Cisco Connect

Praha, hotel Clarion
10. – 11. dubna 2013

Anatomy of Cisco Unified Computing System

T-VT4/ L3

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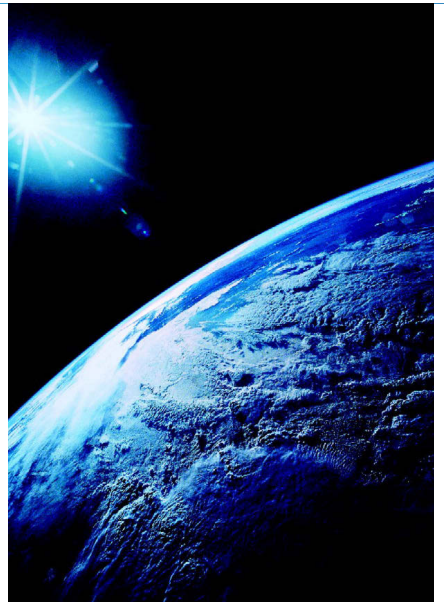
Luděk Šafář – EMC, System Engineer Manager



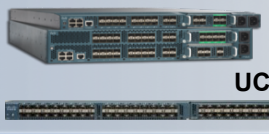
Building Blocks of Cisco UCS

An Integrated System Optimizes Data Center Efficiency

UCS Manager
- Embedded – Manages entire system
- 20 Chassis Scale (160 servers total including rack mounts)

UCS Fabric Interconnect – UCS 6100
- 20x 10GE Ports – 1 RU
- 40x 10GE Ports – 2 RU
- Ethernet or FC Expansion Modules

UCS Fabric Interconnect – UCS 6200
- 48x Unified Ports (Eth/FC) – 1 RU
- 96x Unified Ports (Eth/FC) – 2 RU
- 32/48x base and 16x expansion(s)



UCS Fabric Extender – UCS 2104
- 8x 10GE Downlinks to Servers
- 4x 10GE Uplinks to Fabric Interconnects

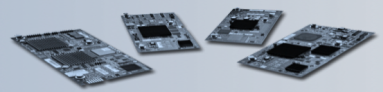
UCS Fabric Extender – UCS 2204/8
- 16/32x 10GE Downlinks to Servers
- 4/8x 10GE Uplinks to FIs

UCS Blade Server Chassis
- Flexible Bay Configuration
- Houses blades based on Industry-standard architecture

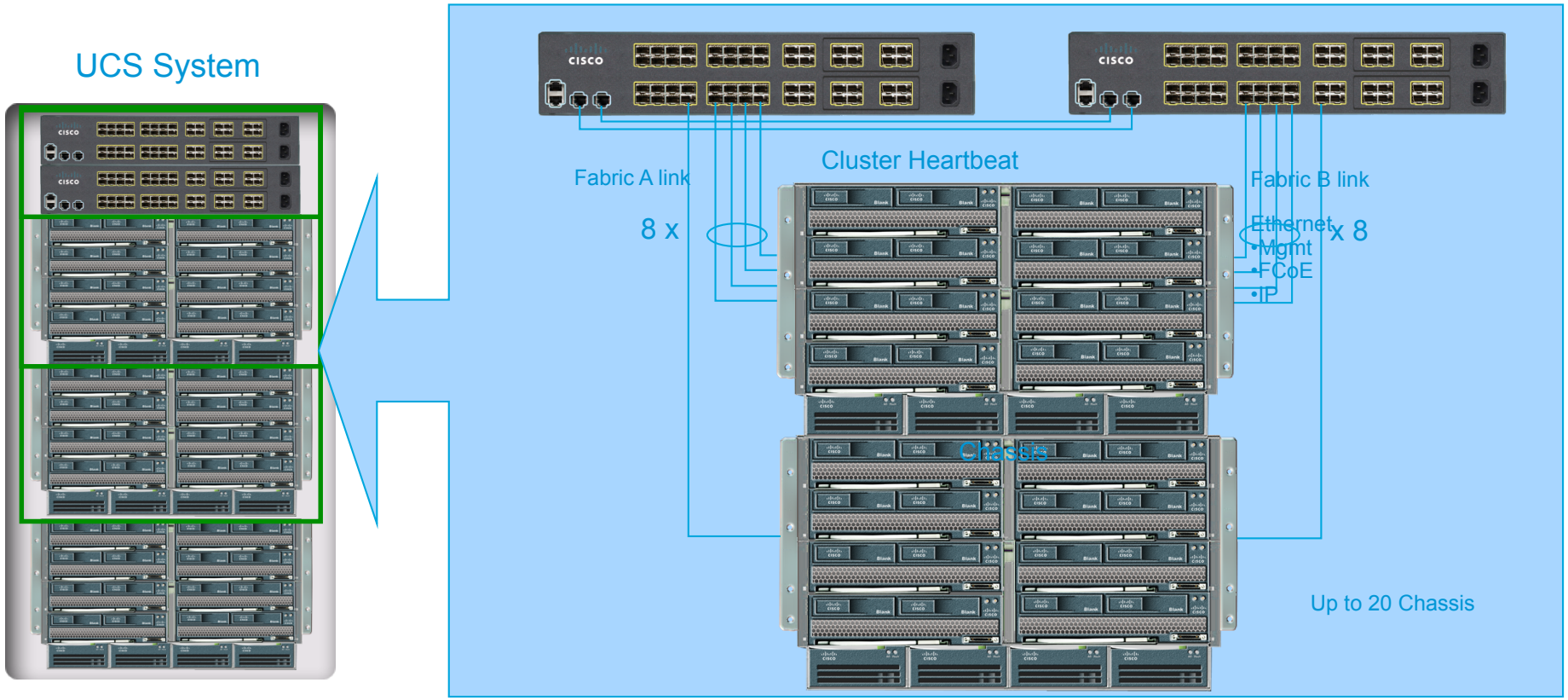
UCS Rack Servers
- Identical stateless model to UCS blades
- Additional PCIe/Disk options
- 1 RU / 2 RU / 4 RU Options

Adapters - M81KR VIC, M72KR, etc.
- Up to 2x 10GE ports
- M81KR: Up to 128 virtual interfaces
- 3rd party adapters (Qlogic, Emulex, Intel, Broadcom, etc)

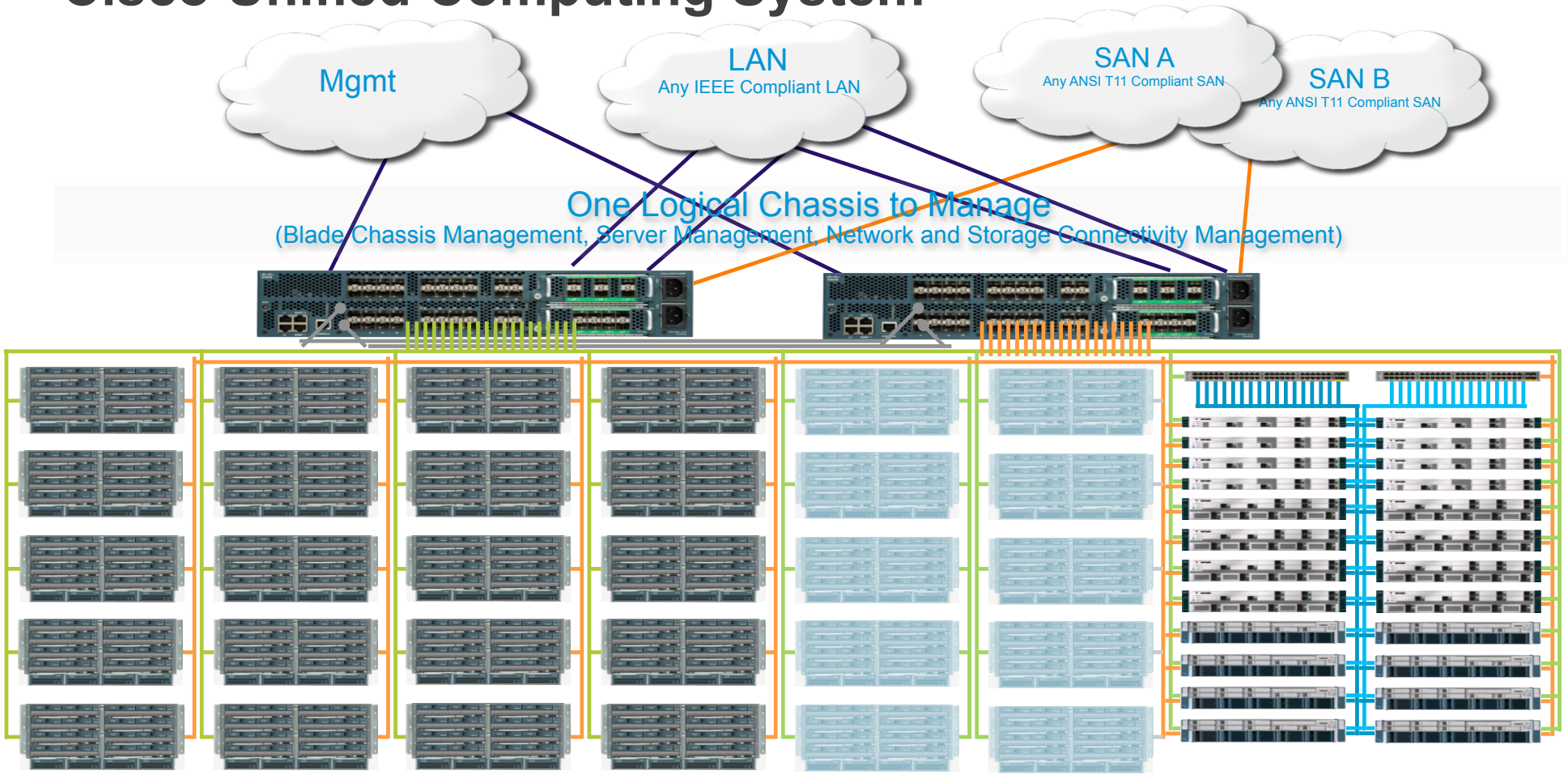
Adapter - UCS VIC 1240/80
- Up to 4/8x 10GE ports
- Up to 256 virtual interfaces



UCS Cable Connections



Cisco Unified Computing System



Compute options – Xeon 5600 and E7 based

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, 2 SSD Disk, 32 DIMM

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

Rack Mount

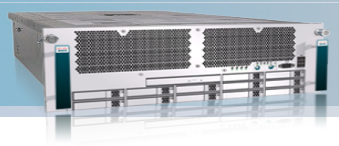
C200 M2
2 Socket Intel 5600, 4 or 8 Disks, 12 DIMM, 2 PCIe 1U

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, 16 Disks, 32-64 DIMM, 7 PCIe 2U

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



Compute options: Xeon E5 based

Industry-leading compute without compromise

	Scale Out	Enterprise Performance	Intensive / Mission Critical
Rack	Avail  **UCS C24 M3** Entry, expandable rack server for storage intensive workloads	Avail  **UCS C240 M3** Ideal platform for Big Data, ERP and database applications	Avail  **UCS C420 M3** Unified Computing in an Enterprise Class, 4-socket rack server for large, memory intensive bare metal & virtualized applications
	Avail  **UCS C22 M3** Entry rack server for distributed & web infrastructure applications	Avail  **UCS C220 M3** Versatile, general purpose enterprise infrastructure and application server	
Blade	Avail  **UCS B22 M3** Entry blade server for IT infrastructure and web applications	Avail  **UCS B200 M3** Optimal choice for VDI, Private Cloud or dense virtualization / consolidation workloads	Avail  **UCS B420 M3** Unified Computing in an Enterprise Class, 4-socket blade for large, memory intensive bare metal & virtualized applications

Cisco UCS: Many Server Form Factors, One System

UCS Fabric Infrastructure Portfolio Expansion

	2009	2011	2012
FABRIC INTERCONNECTS	 UCS 6120  Ethernet and FC Expansion Modules	 UCS 6248UP (Unified Ports)  16 Unified Ports	 UCS 6296UP (Unified Ports)
BLADE CHASSIS IO MODULES	 UCS 2104 IO Module	 UCS 2208 IO Module	 UCS 2204 IO Module

UCS 6200 Series Networking Fabric

48 Unified Port Fabric Interconnect

UCS-FI-6248UP

UCS-FI-E16UP

- **Performance** for improved Workload Density
  - High Density 48 Ports in 1RU
  - Increased 1Tbps Switching Performance
- **Flexibility** to defer port usage type and number at design time rather than purchase time
  - Flexibility to configure any port at Ethernet (1/10 Gigabit with SFP+) or FCoE or Native FC Ports (8/4/2/1G with FC Optics)
  - All Ports usable as uplinks/ downlinks
- **Latency** Lowered to 2.0us within Switch
- **Power** Optimized with 80 PLUS Gold Efficiency
- **Investment Protection** with Backward and Forward Compatibility

FLEXIBILITY, UTILIZATION AND BETTER APP. PERFORMANCE

UCS 6200 Series Networking Fabric

96 Unified Port Fabric Interconnect

UCS-FI-6296UP

3x UCS-FI-E16UP

- **Performance** for improved Workload Density
  - High Density 96 Ports in 2RU
  - Increased 2Tbps Switching Performance
- **Flexibility** to defer port usage type and number at design time rather than purchase time
  - Flexibility to configure any port at Ethernet (1/10 Gigabit with SFP+) or FCoE or Native FC Ports (8/4/2/1G with FC Optics)
  - All Ports usable as uplinks/ downlinks
- **Latency** Lowered to 2.0us within Switch
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FLEXIBILITY, UTILIZATION AND BETTER APP. PERFORMANCE

UCS 2208 IO Module

Enable Dual 40 Gbps to Each Blade Server

UCS-IOM-2208XP

- **Bandwidth increase** for improved response esp for bursty Applications
  - 80G to the Network
  - 320G to the Host Redundant

  (4x10G/ Half width slot; 8x10G/ Full width slot)
- **Latency** Lowered to 0.5us within IOM
- **Investment Protection** with Backward and Forward Compatibility

BANDWIDTH FOR BURSTY APPLICATIONS

UCS 2204 IO Module

Enable Dual 20 Gbps to Each Blade Server

UCS-IOM-2204XP

- **Bandwidth increase** for improved response esp for bursty Applications
  - 40G to the Network
  - 160G to the Host Redundant

  (2x10G/ Half width slot; 4x10G/ Full width slot)
- **Latency** Lowered to 0.5us within IOM
- **Investment Protection** with Backward and Forward Compatibility

BANDWIDTH FOR BURSTY APPLICATIONS

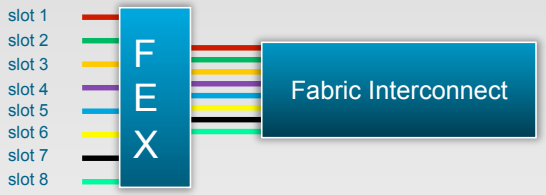
Increased Bandwidth Access to the Blades

4 LINKS, DISCREET—1st Gen

Available Bandwidth Per Blade—10 Gb (5gb Per Side)

- Statically pinned to Individual fabric links
- Deterministic Path

8 LINKS, DISCREET



Available Bandwidth Per Blade—20 Gb (10 Gb Per Side)

- Statically pinned to Individual fabric links
- Deterministic Path
- No oversubscription, each blade gets 20 Gb

8 LINKS, PORT-CHANNEL

Available Bandwidth Per Blade—up to 160 Gb (80 Gb Per Side)

- Statically pinned to Port-channel
- Shared bandwidth, better bandwidth utilization.

