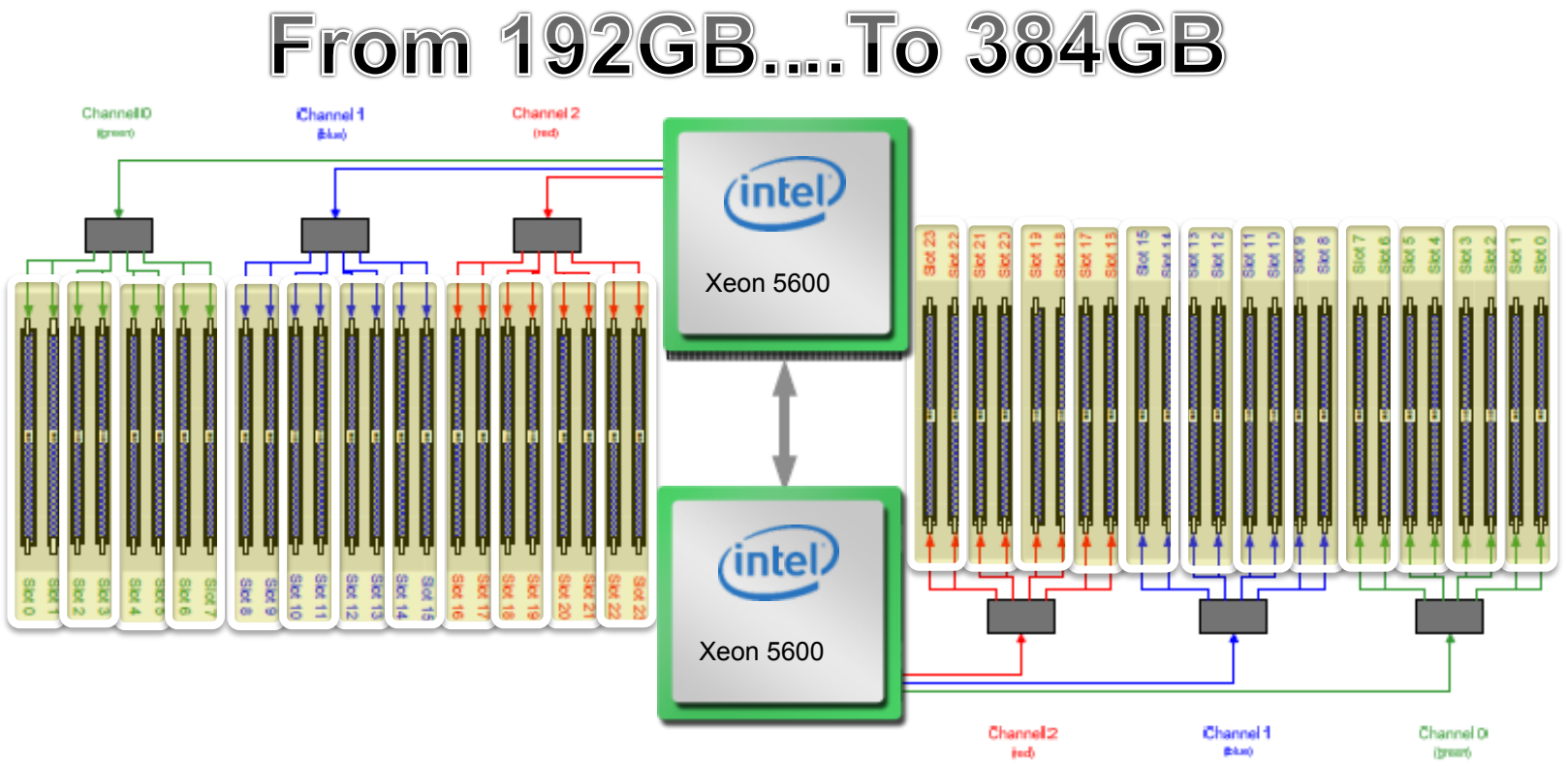
High speed memory access @ 1333MHz up to 384GB

Transparent to the Operating System and Hypervisor: no change needed

Savings on licenses, power

Cisco Extended Memory Architecture

UCS B250 2S X5600 blade server layout



- Scale memory by simple addition of more 8GB DIMMs
- Investment protection, no rip and replace

UCS Compute Options

Blade

B200 M2
2-Socket Intel 5600, 2 SFF Disk, 12 DIMM

B250 M2
2-Socket Intel 5600, 2 SFF Disk, 48 DIMM

B230 M2
2-Socket Intel E7-2800, 2 SSD, 32 DIMM

Updated

B440 M2
4-Socket Intel E7-4800, 4 SFF Disk, 32 DIMM

Updated

Rack Mount

C200 M2
2-Socket Intel 5600, 4 Disks, 12 DIMM, 2 PCIe 1U

C210 M2
2-Socket Intel 5600, 16 Disks, 12 DIMM, 5 PCIe 2U

C250 M2
2-Socket Intel 5600, 8 Disks, 48 DIMM, 5 PCIe 2U

C260 M2
2-Socket Intel E7-2800, 16 Disks, 64 DIMM, 6 PCIe 2U

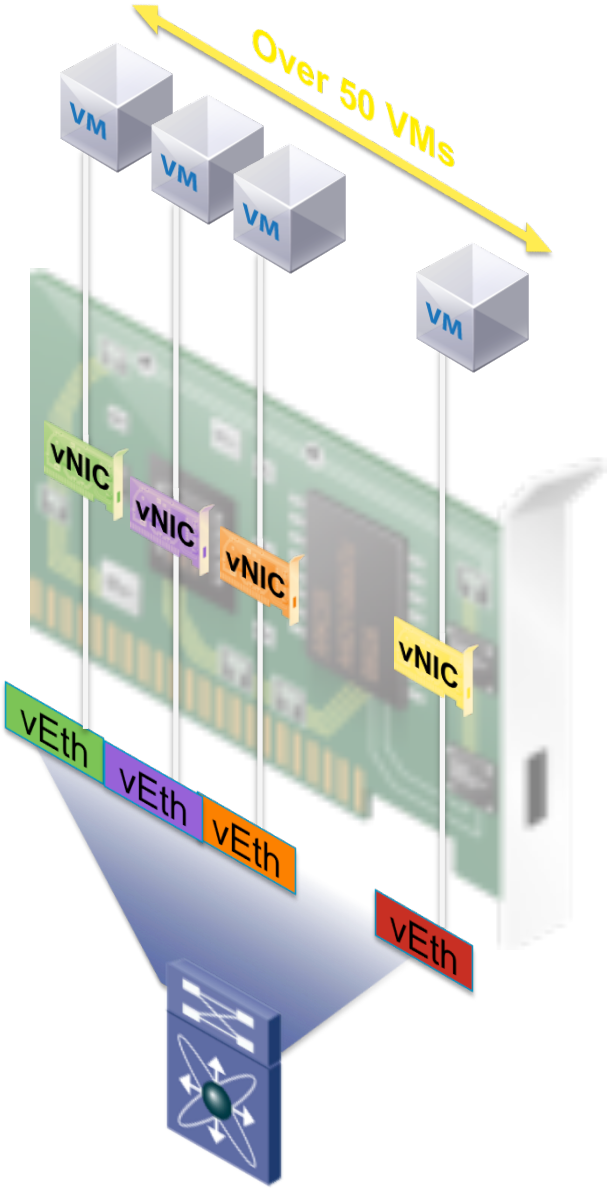
New

C460 M2
4-Socket Intel E7-4800, 12 Disks, 64 DIMM, 10 PCIe 4U

Updated

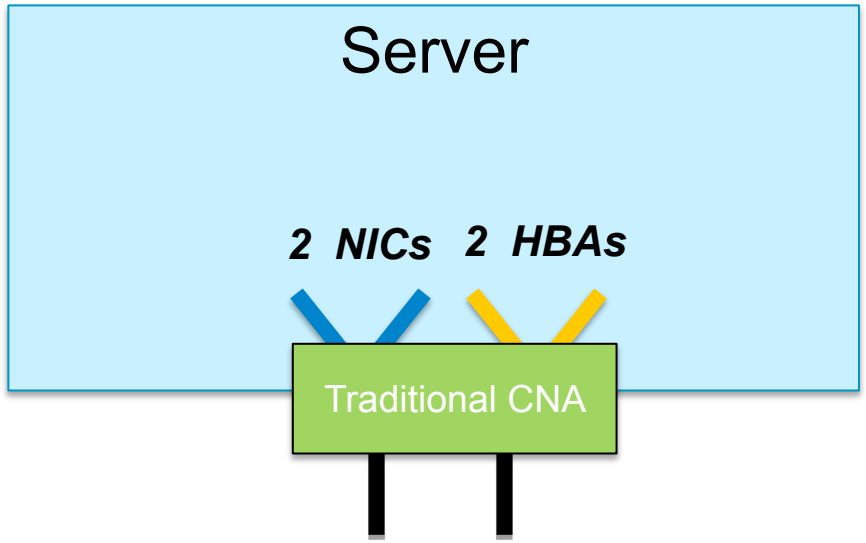
Introducing the Cisco Virtual Interface Controller

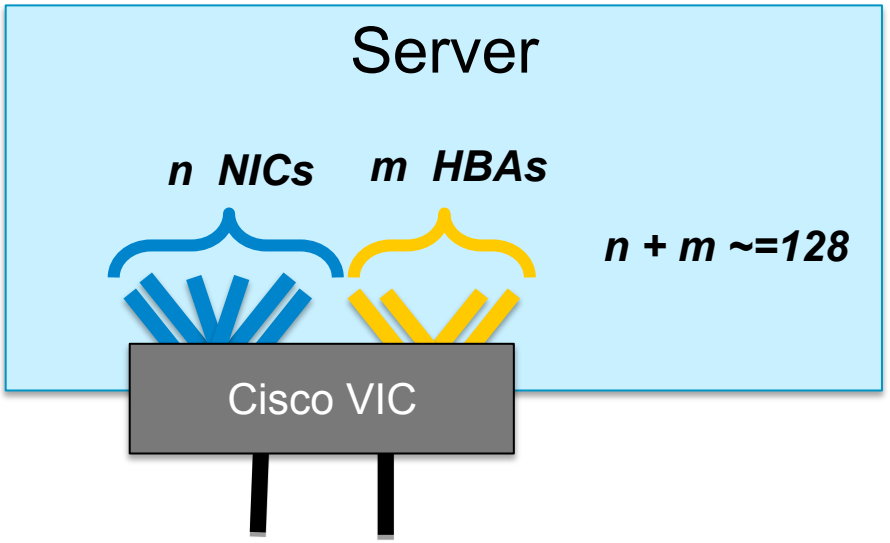
- Converged Network Adapter designed for both single-OS and VM-based deployments
  - Virtualize in hardware
  - PCIe compliant
- 2 x 10GbE performance
- When used with Vmware, chose one of 3 deployment models
  - Multiple vNICs/vHBAs, PCIe virtualization
  - Bypass vSwitch to deliver VN-Link in hardware
  - VM Direct Path: bypass vSwitch and hypervisor for maximum performance



Cisco UCS VIC Overview

Multiple Separate Interfaces – Ideal for Certain Workloads

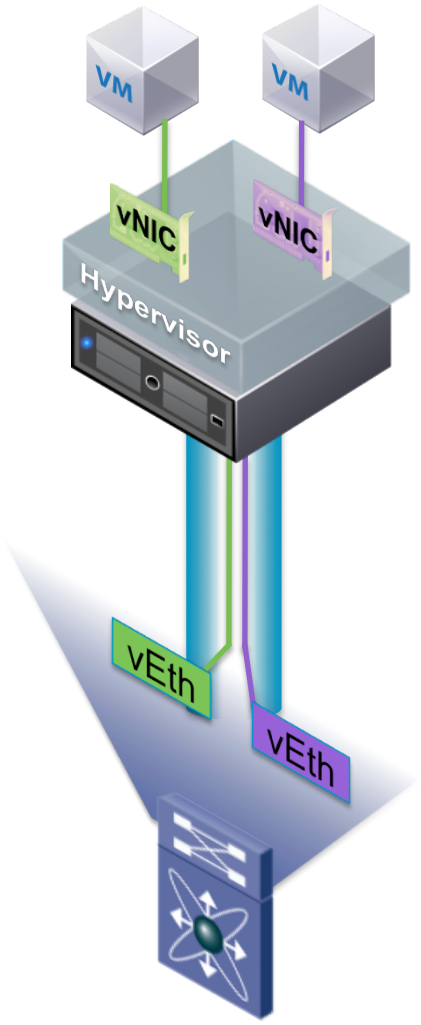




- Ideal for workloads/applications that recommend multiple separate interfaces
- Applicable to both Single OS (e.g. Windows/RHEL) or Virtualized (ESX) environments
- Virtualization achieved using classical PCIe devices (no special OS support)
- CPU offload with VN-Link in Hardware and Hypervisor Bypass
- Integration with VMware vCenter

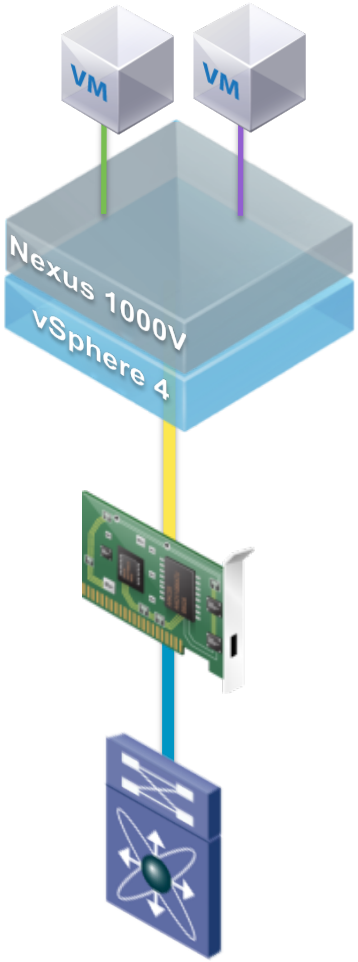
What is VN-Link?

- Extends the network to the virtualization layer
- Requires innovation within networking equipment
  - Virtual Ethernet Interface
  - Port Profiles
  - Virtual Interface mobility
- Solution Integrated with vSphere