UCS VIC 1200 Series—80 Gbps to the Host

Adapter and Virtual Machine Fabric Extender

PORT DENSITY TO MATCH CORE DENSITY

- Dual 40 Gbps to a single half-width slot
- Easy upgrade path for BW to server blade
- Uses 4x10 EtherChannel, HW 40Gb Capable
- vNICs/vHBAs NOT limited to 10Gb

PCIE & NETWORK INTERFACE VIRTUALIZATION

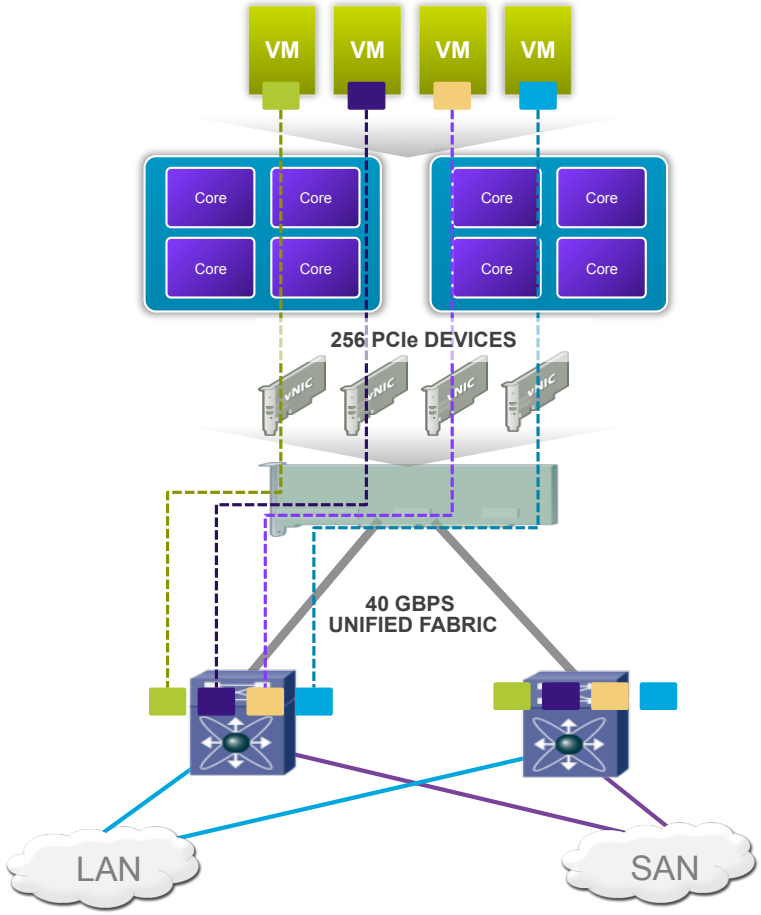
- Up to 256 PCIe devices and associated switch interfaces
- OS independent PCIe Virtualization

VM FEX MODE

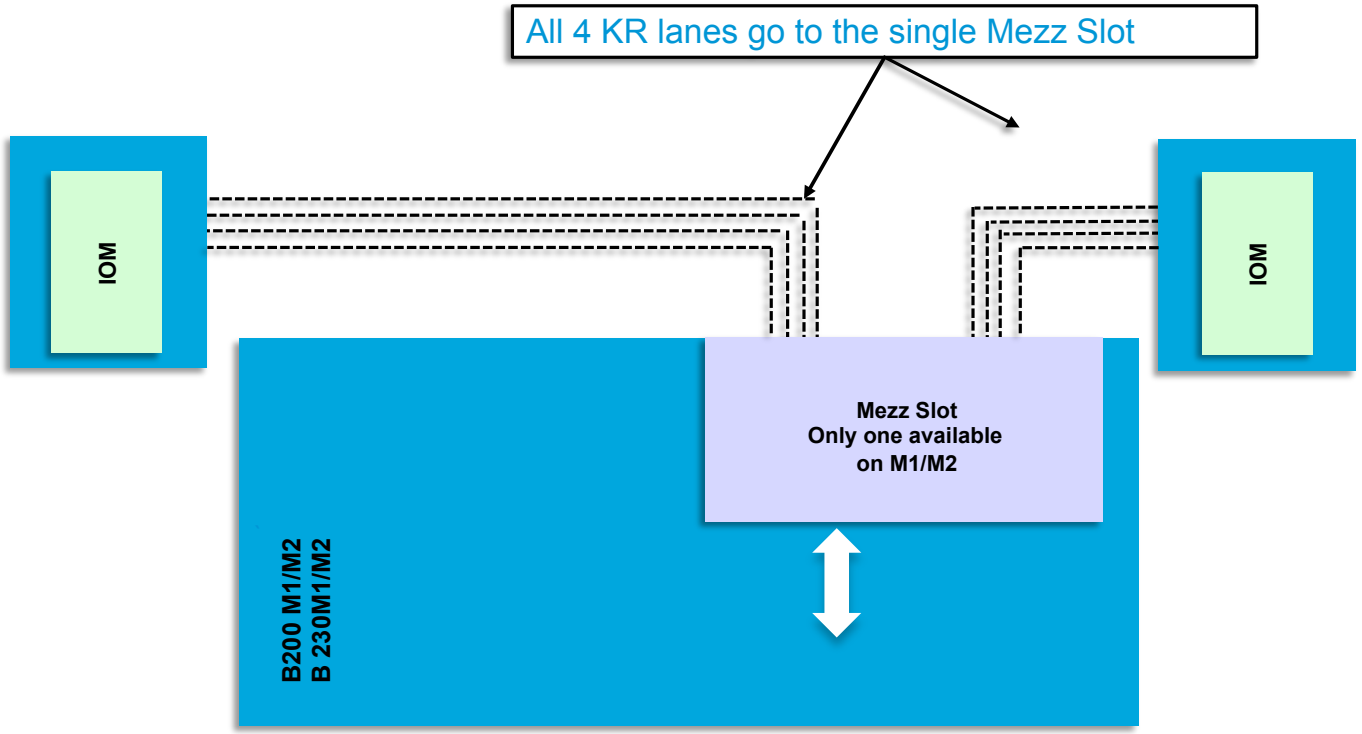
- Virtual and physical collapsed into a single network
- VMs get dedicated switch interface (vEth)
- Full network visibility (span, statistic) at vEth level

VIRTUAL SERVICE CAPABLE

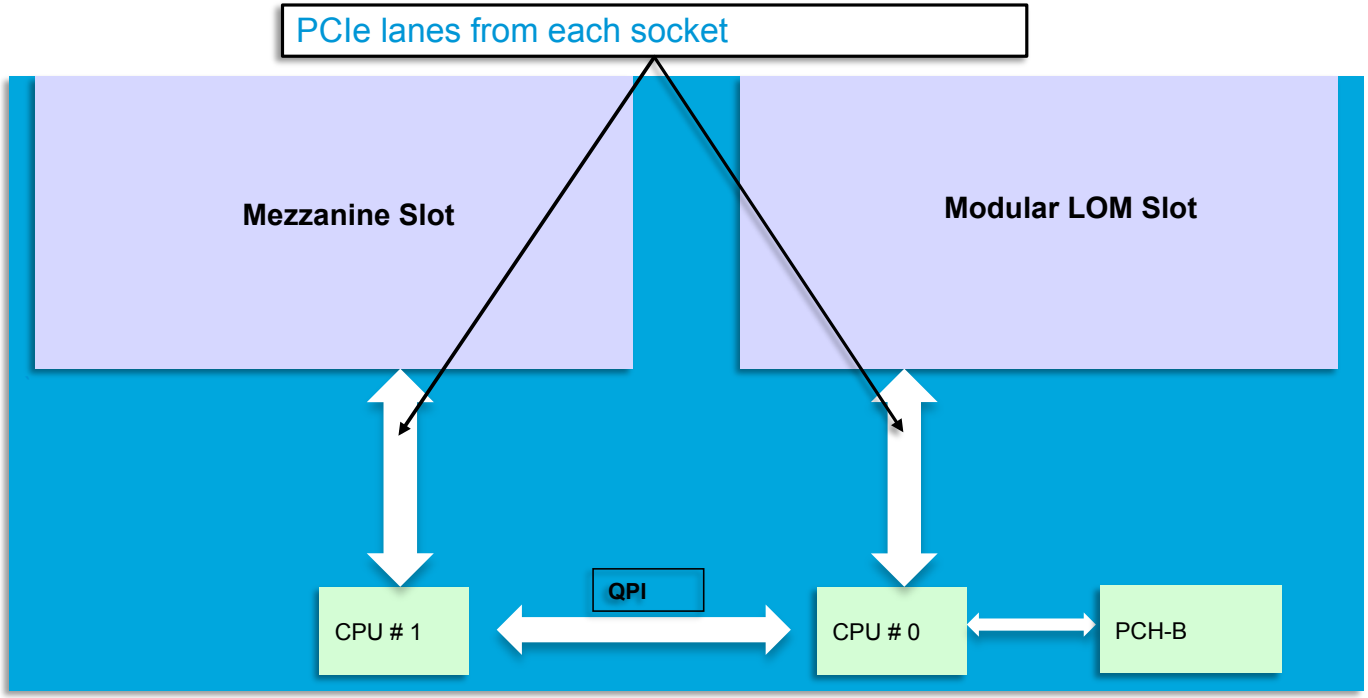
- Hardware support for vPath (for Virtual Services)



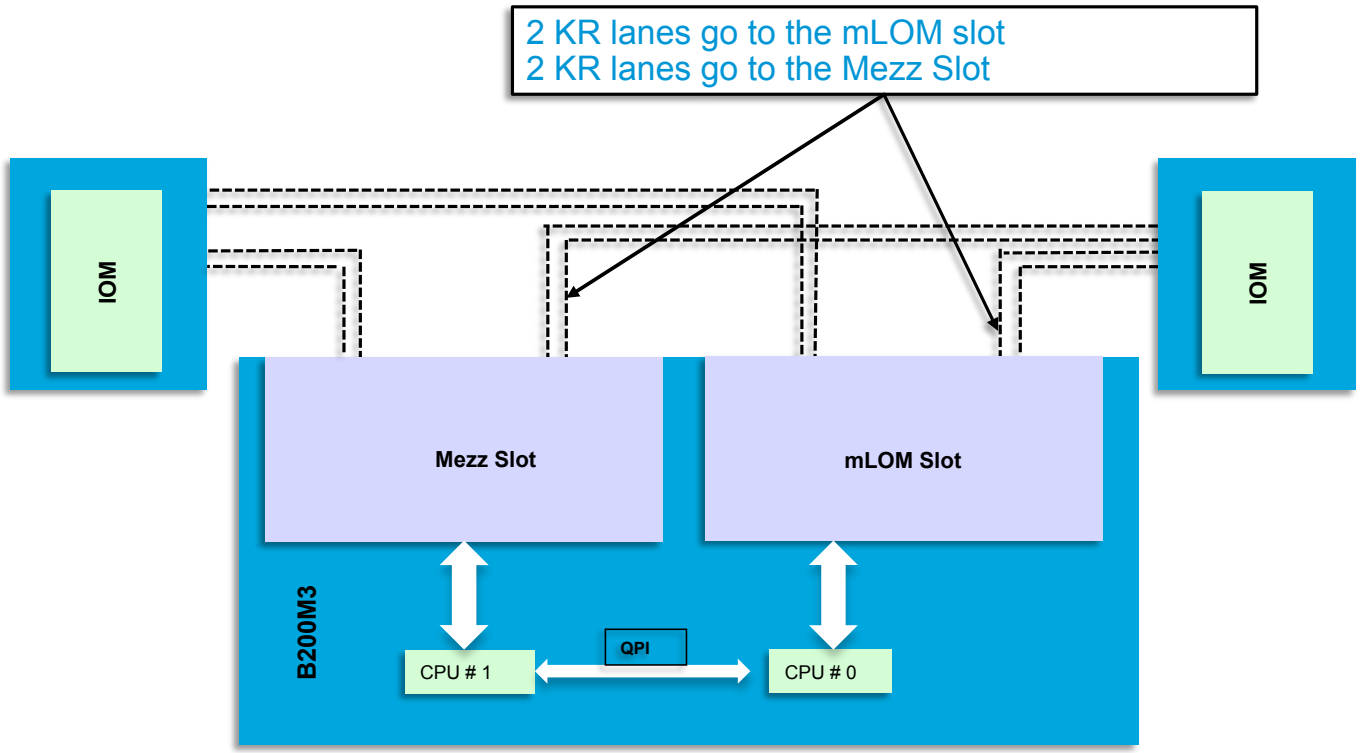
Backplane lanes for M1/M2 Blades



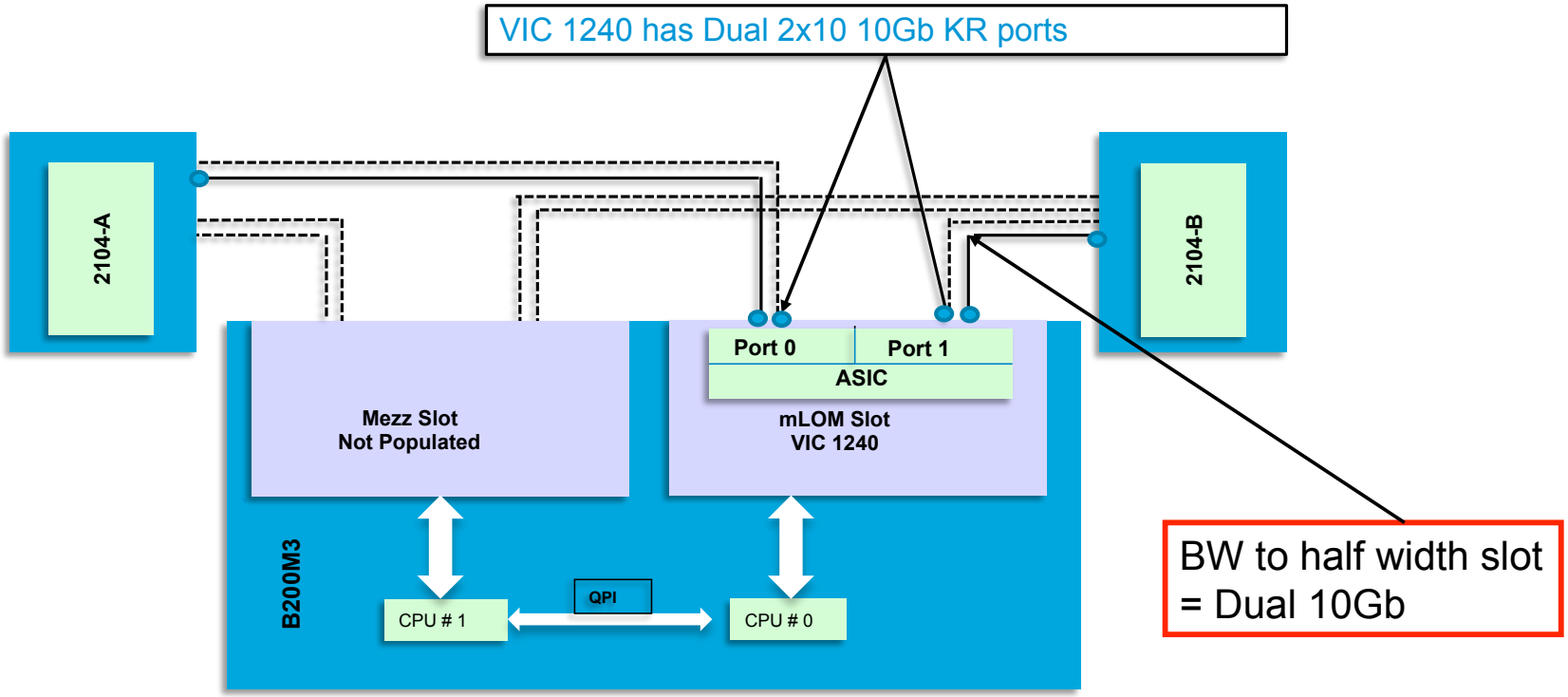
B200 M3 I/O Block Diagram
Modular LOM and Mezzanine slot



Backplane lanes for B200 M3

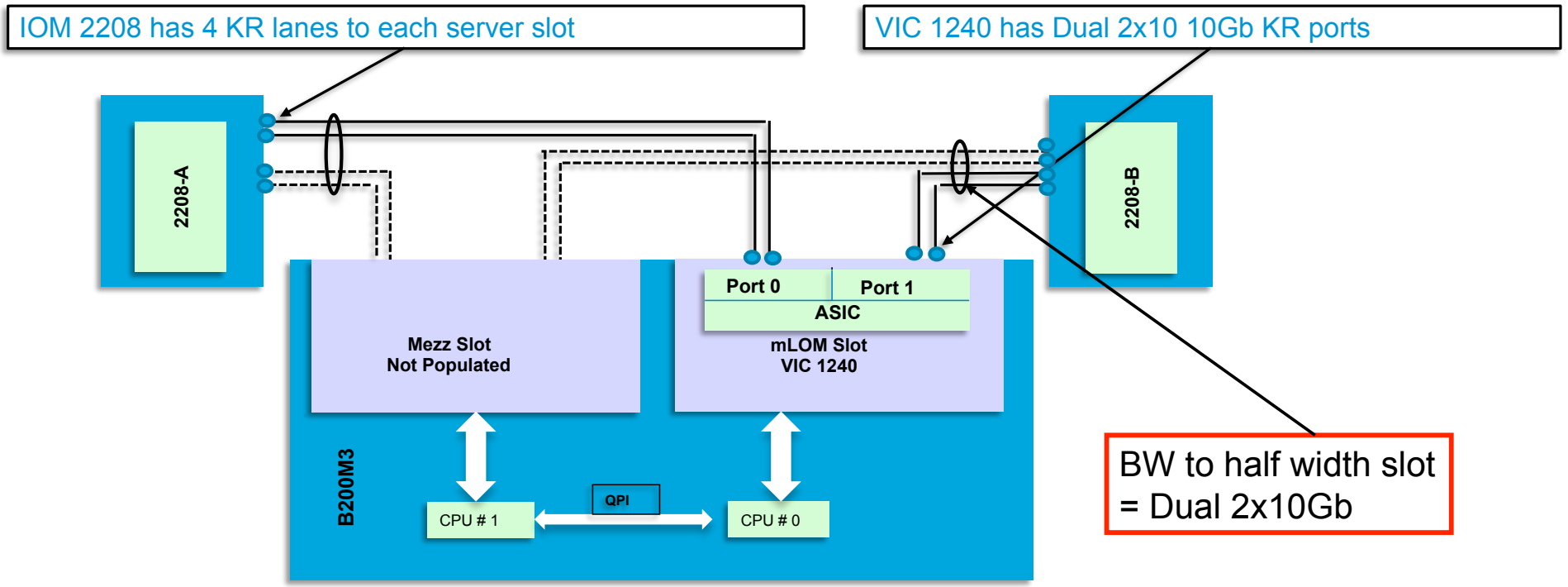


IOM 2104 with VIC1240 in B200M3

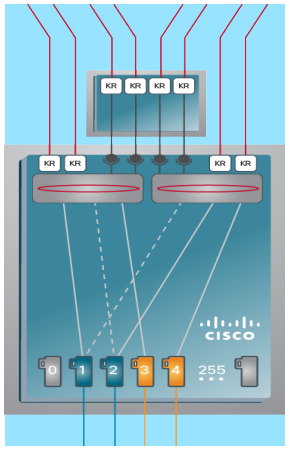


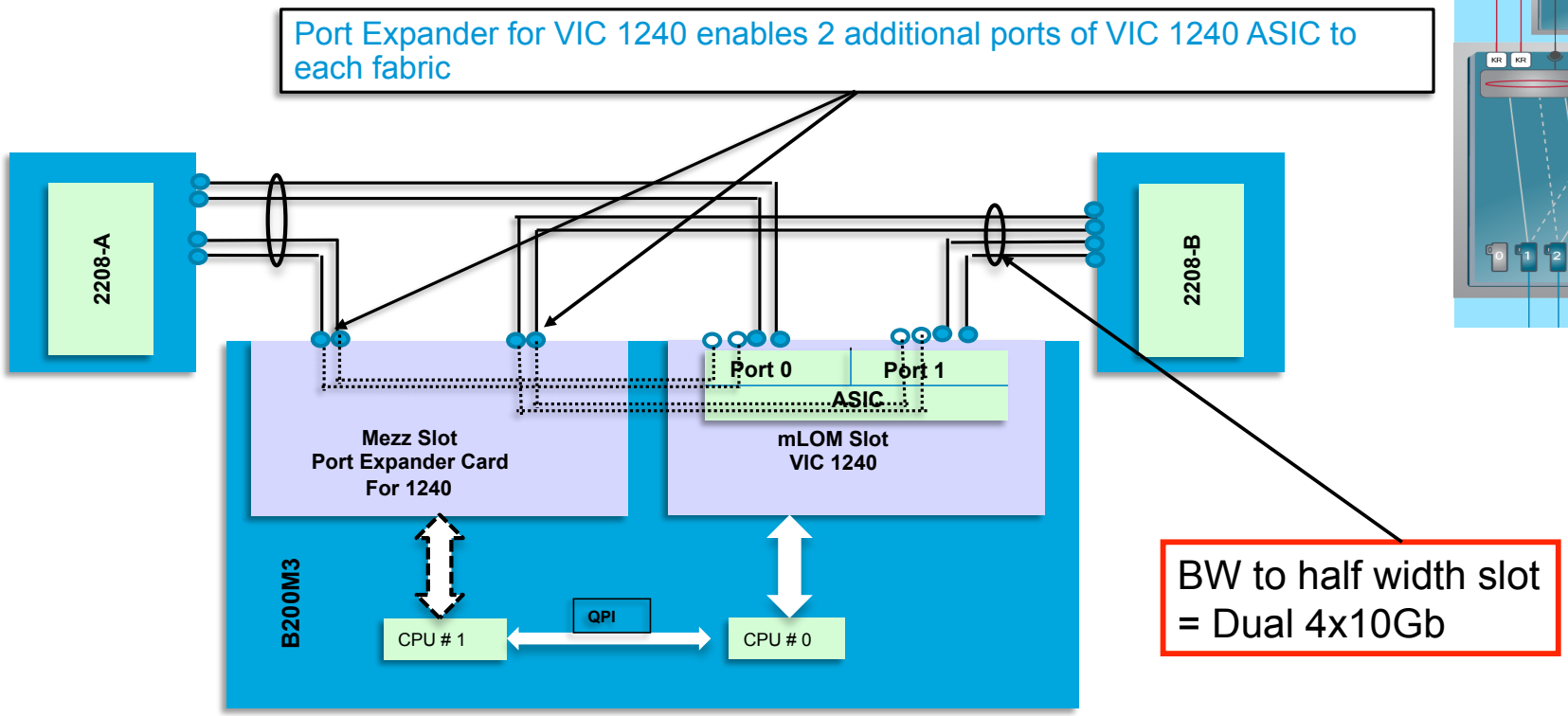
Only *valid* adapter option with IOM 2104