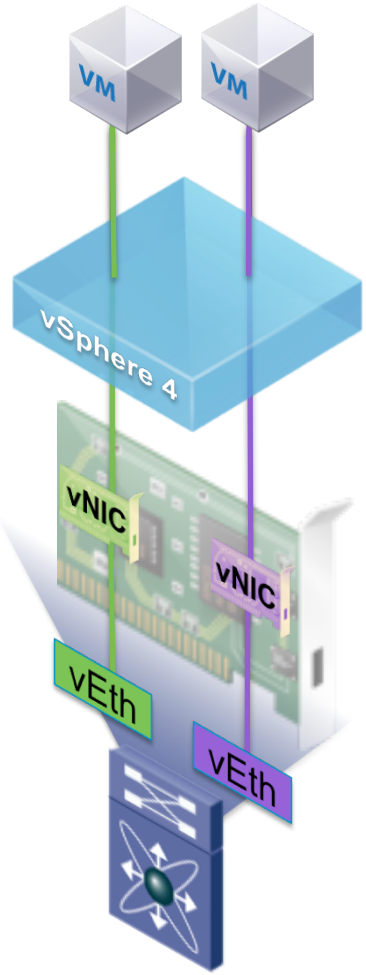


Options for VMware Environments

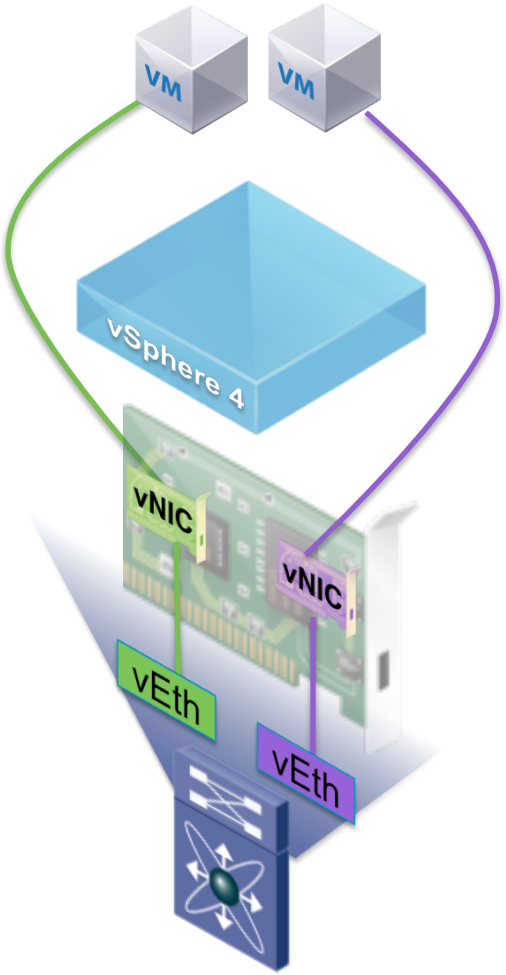
VN-link in Software



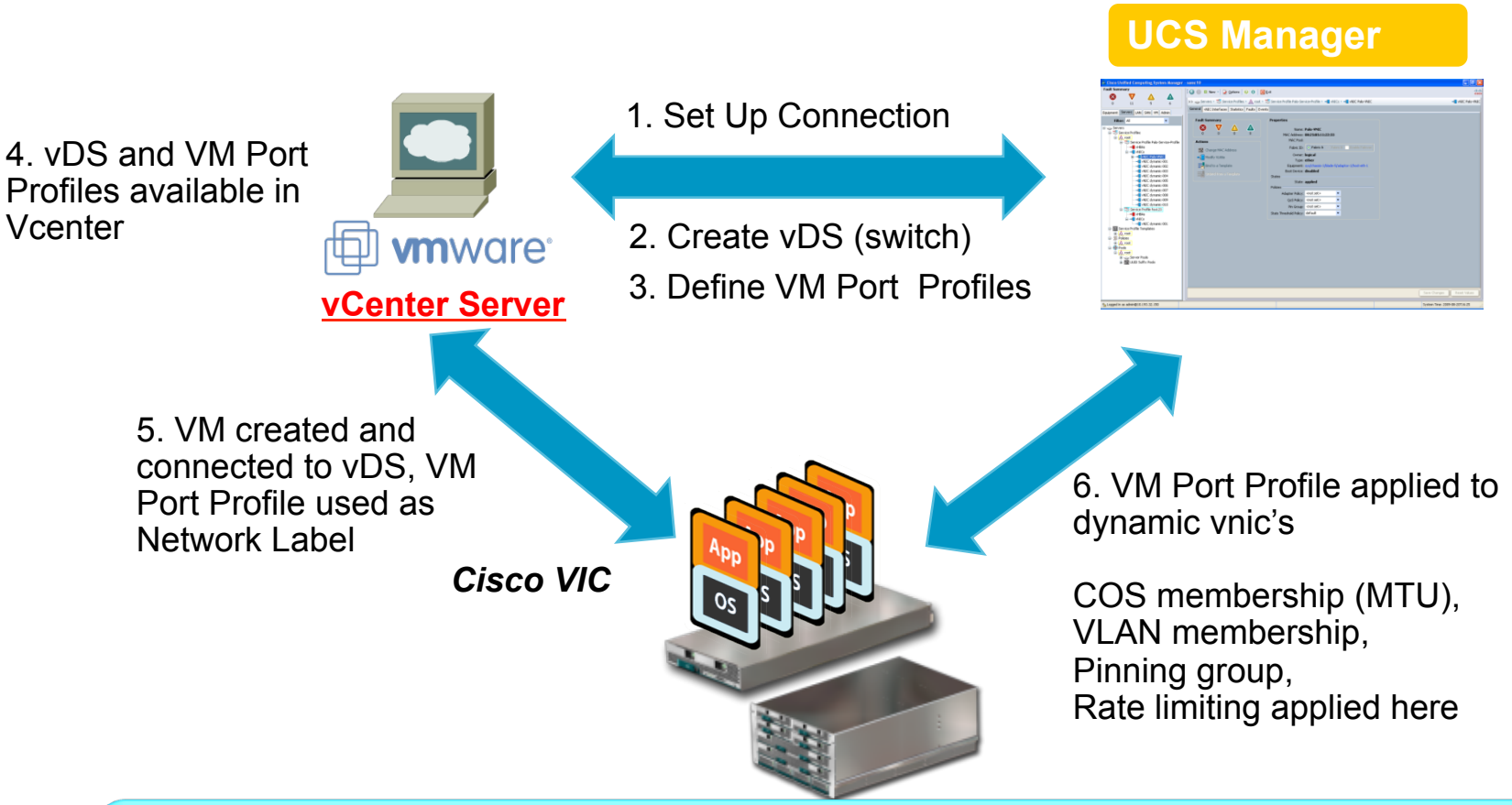
VN-Link in Hardware



VN-Link in Hardware with VM Direct Path



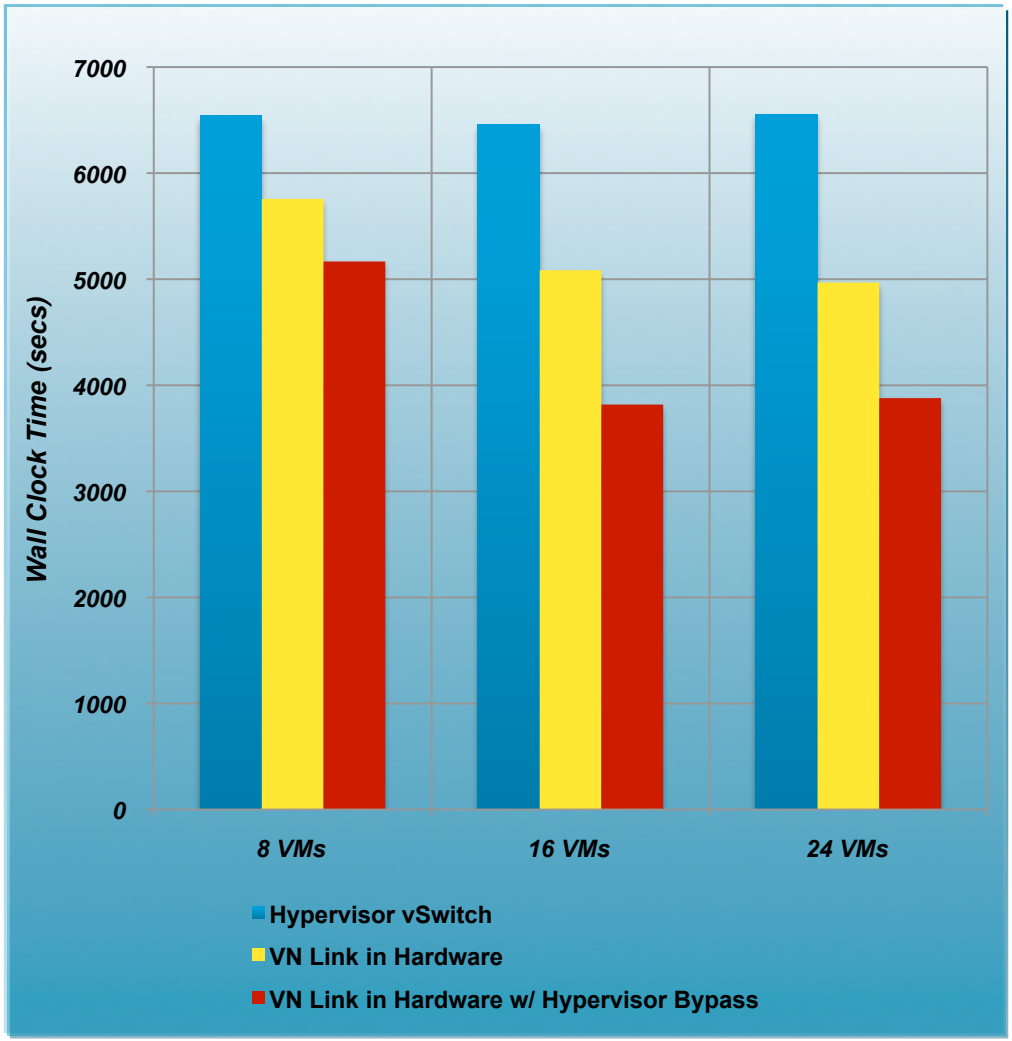
Simplify Management and Facilitate Collaboration
Huge OPEX Savings



Cisco Virtualized Adapter Benefits

- Tight integration with hypervisor mgmt tool (e.g. vCenter)
- Network admin sets up network policies, server admin applies them – facilitate collaboration between groups
- Clear demarcation of responsibility between diff groups

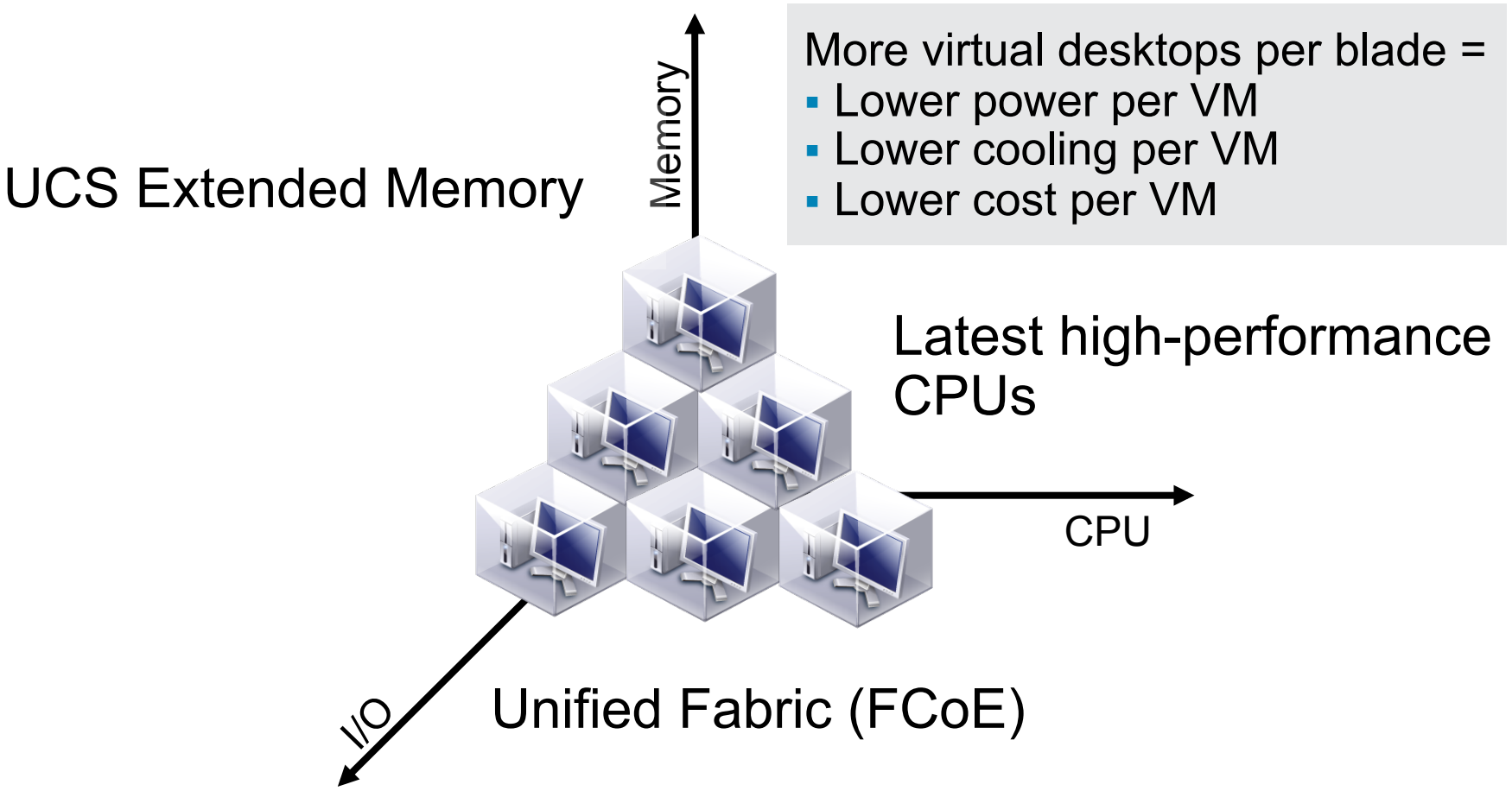
Cisco M81KR VIC – Time to Complete Task
(6TB TCP transfer – one way)



- Savings in Wall Clock Time reflect CPU cycles saved.
- VMDirectPath IRQs are serviced directly by the VM.
- In VN Link in Hardware mode IRQs are pinned to the VM. This avoids the overhead of steering traffic to VMs.
- 40% lower CPU cycles in VMDirectPath Mode ***(24 VMs)***
- 25% lower CPU cycles in VN Link in Hardware ***(24 VMs)*** compared to vSwitch.

Cisco Unified Computing System

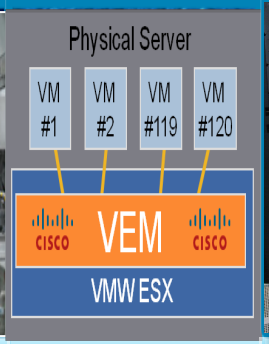
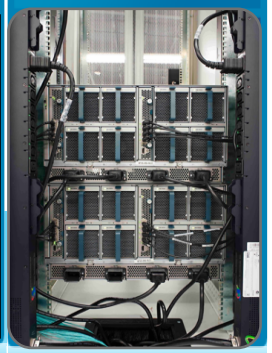
Cisco UCS is an ideal platform for Desktop Virtualization



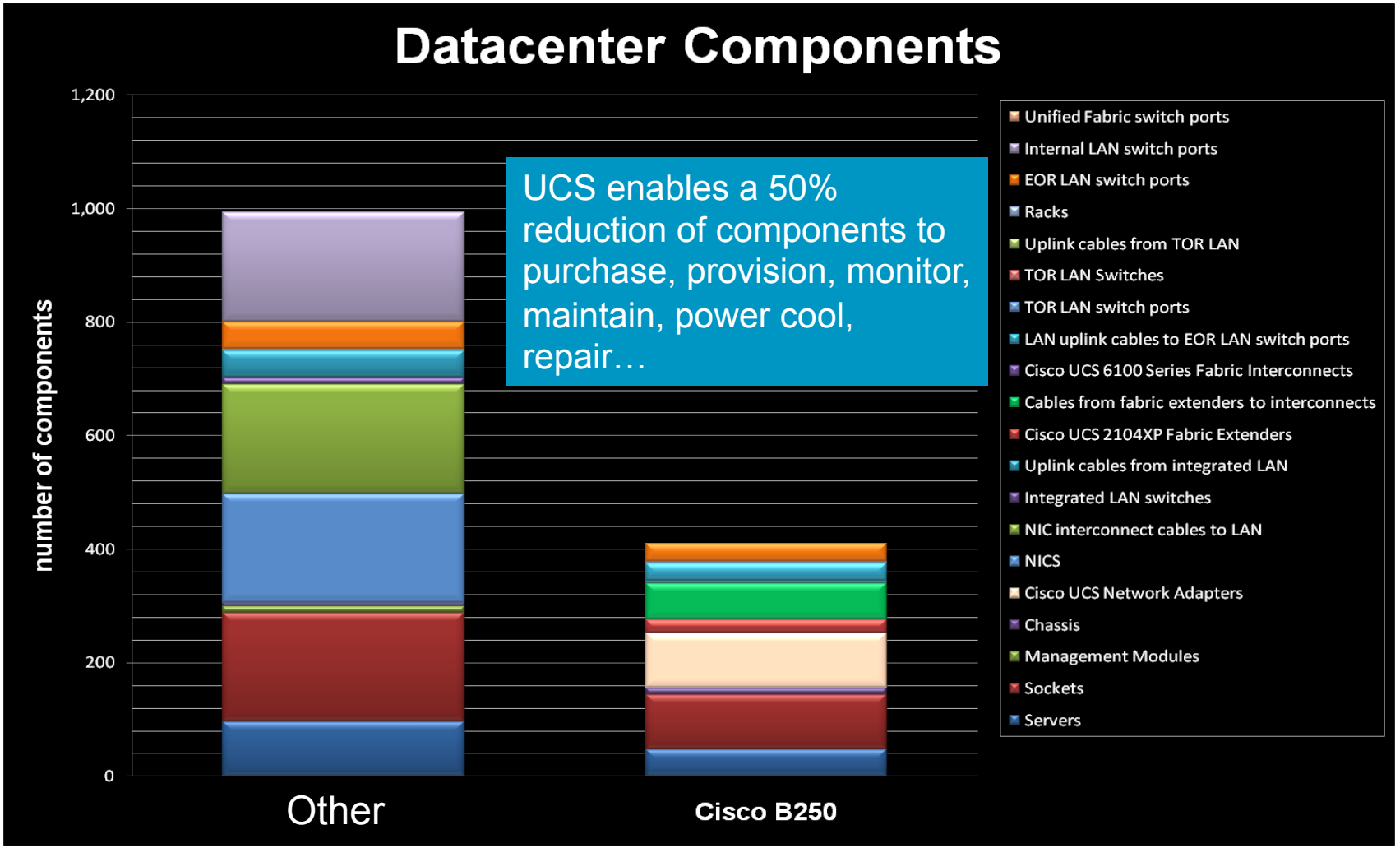
Cisco UCS – Do More with Less!