IOM 2208 with VIC1240 in B200M3



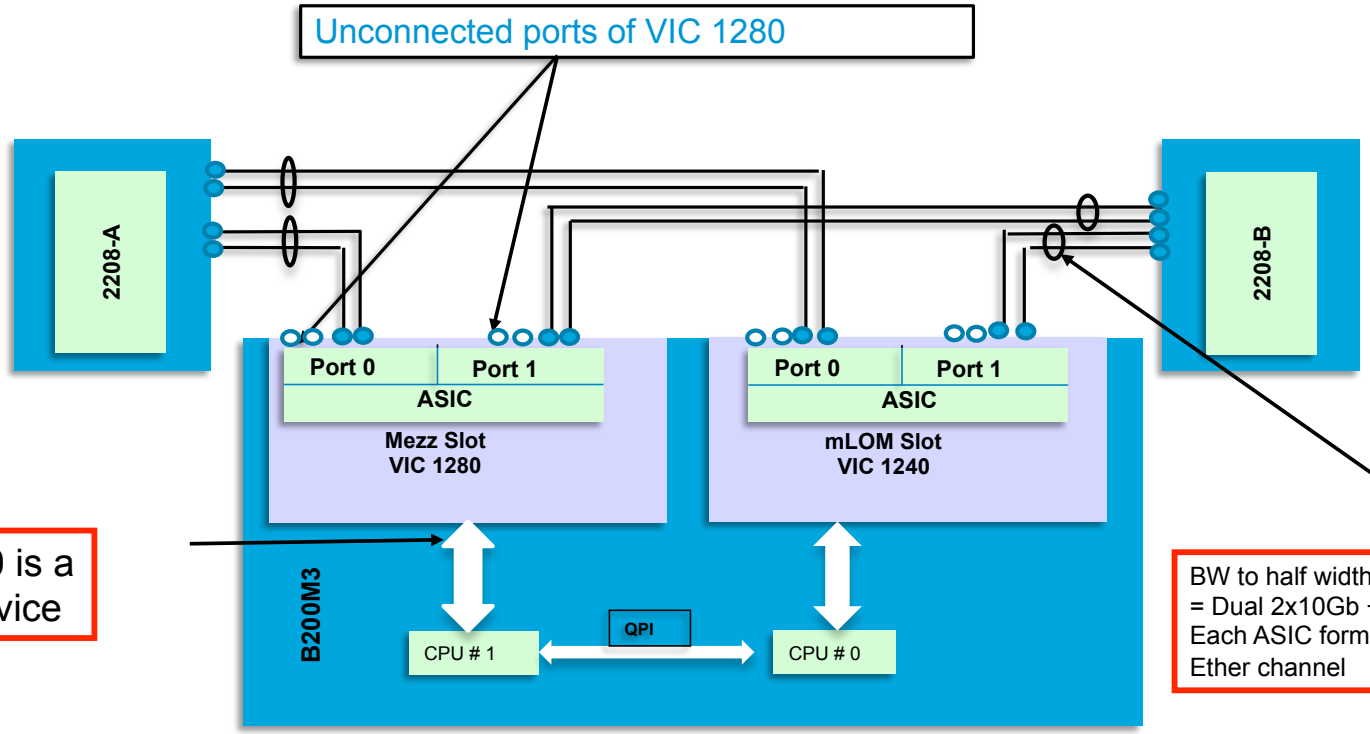
IOM 2208 with VIC1240 & Port Exp Card in B200M3





Full BW of 2nd Gen VIC ASIC exposed

IOM 2208 with VIC1240 & VIC 1280 in B200M3

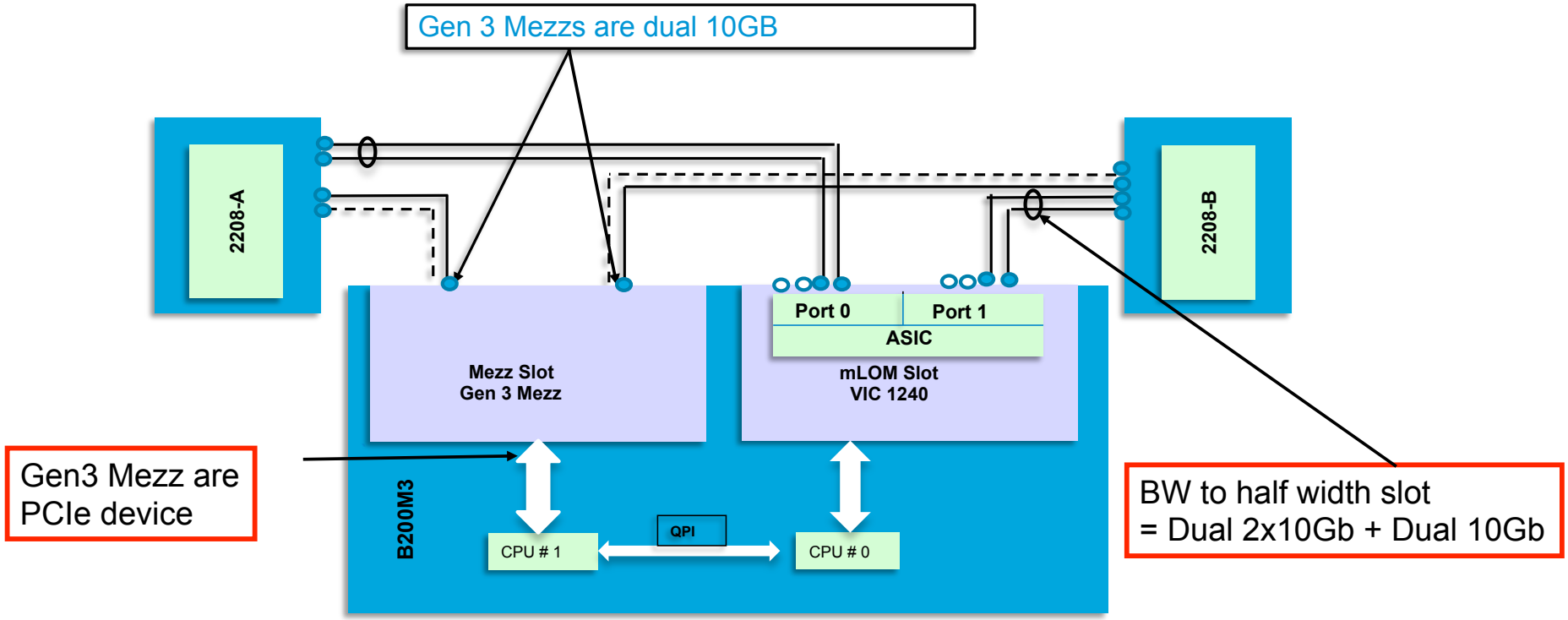


VIC1280 is a PCIe device

BW to half width slot
= Dual 2x10Gb + Dual 2x10Gb
Each ASIC forms its own
Ether channel

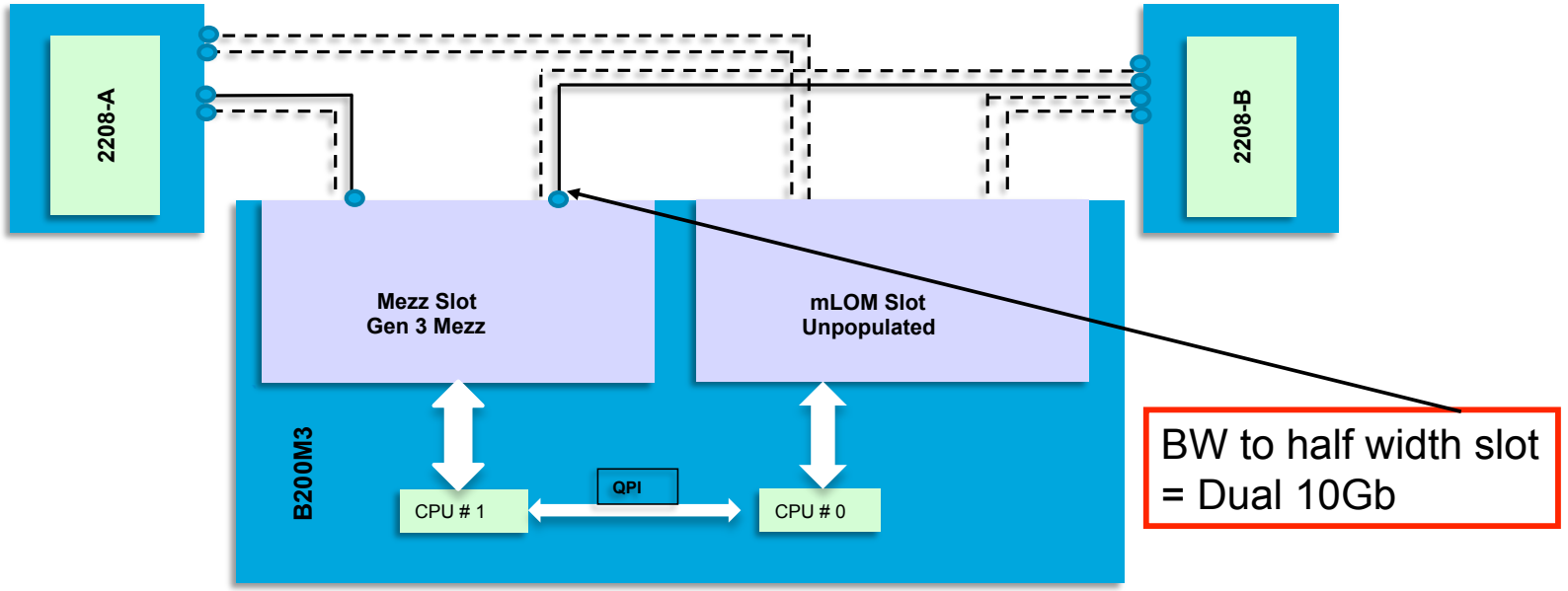
Adapter level “Redundancy” available with M3 blades

IOM 2208 with VIC1240 & Gen 3 Mezz in B200M3



Flexibility to choose a 3rd party Mezz to complement VIC 1240

IOM 2208 Gen 3 Mezz in B200M3



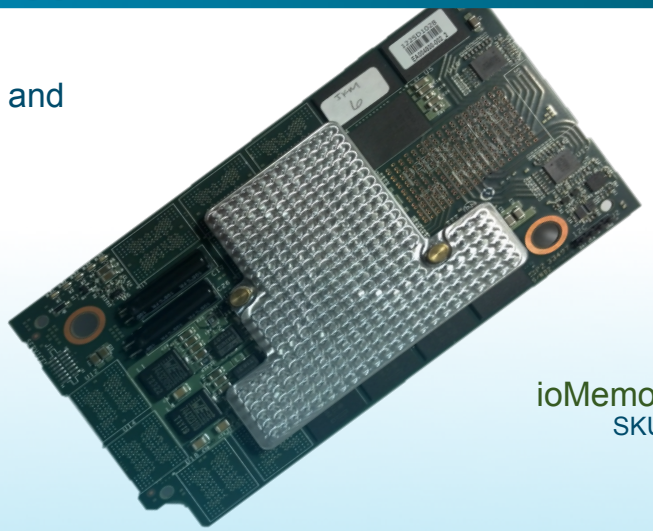
Flexibility to choose a 3rd party Mezz without VIC

FusionIO Mezzanine Card for UCS B-Series

Expanding the Unified Computing Blade Option Portfolio

Fusion ioDrive2 architected into Cisco UCS blade servers allow storage performance to be decoupled from capacity through the integration of **a powerful new memory tier uniquely designed to accelerate applications**

- Create new ultra-low latency storage tiers
- Boost in-server application performance with Database and Virtualization workloads
- Specs:
  - 785 GB MLC Flash capacities (365 GB MLC 2nd Phase)
  - 1.5GB/s Bandwidth (1MB Read)
  - 1.1GB/s Bandwidth (1MB Write)
  - 141,000 IOPS (512B Random Read)
  - 535,000 IOPS (512B Random Write)
  - 15µs Write Latency, 68µs Read Latency
- HW supported: All M3 Blades
- SW supported: UCSM 2.1 (Del Mar)



ioMemory2 for UCS B-Series
SKU: UCSB-F-FIO-785M

LSI Nytro™ WarpDrive™ for UCS B-Series

Expanding the Unified Computing Blade Option Portfolio

LSI Storage. Networking. Accelerated.™

LSI Nytro™ WarpDrive™ acceleration solutions allow storage performance to be decoupled from capacity through the integration of **a powerful new memory tier uniquely designed to accelerate applications**

- Create new ultra-low latency storage tiers
- Boost in-server application performance with Database and Virtualization workloads
- Specs:
  - 400GB SLC Flash capacities
  - 1041 MB/s Read Bandwidth (256KB, 20% compressible data)
  - 882 MB/s Write Bandwidth (256KB, 20% compressible data)
  - 79K+ Random Read IOPS (8KB)
  - 14K+ Random Write IOPS (8KB)
  - < 50µs Average Latency
- HW supported: All M3 Blades
- SW supported: UCSM 2.1 (Del Mar)
- Option with EMC XtremSW

Cisco UCS for UCS B-Series
SKU: UCSB-F-LSI-400S

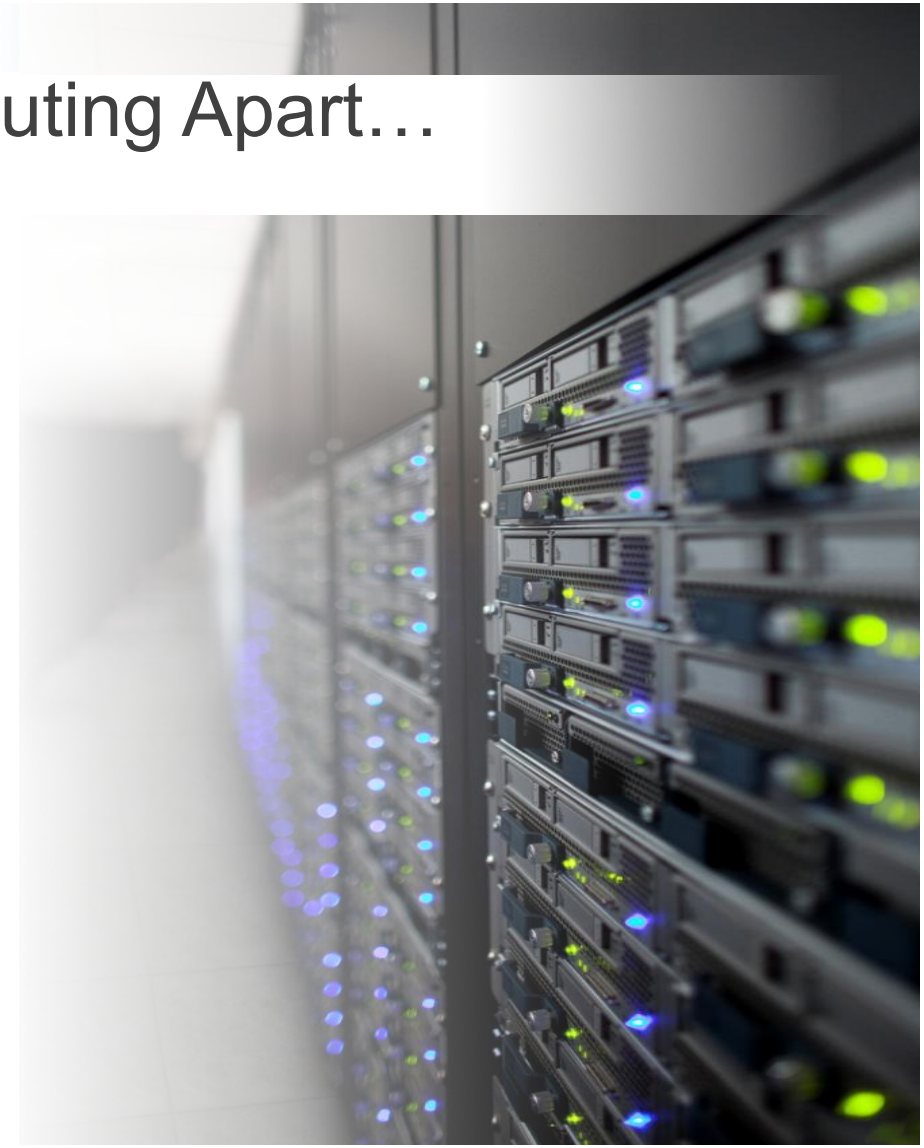
EMC XtremSW: http://www.emc.com/vfcache

Cisco UCS Innovations

What Sets Cisco Unified Computing Apart…

… and how does that impact OpEx

1. **Single Logical Blade Chassis**
   - versus mini racks
2. **Cisco FEX architecture**
   - versus lots-of-little-switches
3. **Stateless Server Provisioning**
   - Service Profiles
4. **Open API for management**
5. **Advanced Networking Features**
   - Virtual Interface Card (Palo)
   - QoS versus Rate-Limiting