Cost Effective Desktop Virtualization

How do you achieve a 30% savings

x86 Servers	Infrastructure Elements	Power Consumption	VDI Instances per Server	Rack Space	Distribution Layer Ports	In Rack Cabling
						
50%	50%	24+%	100%	30%	30%	75%

Cisco Unified Computing System
Component Analysis for 5000 Virtual Desktops



96 Servers

48 Servers

Desktop Virtualization Reference Architecture

Validated Design

Design Validation and Best-Practices Sharing

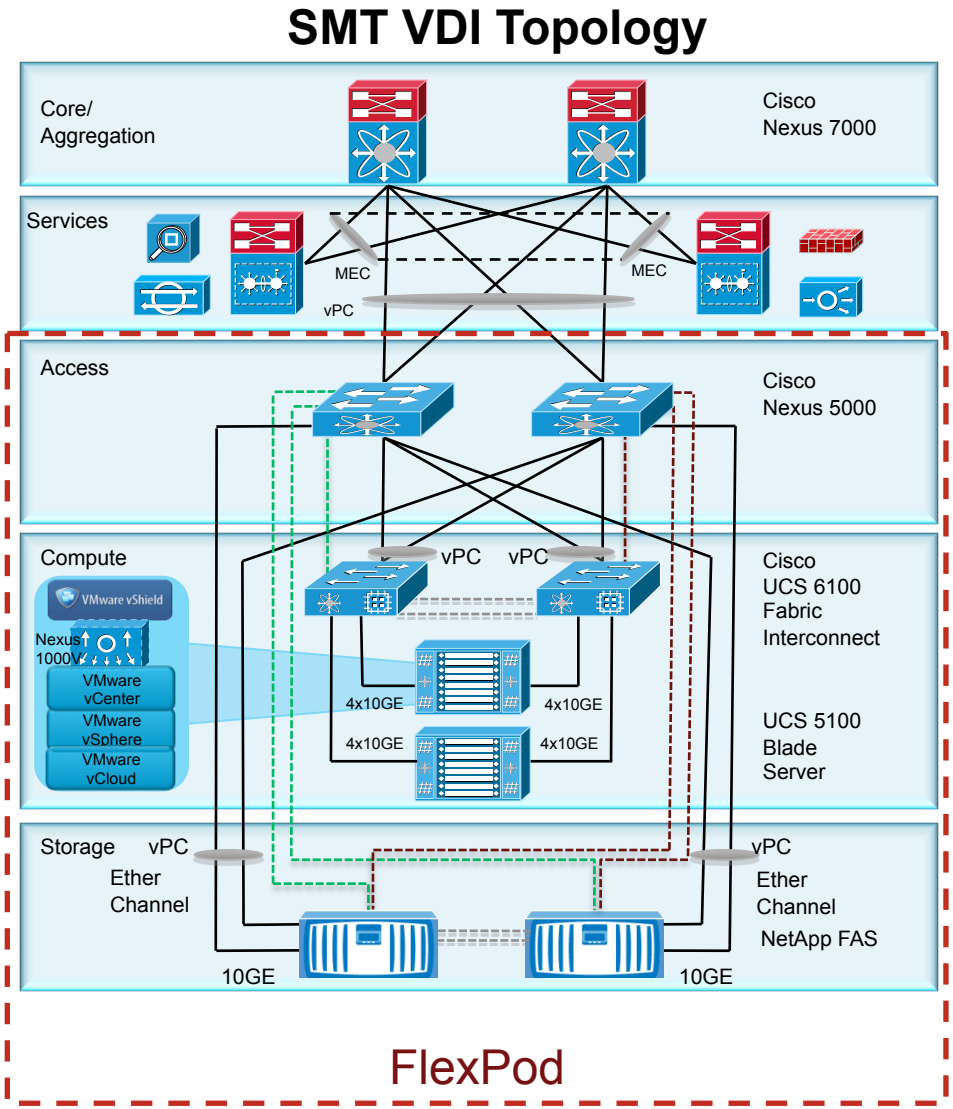
Committed to Your Success

- Best-practices design zone
- Operational best practices
- Application certification
- Cisco® IT shared experiences
- More…

http://www.cisco.com/go/vdi
http://www.cisco.com/go/dcdesignzone
http://www.cisco.com/go/optimizemyapp

Secure Multi Tenancy (SMT) VDI Topology

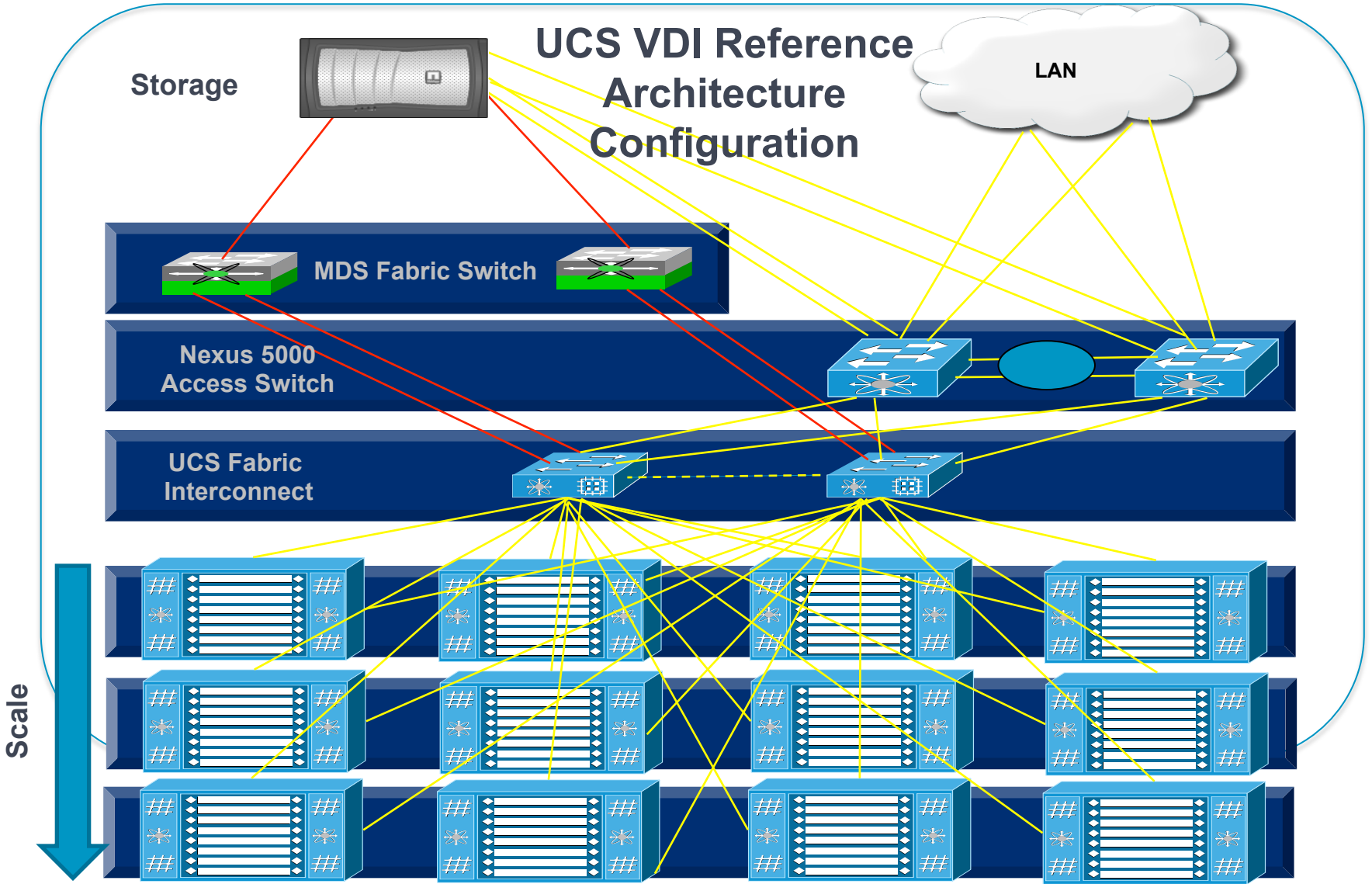
- SMT design offers:
  - Availability
  - Secure separation
  - Service assurance
  - Manageability
- Constituents
  - Cisco UCS server mix:
    - 14x B250-M2
    - 2x B200-M2
  - Cisco Nexus5000
  - NetApp FAS6080 with Flash Cache
  - Vmware View



Reference Architecture Design Principles

- Design includes a scalable building block that can be validated internally
- Run all the Desktop Virtualization infrastructure components in a Virtual Environment
- The resilient architecture is able to scale as well as maintain redundancy, maximum bandwidth and robustness.
  - 2-4 links from each IOM to FI
  - Two links to SAN
  - Multiple links to Network, vPC
  - Dual paths to Storage with dual storage controllers
- Architecture is based on the already established best practices for all the components

Scalable Reference Architecture

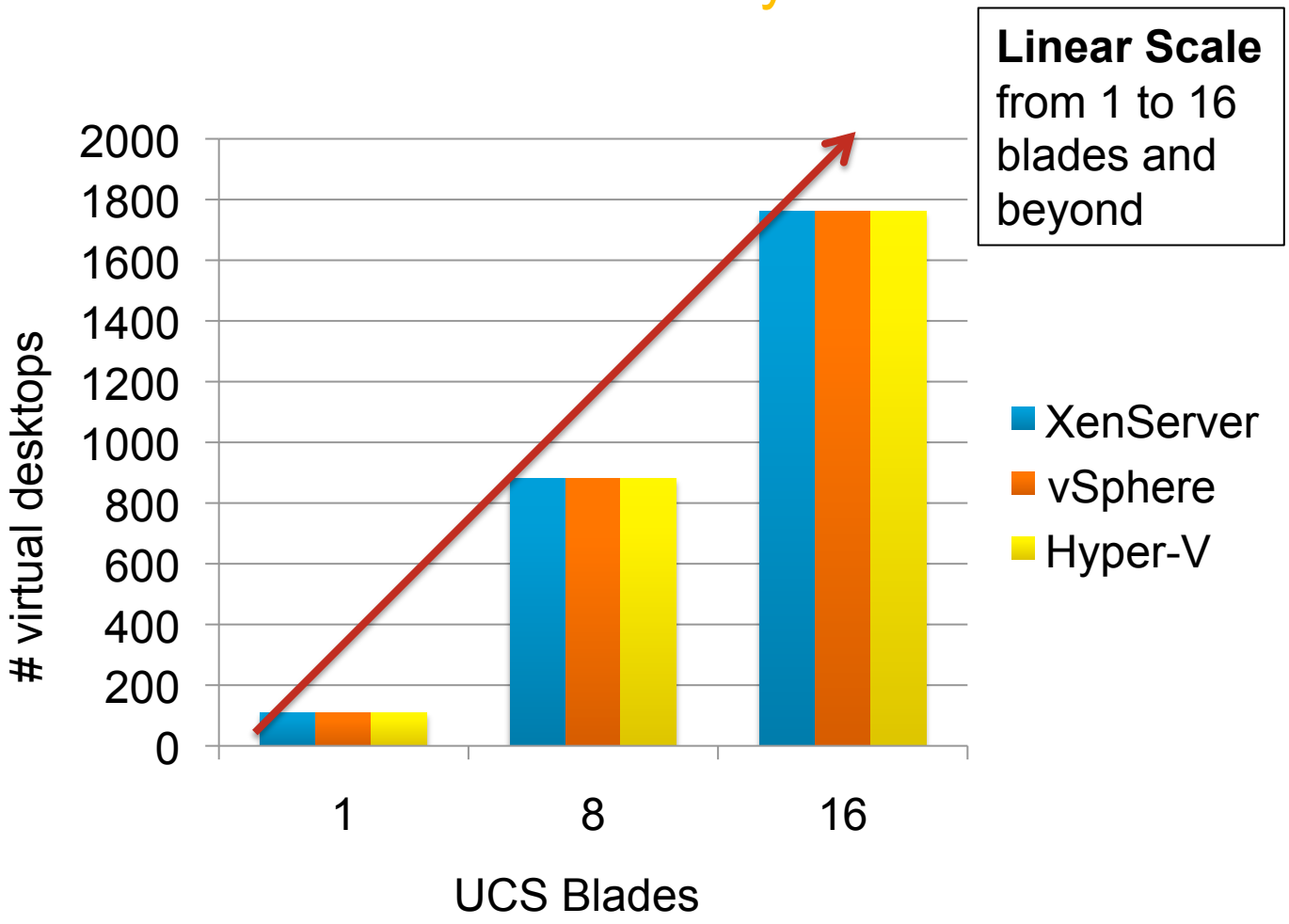


VMWare View Scalability Results

9.16 VMs/core with B250 and 192GB/memory

Desktop Profile
- Windows 7, 32bit
- 1.5GB RAM
- 1vCPU
- Write-back cache 3GB on NFS