What Sets Cisco Unified Computing Apart…

1. Single Logical Blade Chassis
   - versus mini racks
2. Cisco FEX-Link architecture
   - versus lots-of-little-switches
3. Stateless Server Provisioning
   - Service Profiles
4. Open API for management
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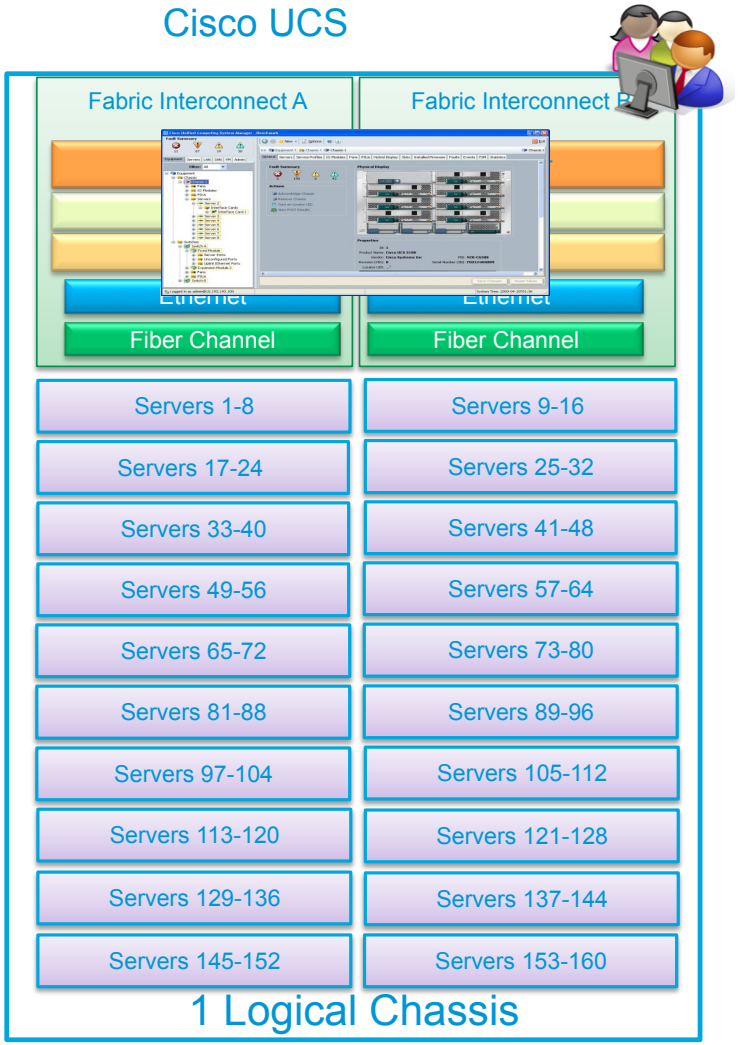
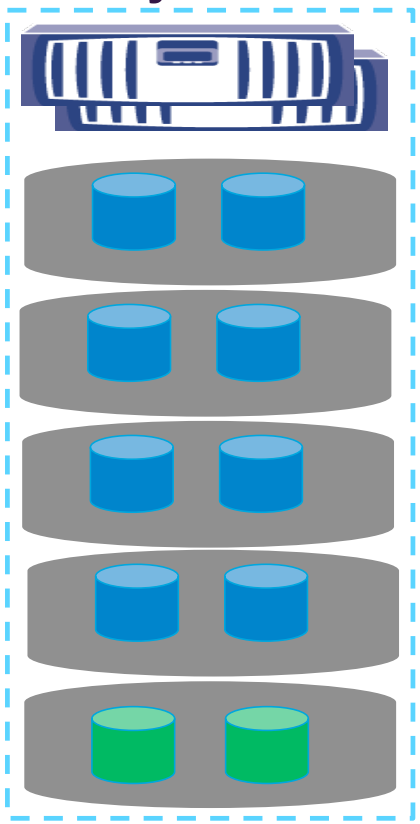
Legacy Blade Architecture

Cisco UCS



Does this look familiar

Storage Array Structure



Network

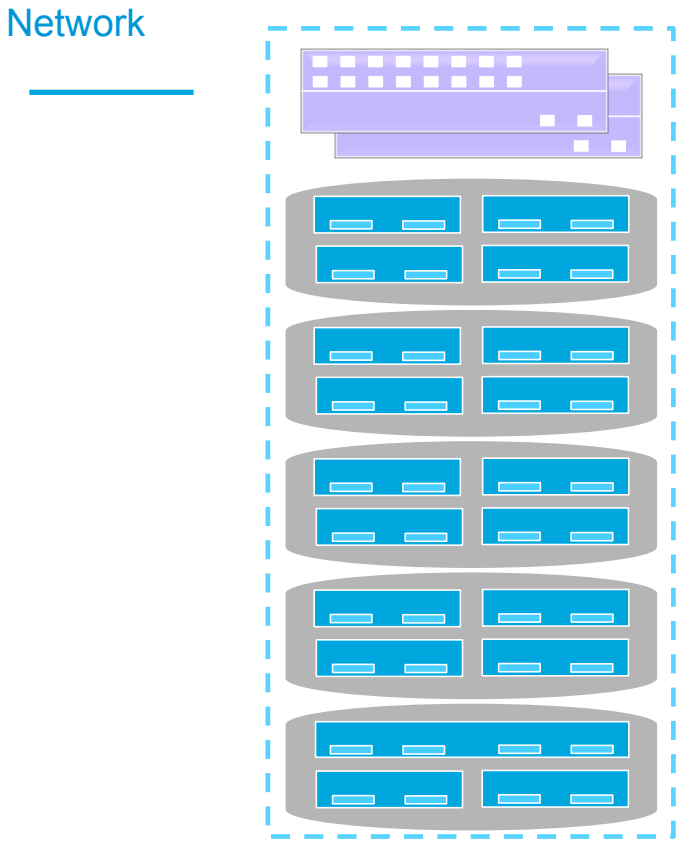
- Storage Controllers:
  - Manage internal structure
  - Present LUNs to the network
  - Implement intelligence
    - Remote copy
    - Backup
    - De-duplication
    - Thin provisioning

    …

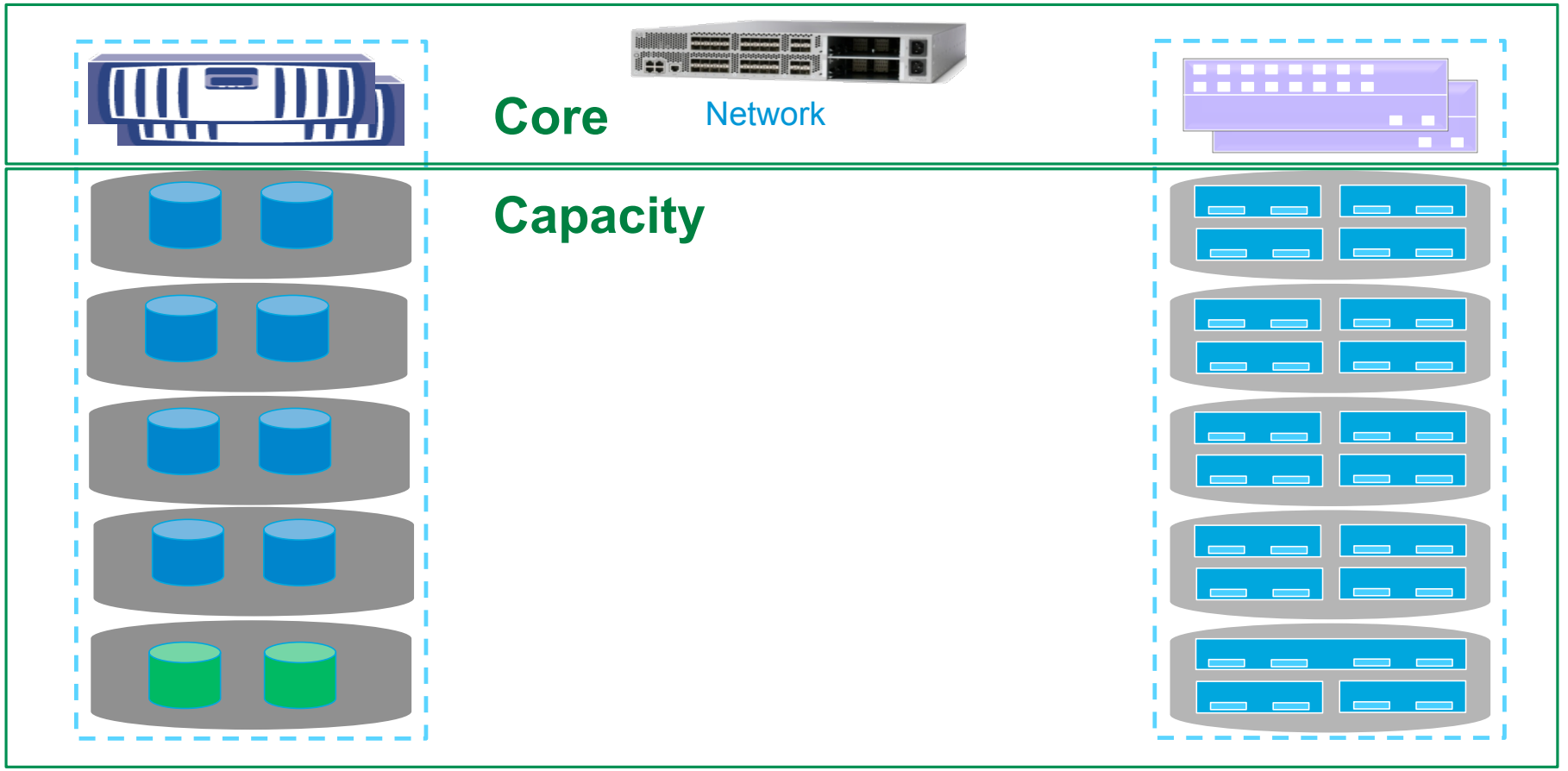
Cisco Unified Computing System

- UCS Fabric Interconnect:
  - Manage internal structure
  - Present Service Profiles to the network
  - Implement intelligence
    - Provisioning
    - Virtualisation optimization
    - Firmware management
    - Power capping

    …



Modern Systems Architecture



What Sets Cisco Unified Computing Apart…

1. Single Logical Blade Chassis

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3. Stateless Server Provisioning

   Service Profiles

4. Open API for management

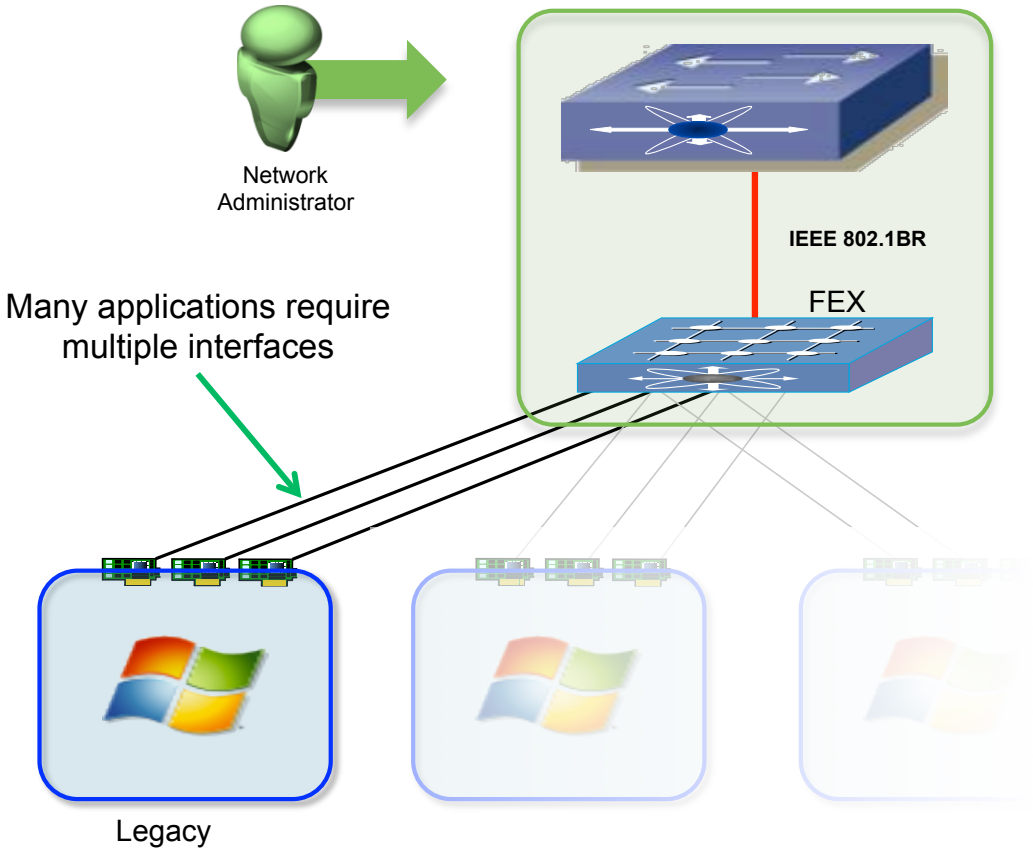
5. Advanced Networking Features

   Virtual Interface Card (Palo)

   QoS versus Rate-Limiting

Fabric Extender Evolution

Distributed Modular System to the ToR, server and Virtual Machine



One Network

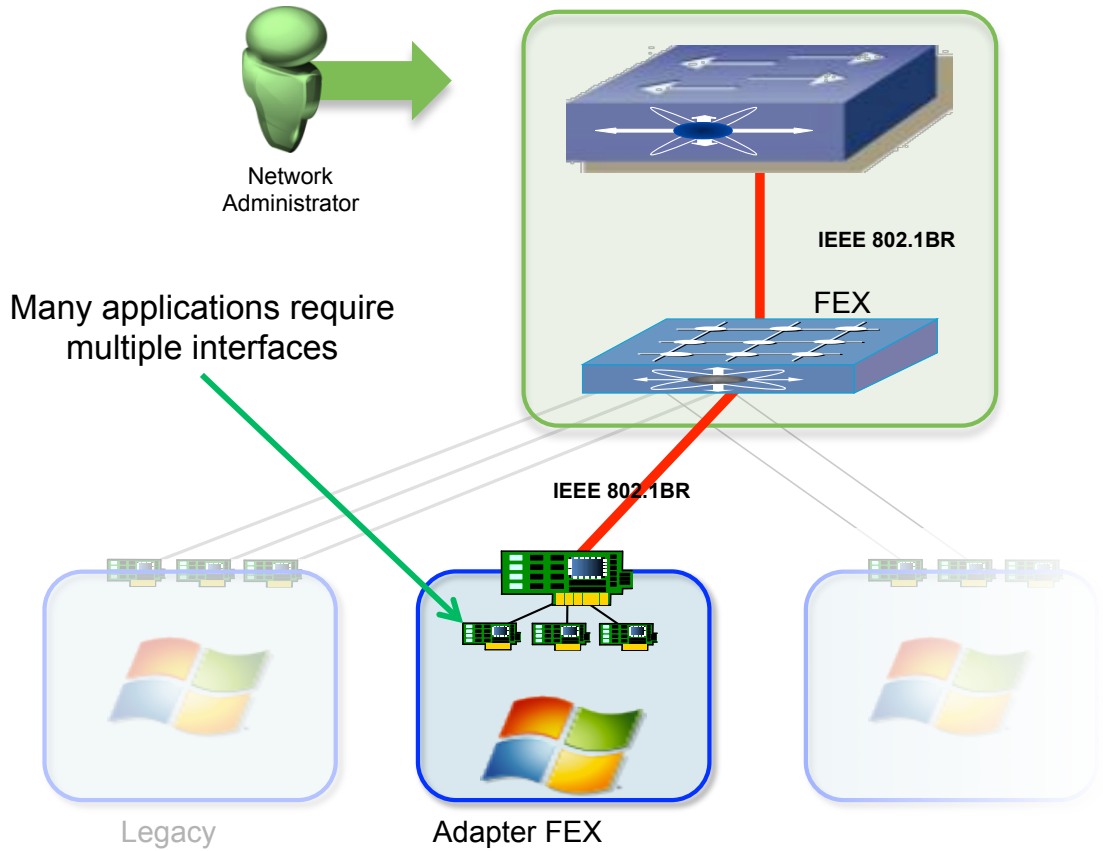
Parent Switch to Top of Rack

FEX Architecture

- **Consolidates** network management
- FEX managed as line card of parent switch
- Uses Pre-standard IEEE 802.1BR