UCS Blade Profile
- B250 M2
- 192GB Memory
- Dual Xeon 5680 CPU

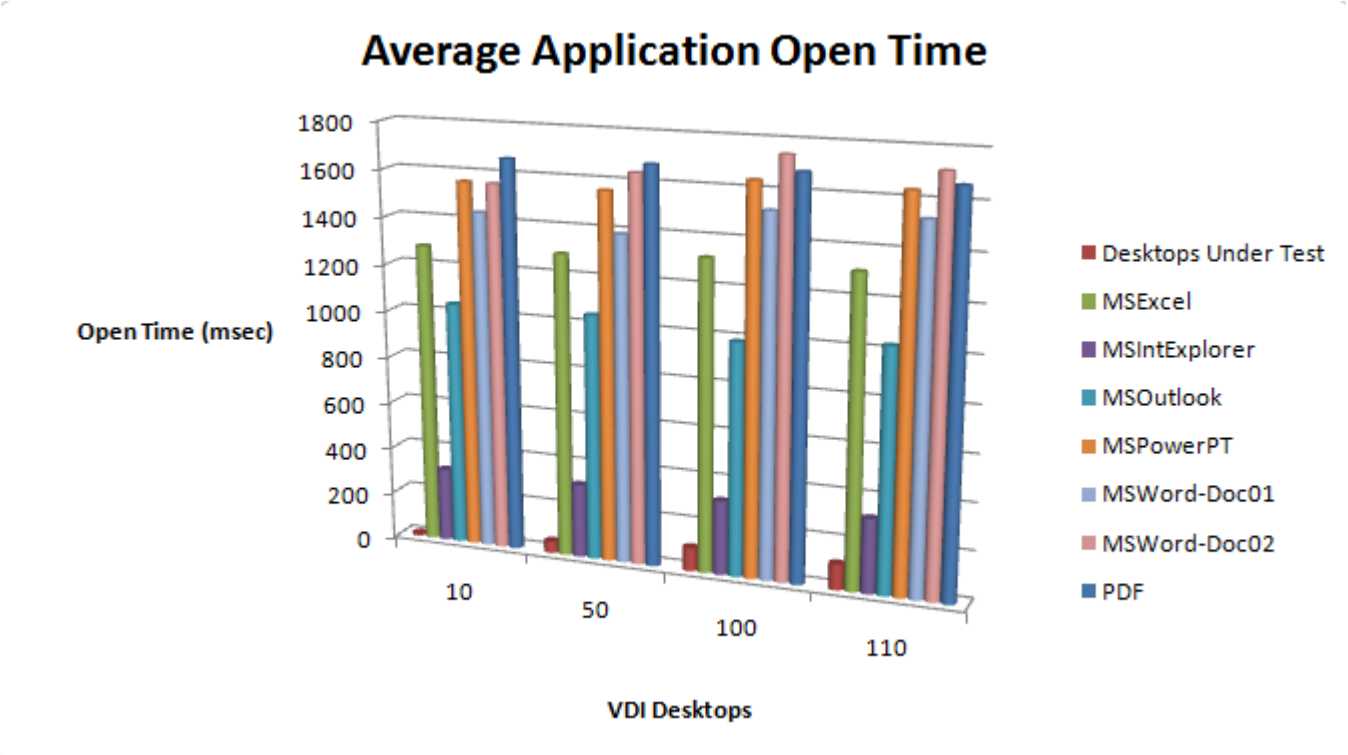


110 VM/Blade – Linear scalability

Application Responsiveness For VDI

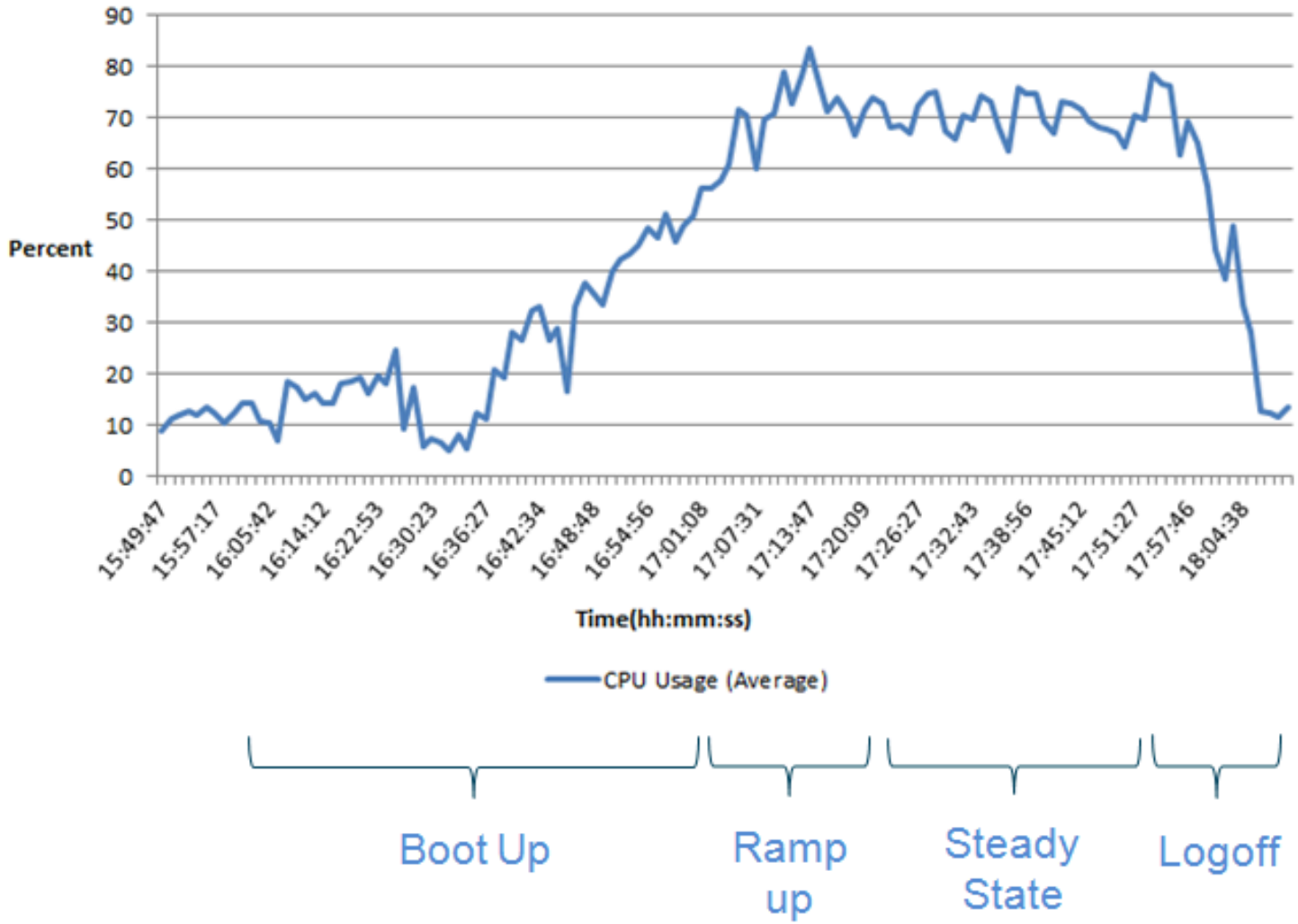
Single ESX Host - Average Application Open Times

- Open time deemed more important than Close times
- All open times below 2 seconds (2000 msec)



CPU utilization sample on a single blade

70% CPU utilization workload (steady state)



Memory Utilization (Blade with192G RAM)

Single ESX Host – NonKernel Memory Ultization

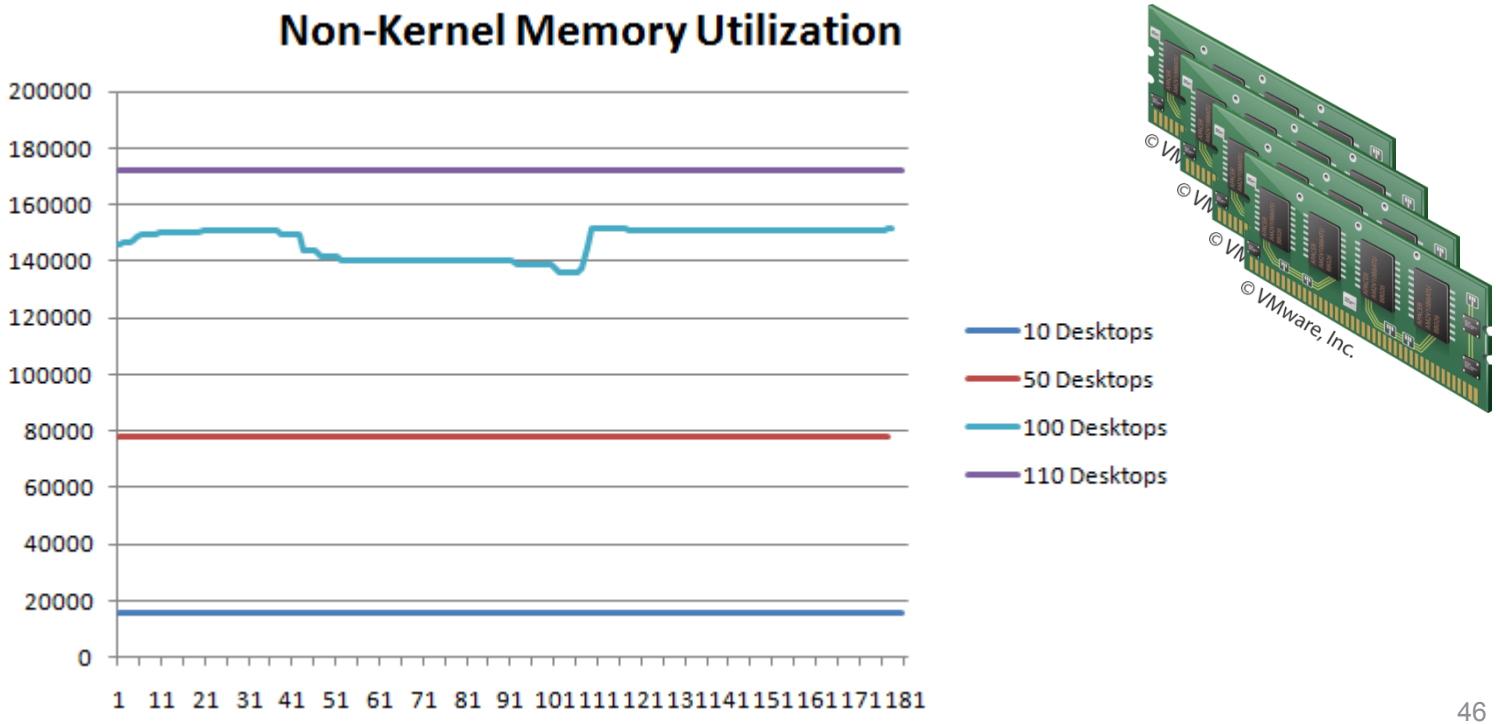
- VMkernel uses approximately 6% of available memory resources