Fabric Extender Evolution

Distributed Modular System to the ToR, server and Virtual Machine



One Network

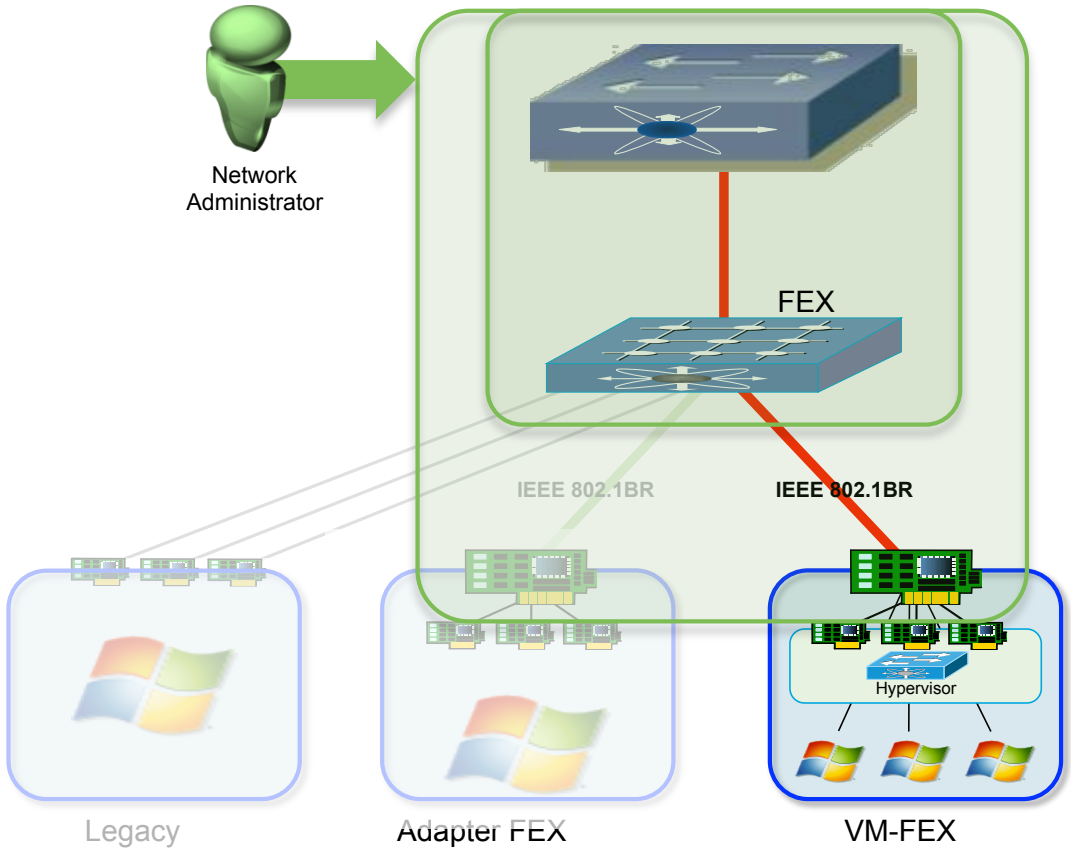
Parent Switch to Adapter

Adapter FEX

- **Consolidates** multiple interfaces into a single 10Gb interface
- Extends network into server
- Uses Pre-standard IEEE 802.1BR

Fabric Extender Evolution

Distributed Modular System to the ToR, server and Virtual Machine



One Network

Virtual Same As Physical

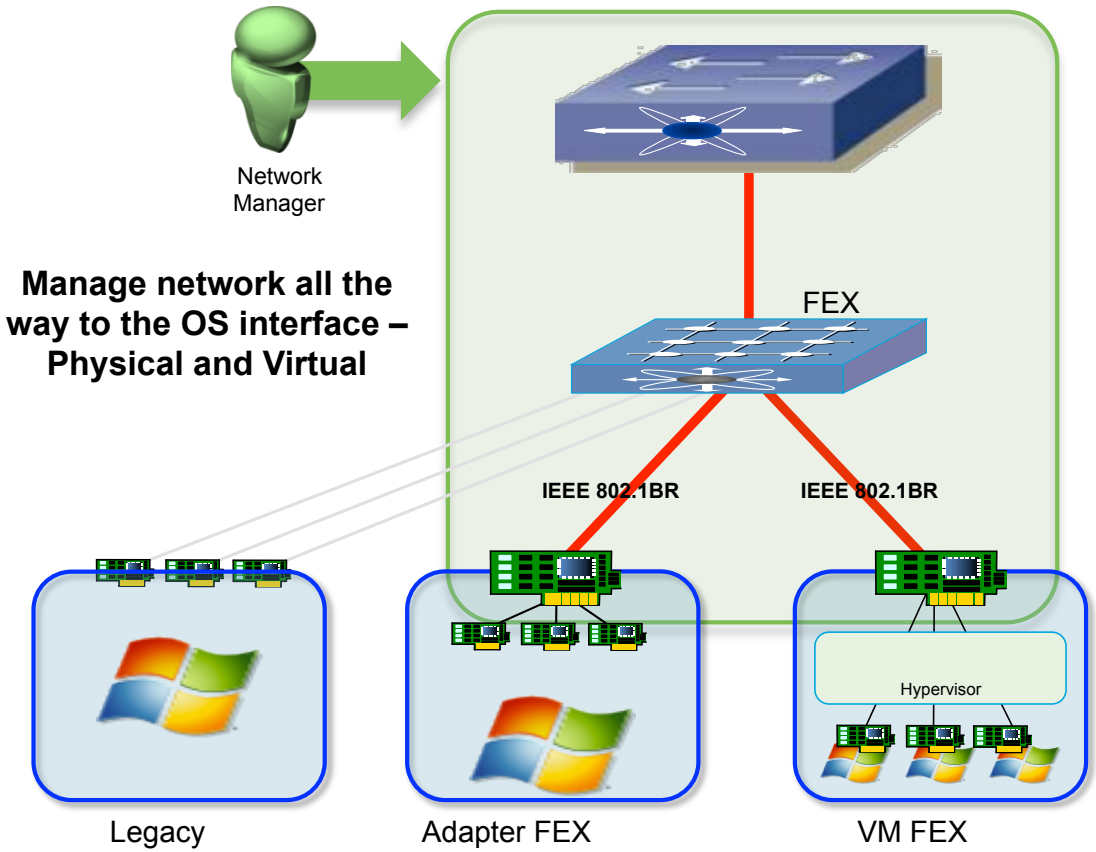
VM-FEX

- **Consolidates** virtual and physical network
- Each VM gets a dedicated port on switch
- Uses Pre-standard IEEE 802.1BR

VM network managed by Server administrator

Fabric Extender Evolution

Distributed Modular System to the ToR, server and Virtual Machine



Manage network all the way to the OS interface – Physical and Virtual

One Network

Parent Switch to Application

Single Point of Management

FEX Architecture

- **Consolidates** network management
- FEX managed as line card of parent switch

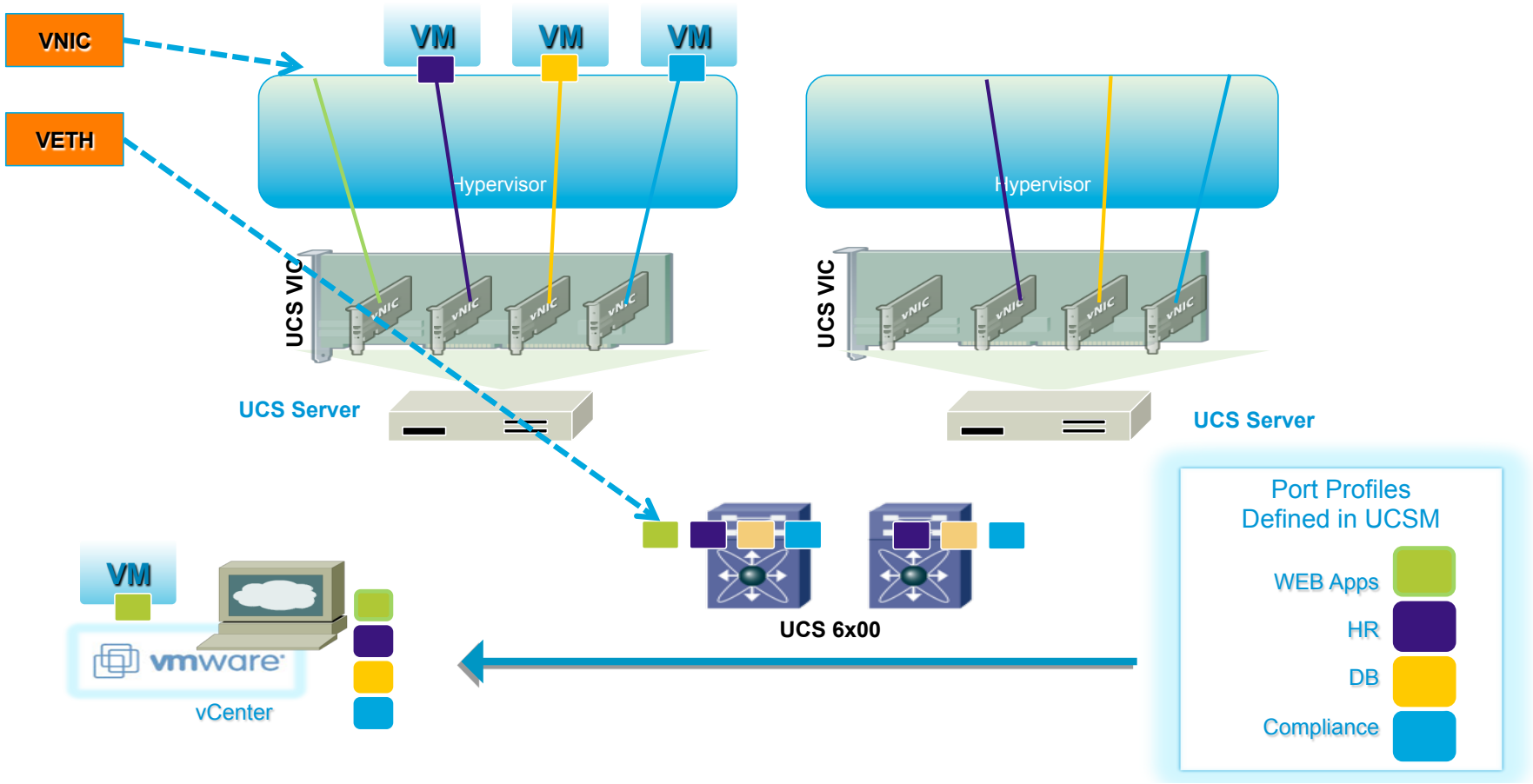
Adapter FEX

- **Consolidates** multiple interfaces into a single 10Gb interface
- Extends network into server

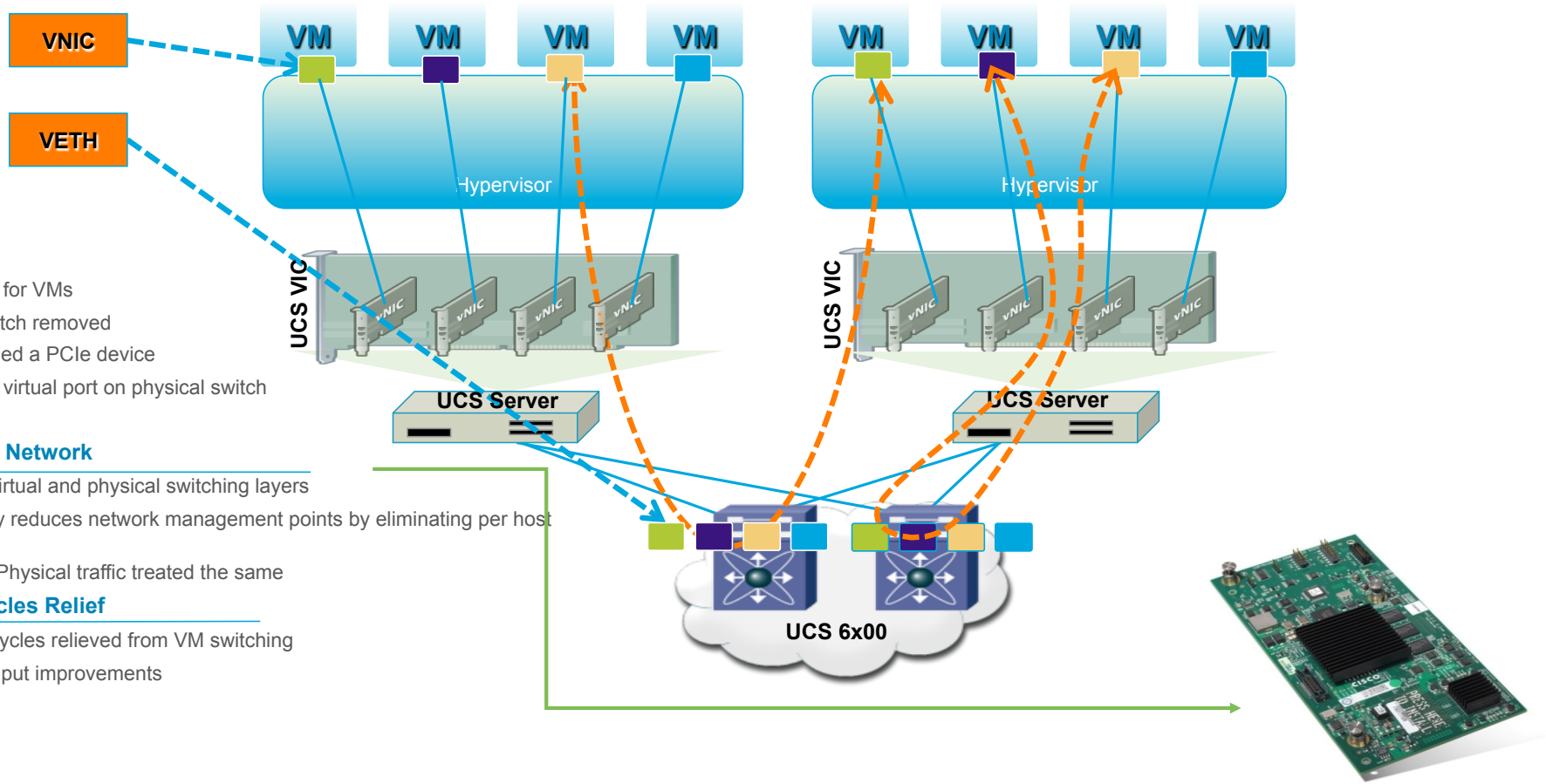
VM-FEX

- **Consolidates** virtual and physical network
- Each VM gets a dedicated port on switch

VM-FEX: Operational model



VM-FEX: Host view – One network



VM-FEX Basics

- Fabric Extender for VMs
- Hypervisor vSwitch removed
- Each VM assigned a PCIe device
- Each VM gets a virtual port on physical switch

VM-FEX: One Network

- Collapses virtual and physical switching layers
- Dramatically reduces network management points by eliminating per host vSwitch
- Virtual and Physical traffic treated the same

Host CPU Cycles Relief

- Host CPU cycles relieved from VM switching
- I/O Throughput improvements

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   - **Service Profiles**
4. Open API for management
5. Advanced Networking Features
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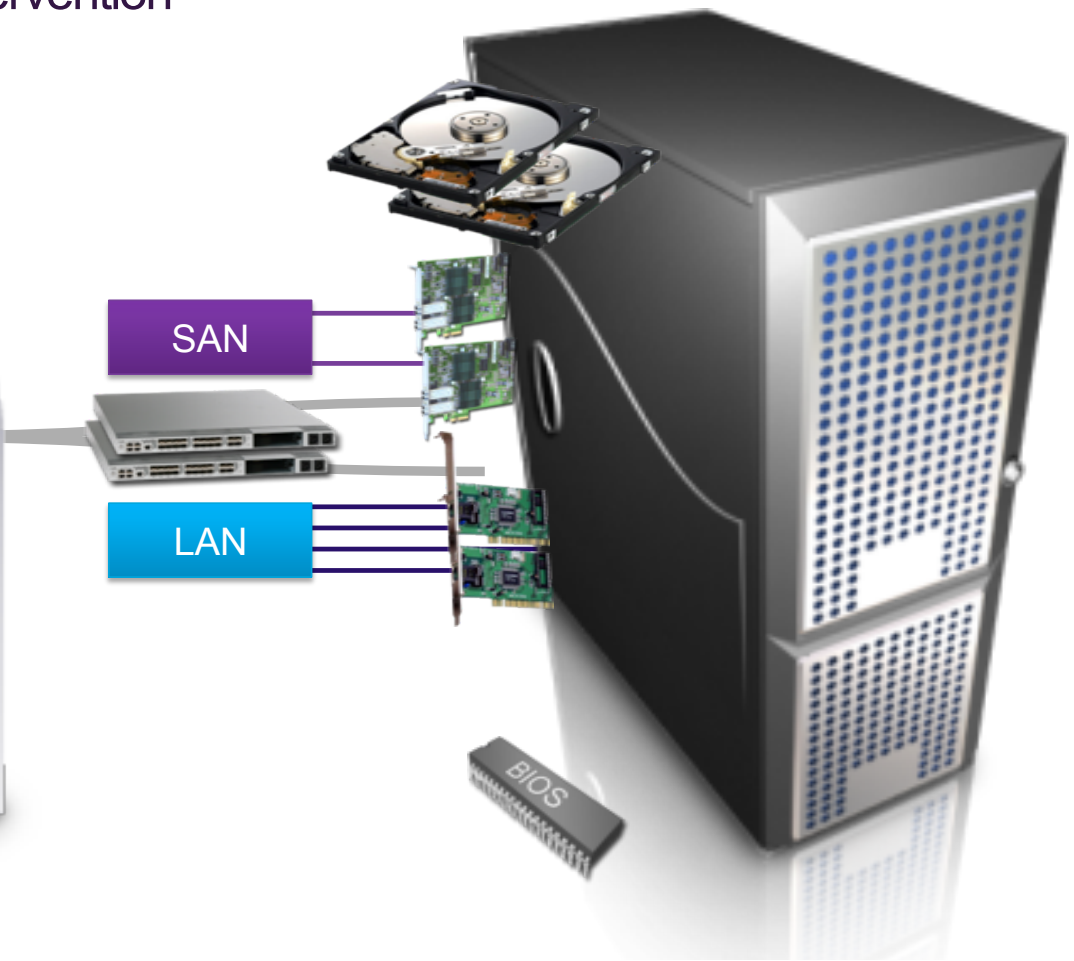
Stateless Computing

Legacy Servers require lots of manual intervention

Server Identity & Personality

NIC MACs
HBA WWNs
Server UUID
VLAN Assignments
VLAN Tagging
FC Fabrics Assignments
FC Boot Parameters
Number of vNICs
Boot order
PXE settings
IPMI Settings
Number of vHBAs
QoS

Call Home
Template Association
Org & Sub Org Assoc.
Server Pool Association
Statistic Thresholds
BIOS scrub actions
Disk scrub actions
BIOS firmware
Adapter firmware
BMC firmware
RAID settings
Advanced NIC settings
Serial over LAN settings
BIOS Settings



Stateless Computing

UCS Service Profiles reduce complexity and deployment speed

To build our server
…
Make one or more unique profile copies from a template

Associate a single profile to a single server. Repeat for more servers as needed

Rapidly deploy any number of servers in just a few clicks!

Service Profile 1

Service Profile 2

Service Profile 3

Service Profile *n*

UCS Rack and Blade Servers

Service Profiles

Flexibility, Agility – Operation Efficiency

ESX Server
Service Profile Template

ESX Server 1
Service Profile

ESX Server 2
Service Profile

ESX Server 3
Service Profile

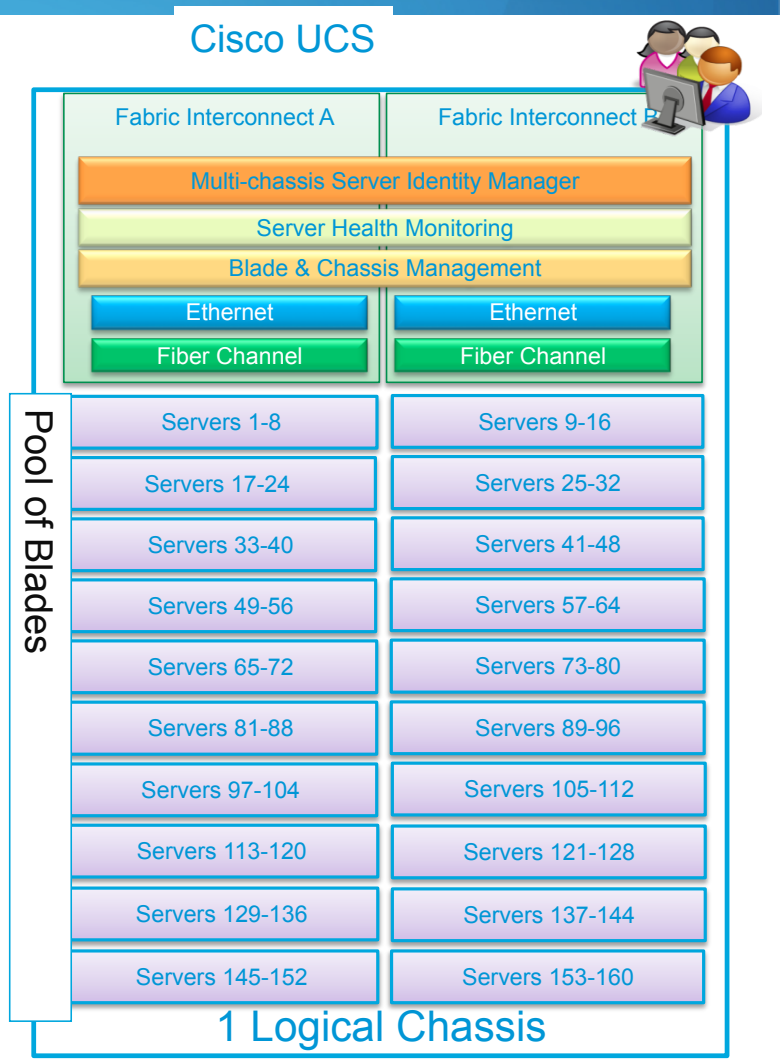
ESX Server 4
Service Profile

Hardware

Hardware

My new Servers
(booted)

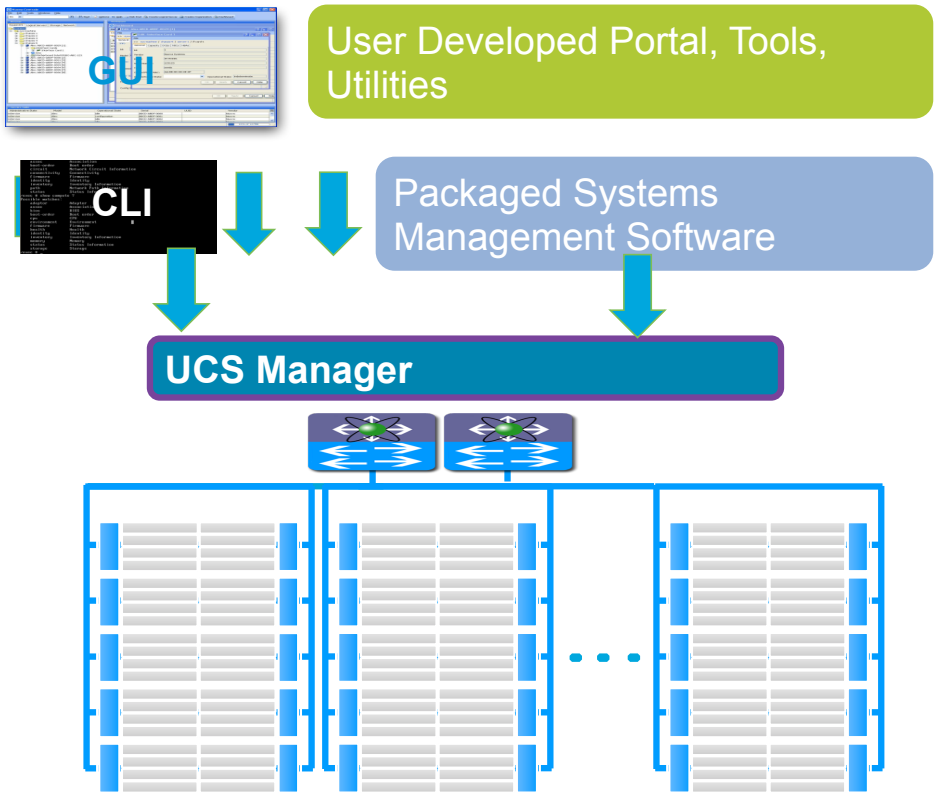
My Servers
(not booted)



What Sets Cisco Unified Computing Apart…

1. Single Logical Blade Chassis
   - versus mini racks
2. Cisco FEX-Link architecture
   - versus lots-of-little-switches
3. Stateless Server Provisioning
   - Service Profiles
4. **Open API for management**
5. Advanced Networking Features
   - Virtual Interface Card (Palo)
   - QoS versus Rate-Limiting

UCS Manager



Embedded device manager

Discovery, Inventory, Monitoring, Diagnostics, Statistics Collection, Configuration, Access Control, Power Capping, etc.

Unifies many UCS HW components into a single, cohesive, system

Adapters, blades, chassis, fabric extenders, fabric interconnects

APIs for integration with new and existing data center infrastructure

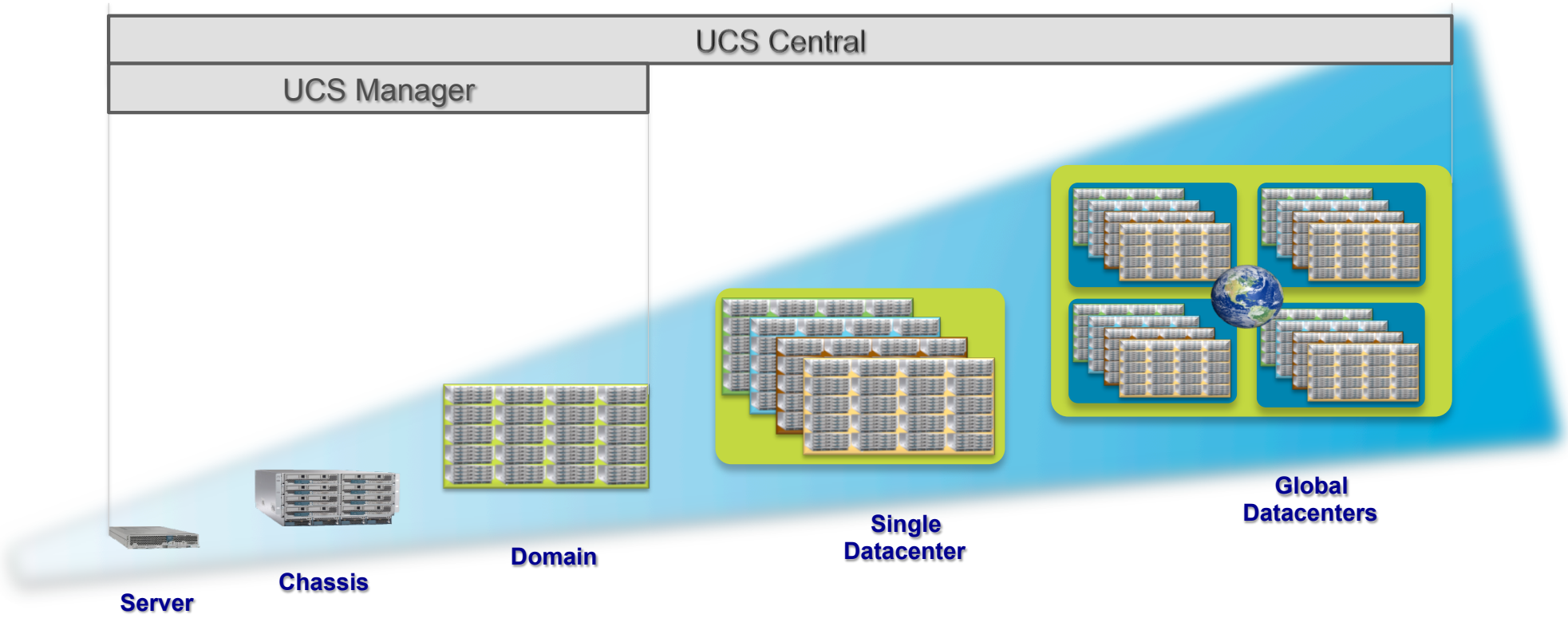
SMASH-CLP, IPMI, SNMP

XML SDK for commercial & custom implementations

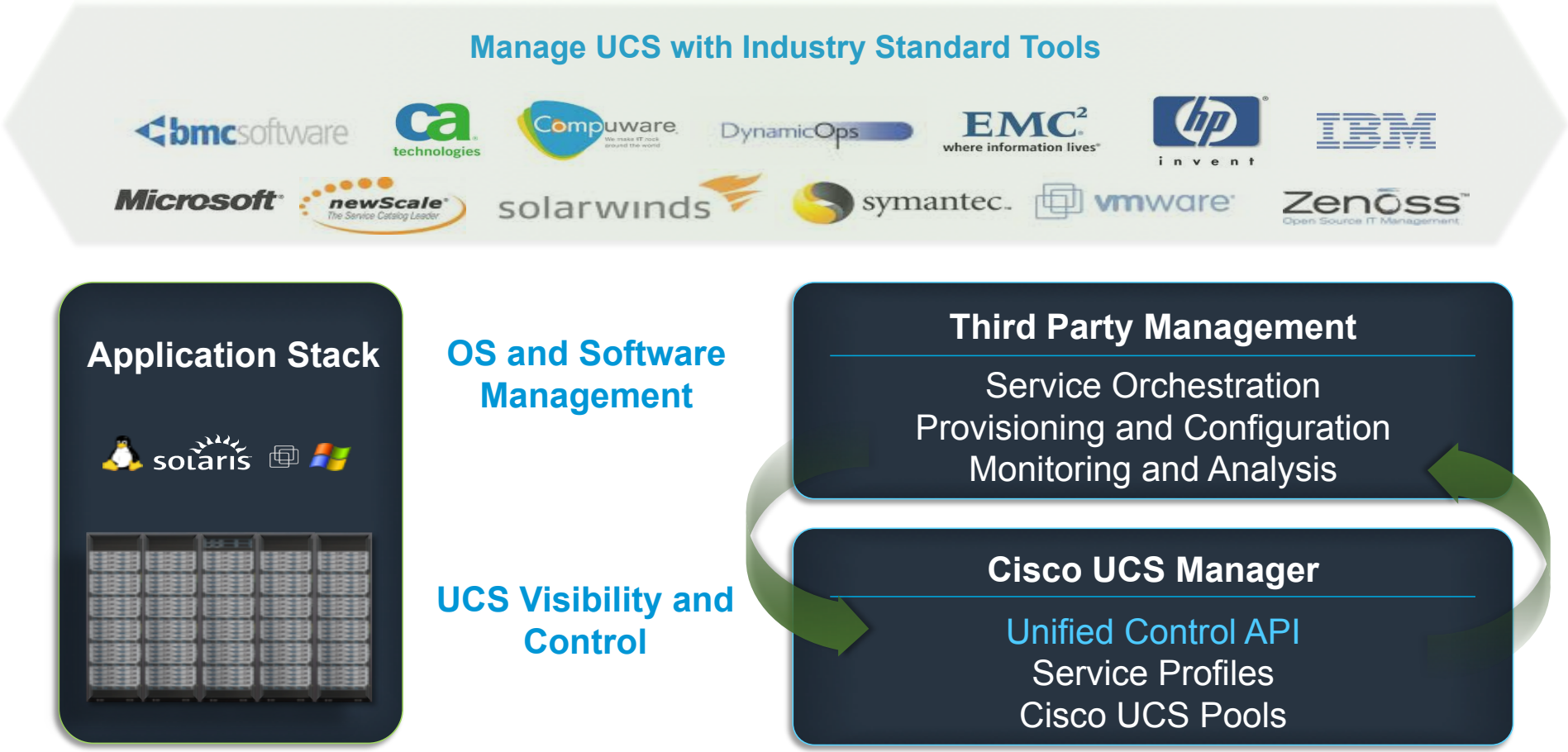
Key Feature: Service Profiles

Coordinated deployment to managed endpoints

Multidomain Management



UCS Management Ecosystem Overview



UCS Platform Emulator

- Full featured UCSM Emulator, installed as a VM
- Support for all XML API calls, including Object Browser
- Import & replicate existing live UCS Manager physical inventory
- Drag-n-drop hardware builder to create customer physical inventory