  # of desktops/blade = (total system memory * 0.94)/(memory for one Win 7 desktop)

  Calculated # of desktops on the tested B250 M2 blade configuration:

  120.32 =(192GB * 0.94)(1.5GB)]

- No memory oversubscription exists at 110 desktops,
- VMware supports a ratio of up to 1.5 memory oversubscription (balooning kicks in)

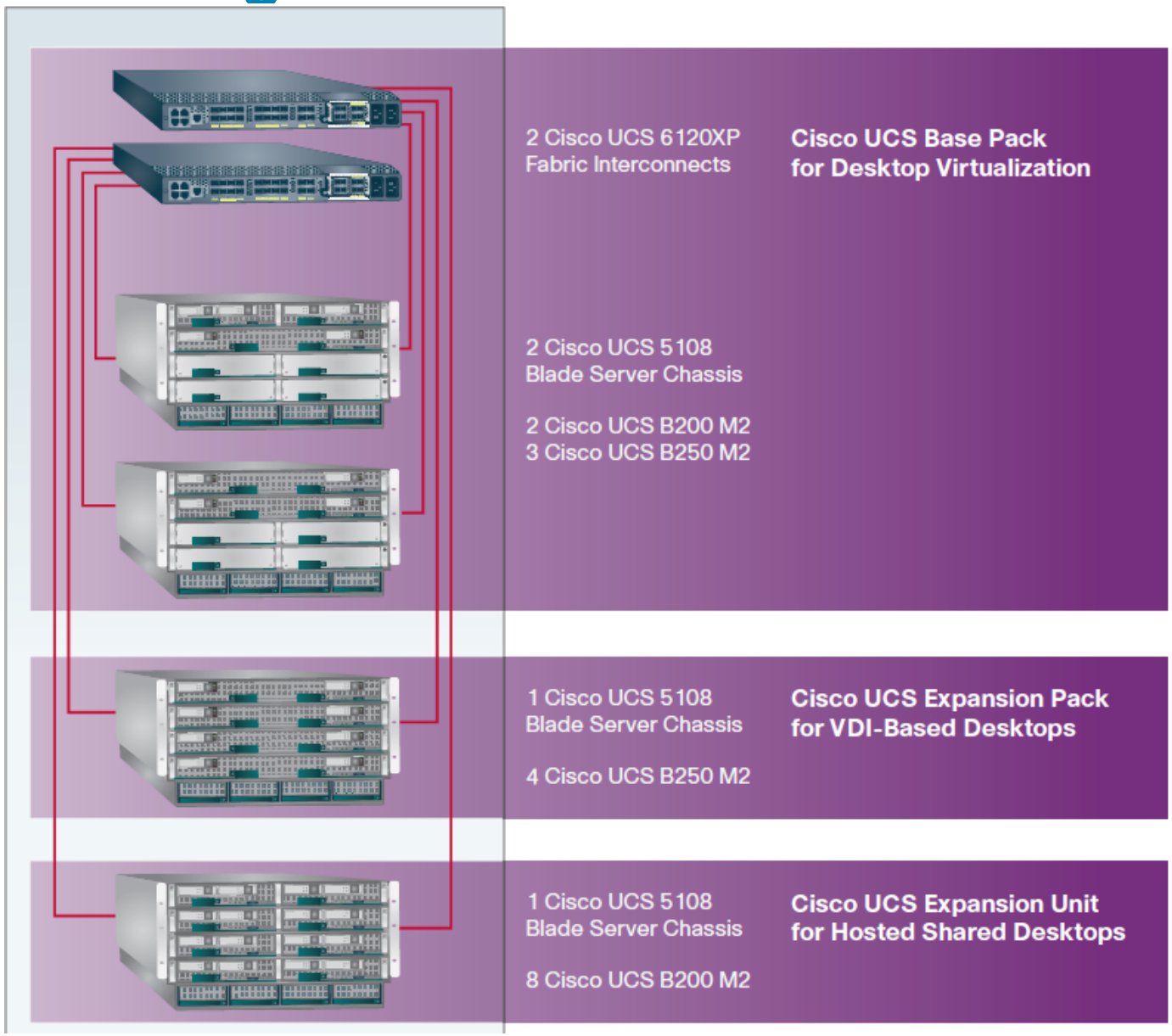


UCS Offer Strategy for Desktop Virtualization

Design for Ease to Deploy, Build to Scale

- Create a logical building block architecture for rapid time to deployment and easy scale
- Focused on VDI-Based Desktops and Hosted Shared Desktops
- Simple **entry** point for customers starting DV and need a base solution
  - Starter kit for proof of concept and Base installations
- Ability to **scale** these entry points with pre-defined, validated, expansion bundles
- Utilize a **unified joint support** for customer support of Compute, Virtualization, and Storage
- Designed to achieve a **full size** VXI architecture that encompasses both base and expansion bundles
  - Capable of scaling to thousands of desktops

UCS Package for VDI



References – Cisco UCS

- **Cisco UCS Home Page:**
  http://www.cisco.com/go/ucs
- **VDI: VMware View 4.5, Cisco UCS NetApp Design Guide**
  http://www.cisco.com/en/US/docs/solutions/Enterprise/Data_Center/Virtualization/ucs_view_netapp.html
- **UCS portal: application performance, benchmarks, interoperability**
  http://www.cisco.com/en/US/prod/ps10265/at_work_promo.html
- **Cisco Datacenter – Design Guides**
  http://www.cisco.com/en/US/netsol/ns743/networking_solutions_program_home.html
- **Cisco UCS – Design Guides**
  http://www.cisco.com/en/US/netsol/ns1071/networking_solutions_sub_program_home.html
- **Cisco UCS – Case Study**
  http://www.cisco.com/en/US/netsol/ns944/networking_solutions_customer_success_stories_list.html
- **Cisco on Facebook**
  http://www.facebook.com/Cisco

References – You Tube videos

- **Expanding UCS with new chassis**
  http://www.youtube.com/watch?v=RS231c_awFw
- **Closer Look to UCS chassis back view**
  http://www.youtube.com/watch?v=7H4ppd1VoT0&feature=related
- **Cisco UCS - Installing an OS**
  http://www.youtube.com/watch?v=Tk1xwifZAN4&feature=related
- **Cisco UCS - Configuration of Service Profiles**
  http://www.youtube.com/watch?v=RGoccyn7d4Y&feature=related
- **Configuring VMDirectPath IO with Cisco UCS and vSphere**
  http://www.youtube.com/watch?v=jmQ5Ej8r-aA&feature=related
- **Understanding Cisco UCS VNLink in Hardware**
  http://www.youtube.com/watch?v=f2pU9fvOU9g&feature=related
- **UCS Firmware**
  http://www.youtube.com/watch?v=jEMHTutl8To&feature=related

Summary

- Cisco UCS is a simple, resilient and robust architecture for deploying Desktop Virtualization
- Rapid provisioning with Cisco UCS Manager for ease of scale in minutes
- Linear scalability and performance from 100 to 1000's of desktops without a change in architecture
- Granular network control to optimize the experience of the desktop through QoS and policies
- Download the new CVD at Cisco.com/go/vdi and read by yourself for outstanding results

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