What Sets Cisco Unified Computing Apart…

1. Single Logical Blade Chassis
   - versus mini racks
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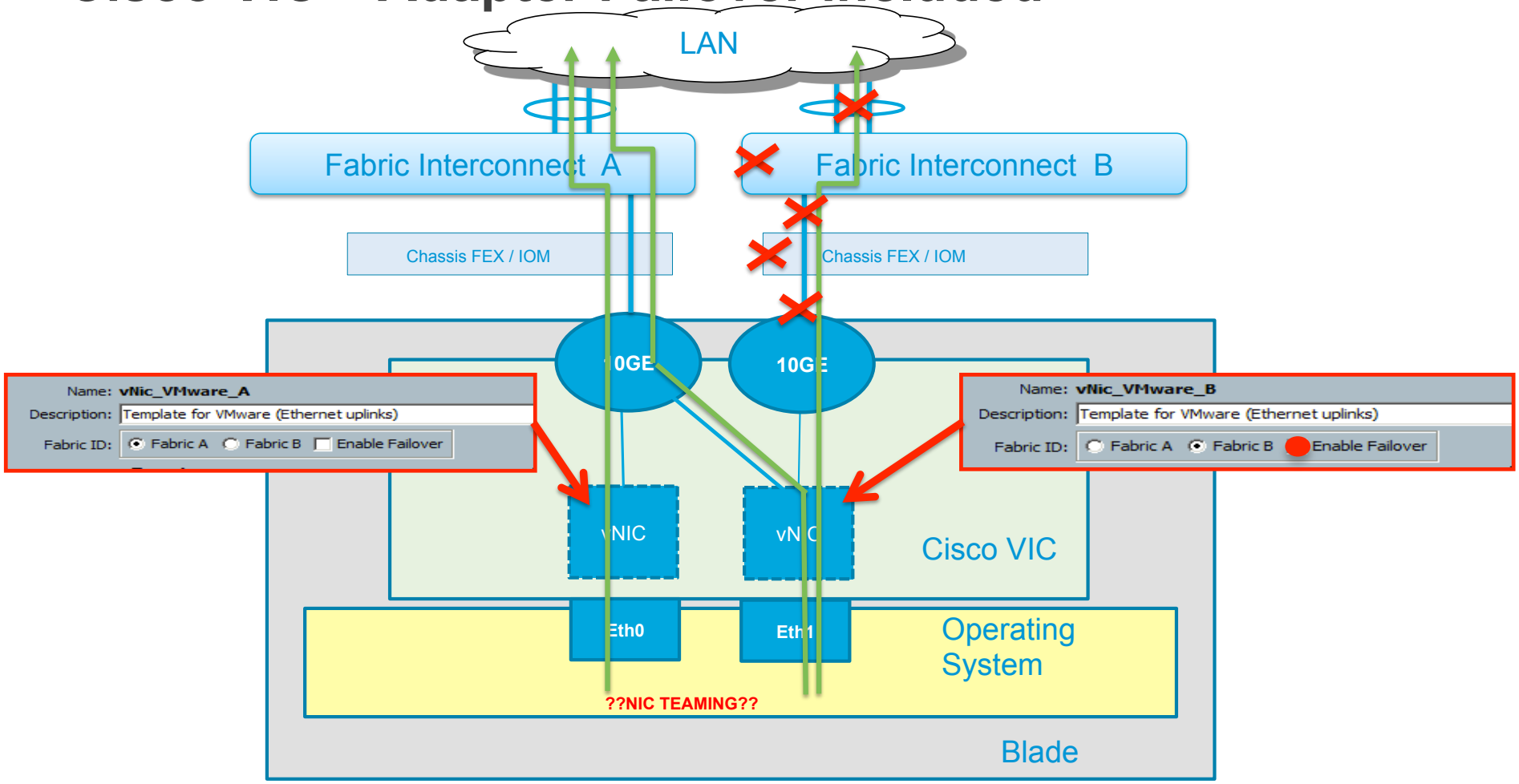
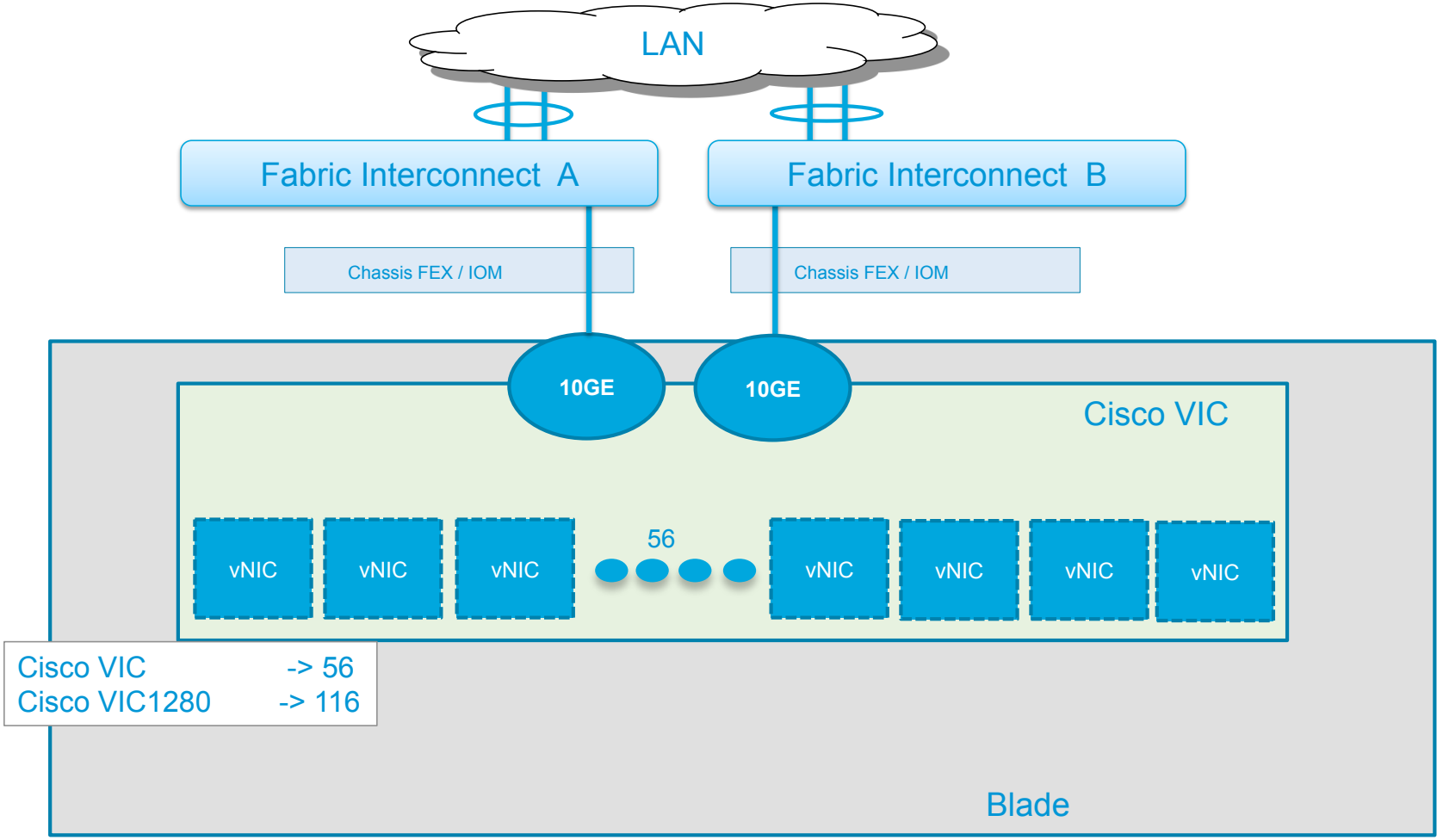
3. Stateless Server Provisioning
   - Service Profiles
4. Open API for management
5. Advanced Networking Features
   - Virtual Interface Card
   - QoS versus Rate-Limiting

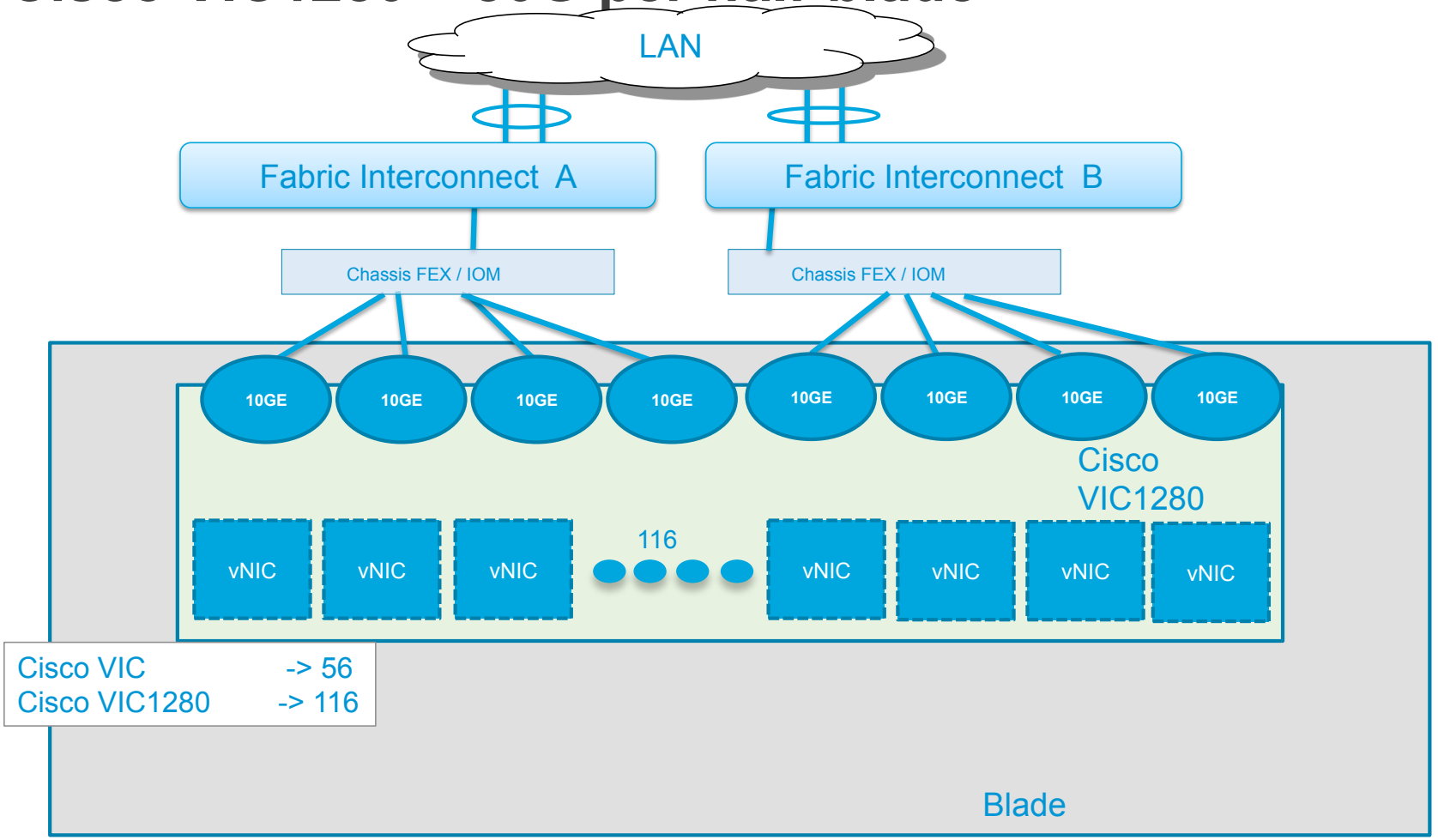
Cisco VIC – Adapter Failover included



Cisco VIC – Virtual Interfaces



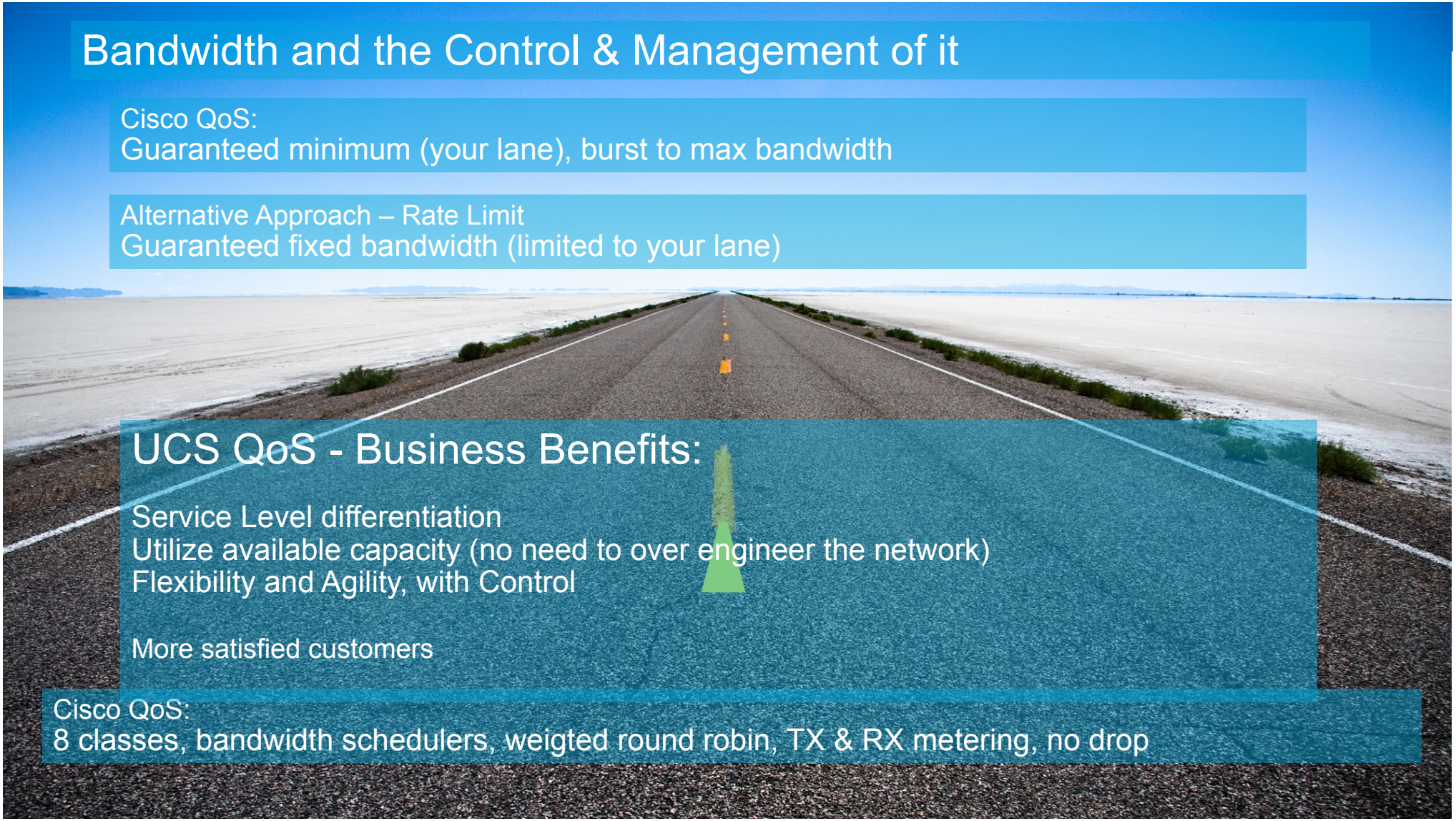
Cisco VIC1280 – 80G per half-blade



Bandwidth and the Control & Management of it

Cisco QoS:
Guaranteed minimum (your lane), burst to max bandwidth

Alternative Approach – Rate Limit
Guaranteed fixed bandwidth (limited to your lane)



UCS QoS - Business Benefits:

Service Level differentiation
Utilize available capacity (no need to over engineer the network)
Flexibility and Agility, with Control

More satisfied customers

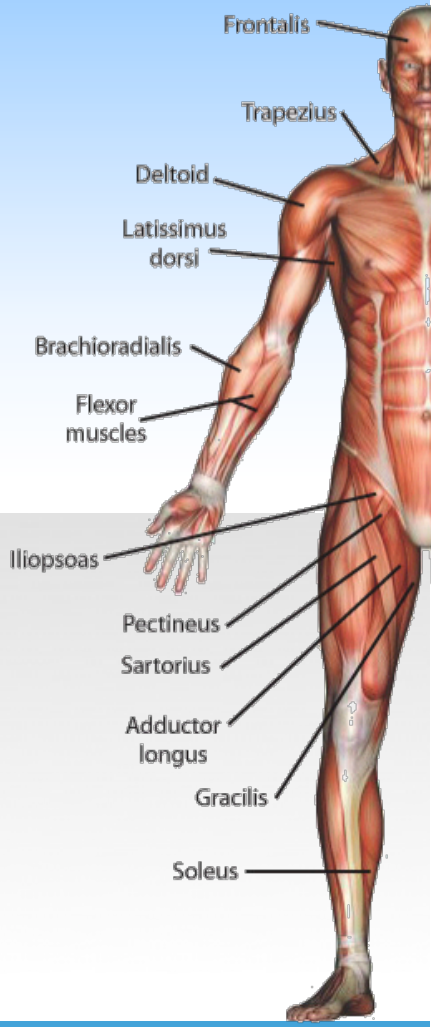
Cisco QoS:
8 classes, bandwidth schedulers, weigted round robin, TX & RX metering, no drop

Unified Computing System Innovations

Integrated Design	Performance optimized for any type of workload
Service Profiles	Agility and reduced time to deploy and provision applications
UCS Manager	Role-based management, automation, ease of integration
UCS Central	Centralized, multi-domain management, alerting and visibility
Unified Fabric	Simplified infrastructure
Virtualized I/O	Security isolation per application, scale, improved performance
Form Factor Independence	Supports both blades and rack mount servers in a single domain
Memory Scale	Cost effective application performance, scale, full capacity not dependent on CPU

EMC **Xtrem** - anatomy

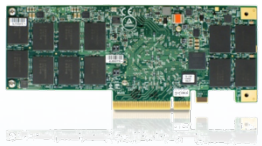
Luděk Šafář, EMC



EMC²

EMC Xtrem family

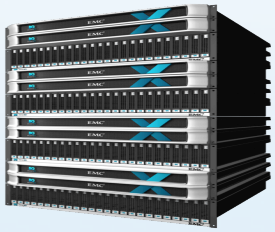
XtremSF



HW kapacitní PCIe karta o výkonu až milion IOPS. Je instalována přímo v serveru. Může být použita jako lokální kapacita nebo cache

XtremSW cache

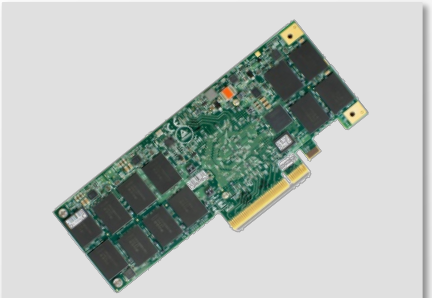
SW řešení umožňující využívat lokální flash kapacitu jako cache pro transakčně aktivní data



XtremIO

scale-out All-flash array nové generace pracující s in-line deduplikací, pro systémy s vysokými nároky na výkon a nízkou latencí

Flash



PCIe Server Flash

SSD Array Flash

Hard Drive

Performance

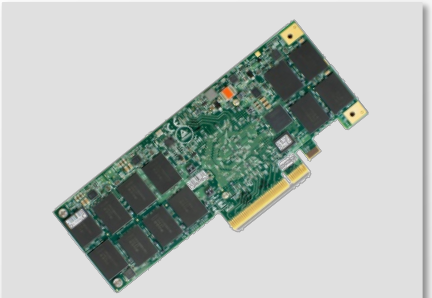
Nearline

<100uS – 500uS 1ms

Latence

EMC²

Flash



PCIe Server Flash

SSD Array Flash

Hard Drive

Performance

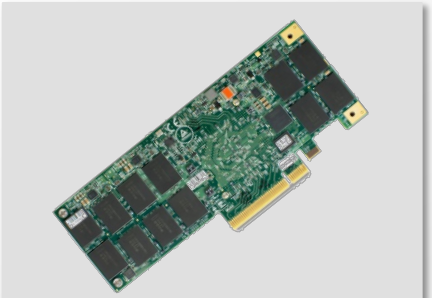
Nearline

10K – 200K **200**

IOPS

EMC²

Flash



PCIe Server Flash

SSD Array Flash

Hard Drive

Performance

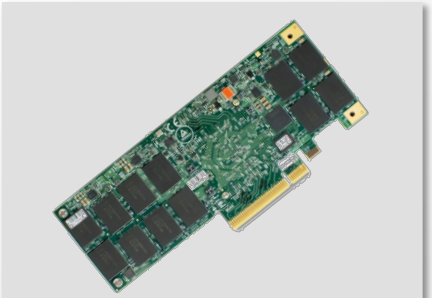
Nearline

10X **X**

$ / GB

EMC²

Flash



PCIe Server Flash

SSD Array Flash

Hard Drive

Performance

Nearline

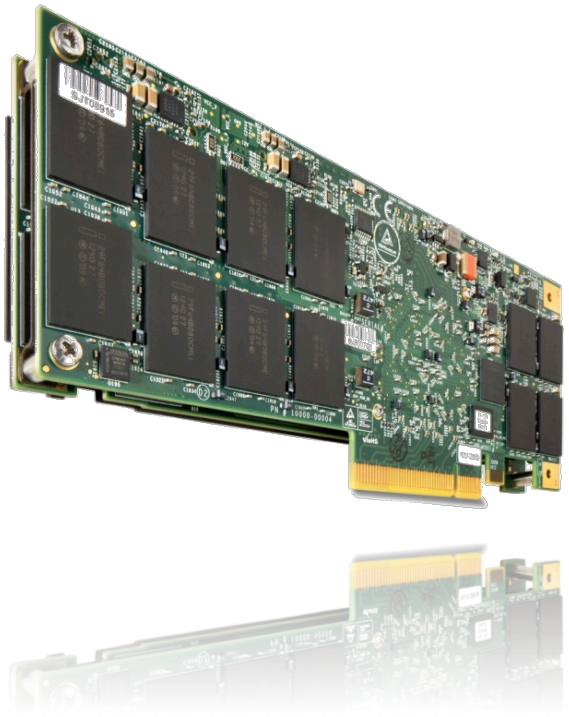
100X **5X** **X**

IOPS / $

EMC²

XTREM SF

ACCELERATING APPLICATION PERFORMANCE



XtremSF

- PCIe X8 Architecture For Superior Bandwidth
- Advanced Garbage Collection Reduces Spikes
- Optimized For Real World, 4K & 8K Workloads
- Range Of Capacities in MLC & SLC Flash
- Offload Engine Reduces CPU Consumption

XTREM SW

SERVER FLASH DAS BECOMES CACHE

XtremSW Cache 1.5

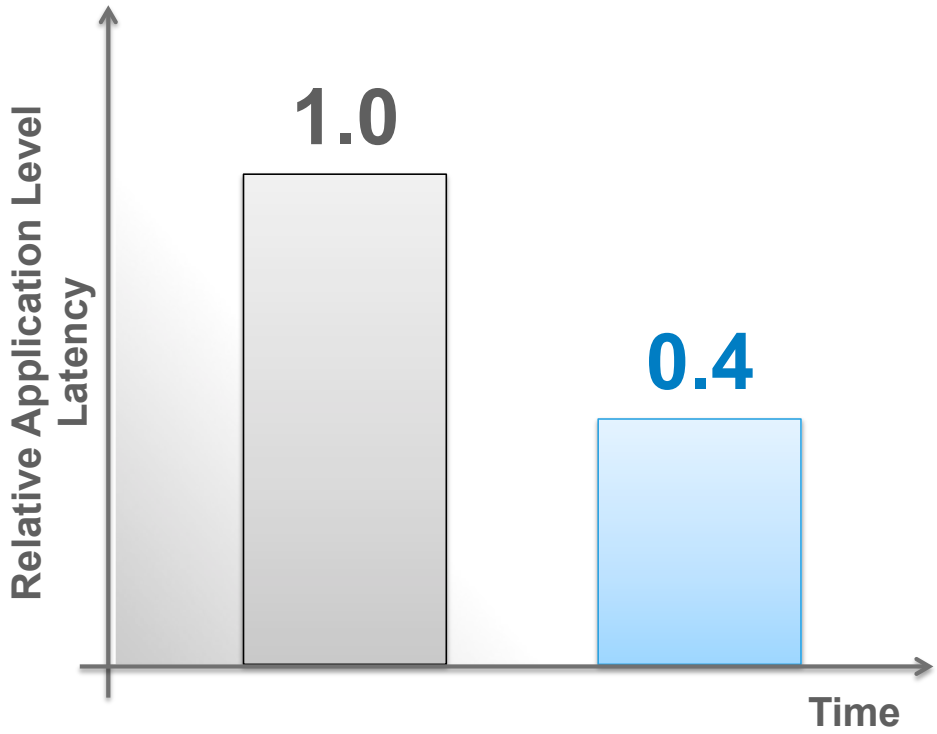
- Write-Through Cache
- De-Duplication
- VMAX Management Integration
- Works On All XtremSF Cards

CentOS redhat Windows Server 2008 Hyper-V

Windows Server 2012 vmware

EMC²

Real World Application Testing Results



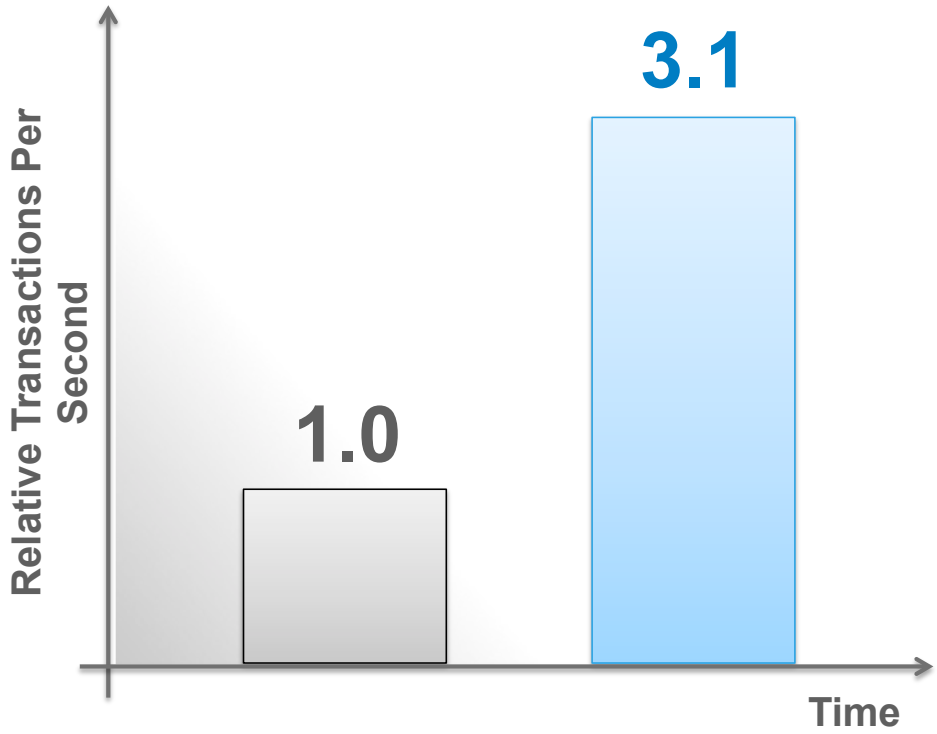
ORACLE

60%
RESPONSE
BETTER
TIMES

Solution architecture consists of an Oracle Database, Cisco UCS C-460 server and an EMC VMAX . EMC tested the capabilities of VFCache. Testing employed a standard TPC-C like OLTP workload with a 1.2 TB database and a 70-30% read/write mix with 250 GB of hot data. VFCache enabled on all data LUNs, but not on log LUNs. No tuning of Oracle database. VMAX storage system: 4 Engines, 512GB of mirrored cache; 16 x 250 GB Data LUNs on 64 x 450 GB 15K RPM FC drives (RAID 5), 4 x 200 GB Log LUNs on 16 x 450 GB 15K RPM FC drives (RAID 5); Database buffer cache 4GB, Server connected to VMAX using 4 x 8Gbps Fibre Channel.

EMC²

Real World Application Testing Results



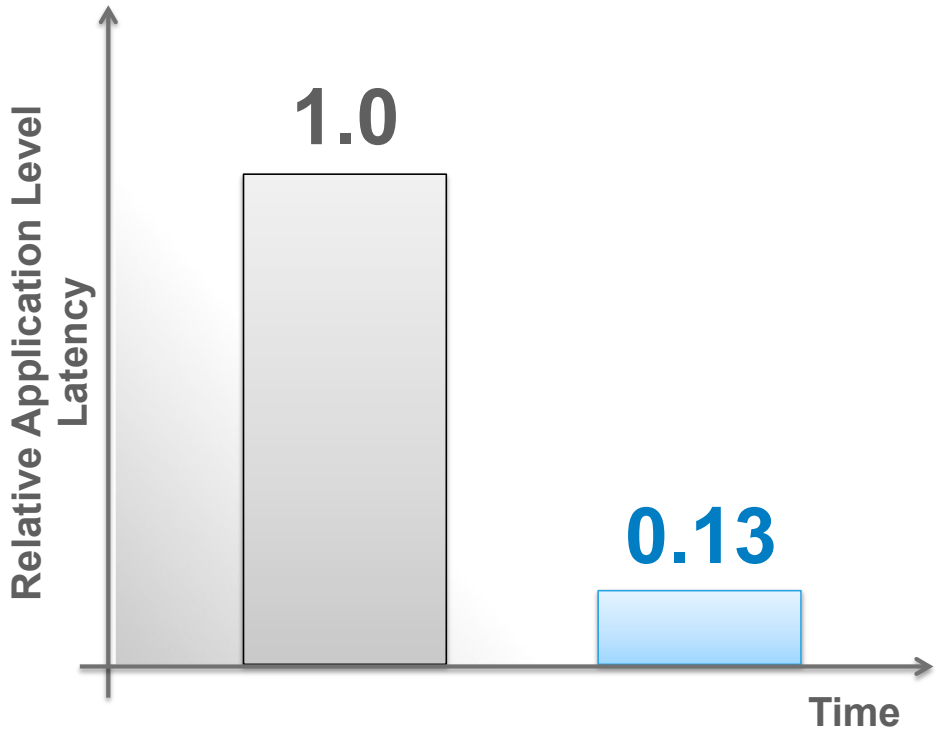
ORACLE

210% BETTER PERFORMANCE

Solution architecture consists of an Oracle Database, Cisco UCS C-460 server and an EMC VMAX . EMC tested the capabilities of VFCache. Testing employed a standard TPC-C like OLTP workload with a 1.2 TB database and a 70-30% read/write mix with 250 GB of hot data. VFCache enabled on all data LUNs, but not on log LUNs. No tuning of Oracle database. VMAX storage system: 4 Engines, 512GB of mirrored cache; 16 x 250 GB Data LUNs on 64 x 450 GB 15K RPM FC drives (RAID 5), 4 x 200 GB Log LUNs on 16 x 450 GB 15K RPM FC drives (RAID 5); Database buffer cache 4GB, Server connected to VMAX using 4 x 8Gbps Fibre Channel.

EMC²

Real World Application Testing Results



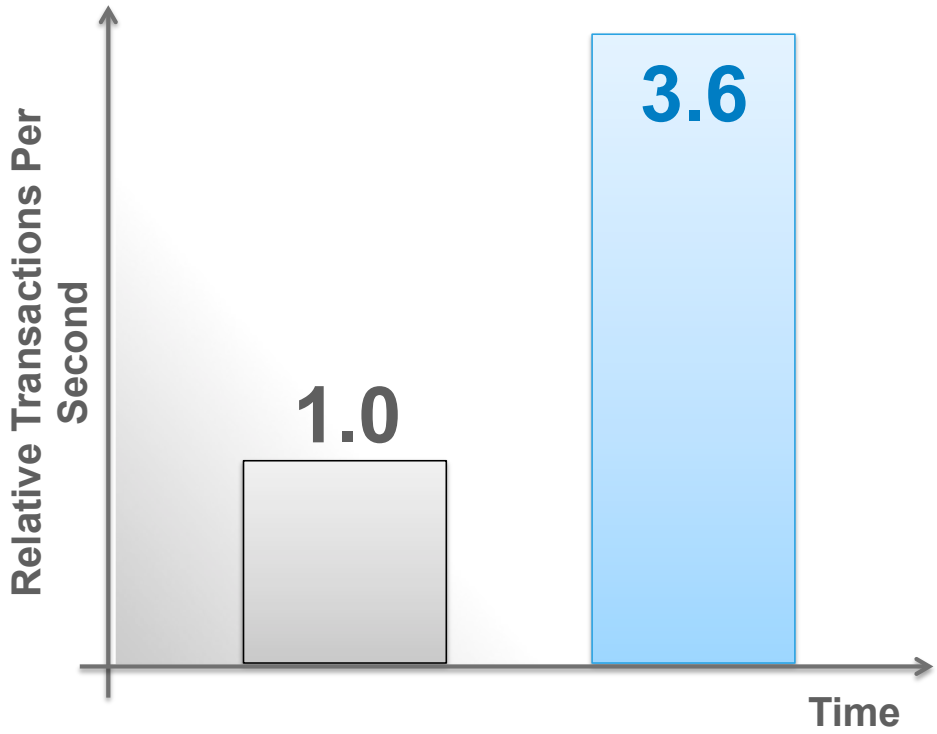
Microsoft SQL Server

87%
RESPONSE TIMES
BETTER

Solution architecture consists of Microsoft SQL Server 2008 R2 , Cisco UCS C-460/M1 rack mount server and an EMC VNX5300. EMC tested the capabilities of VFCache. Testing employed a standard TPC-E like OLTP workload with a 750GB database and a 90/10 % read/write mix. VFCache enabled on all data LUNs, but not on log LUNs. No tuning of SQL database. Configuration Details: Read Cache on VNX5300 = 700MB, Write Cache on VNX5300 = 2000MB; 20 x 260 GB Data LUNs on 100 x 300 GB 10K RPM SAS drives (RAID 5), 1 x 500GB Log LUN on 4 x 300 GB 10K RPM SAS drives (RAID 10); Database buffer cache size 10GB; Server connected to VNX storage system using 4 x 8Gbps Fibre Channel.

EMC²

Real World Application Testing Results



Microsoft SQL Server

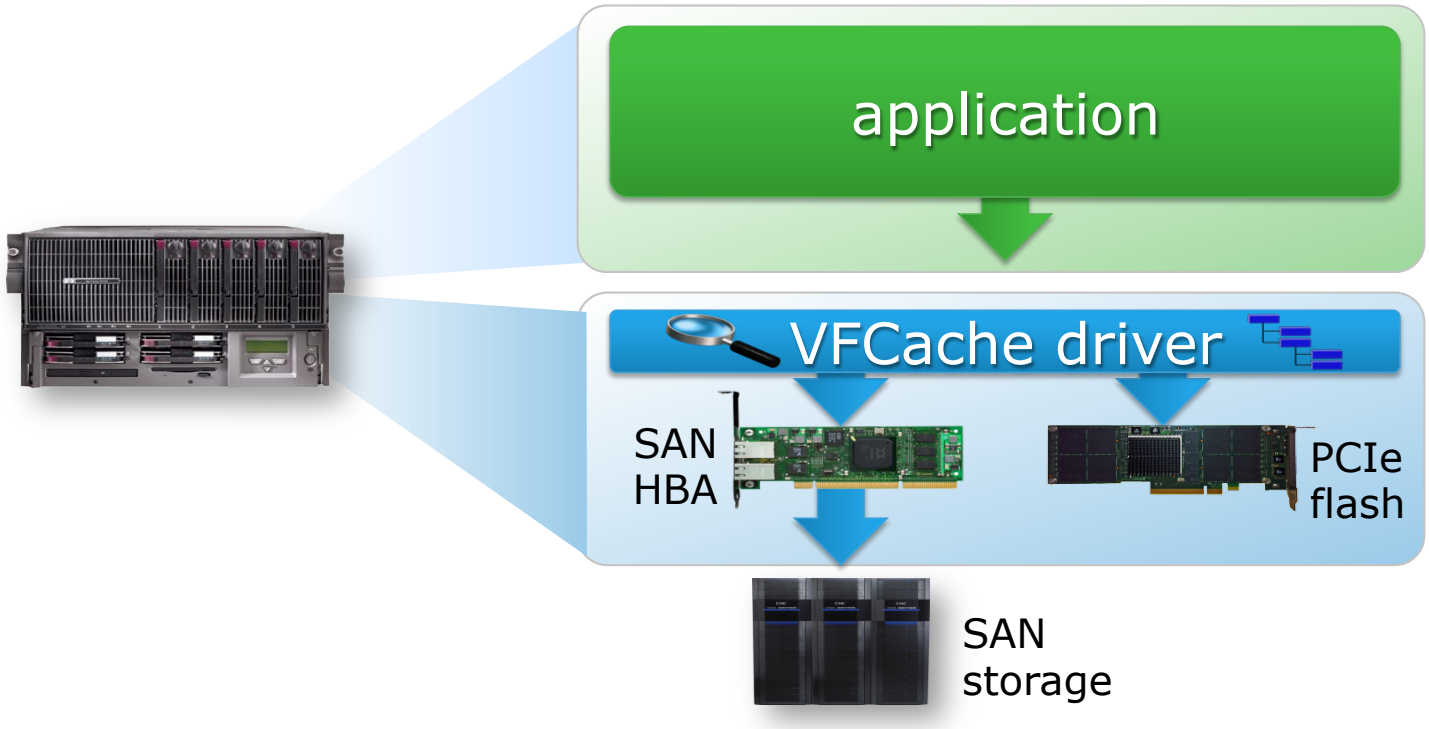
260% BETTER PERFORMANCE

Solution architecture consists of Microsoft SQL Server 2008 R2 , Cisco UCS C-460/M1 rack mount server and an EMC VNX5300. EMC tested the capabilities of VFCache. Testing employed a standard TPC-E like OLTP workload with a 750GB database and a 90/10 % read/write mix. VFCache enabled on all data LUNs, but not on log LUNs. No tuning of SQL database. Configuration Details: Read Cache on VNX5300 = 700MB, Write Cache on VNX5300 = 2000MB; 20 x 260 GB Data LUNs on 100 x 300 GB 10K RPM SAS drives (RAID 5), 1 x 500GB Log LUN on 4 x 300 GB 10K RPM SAS drives (RAID 10); Database buffer cache size 10GB; Server connected to VNX storage system using 4 x 8Gbps Fibre Channel.

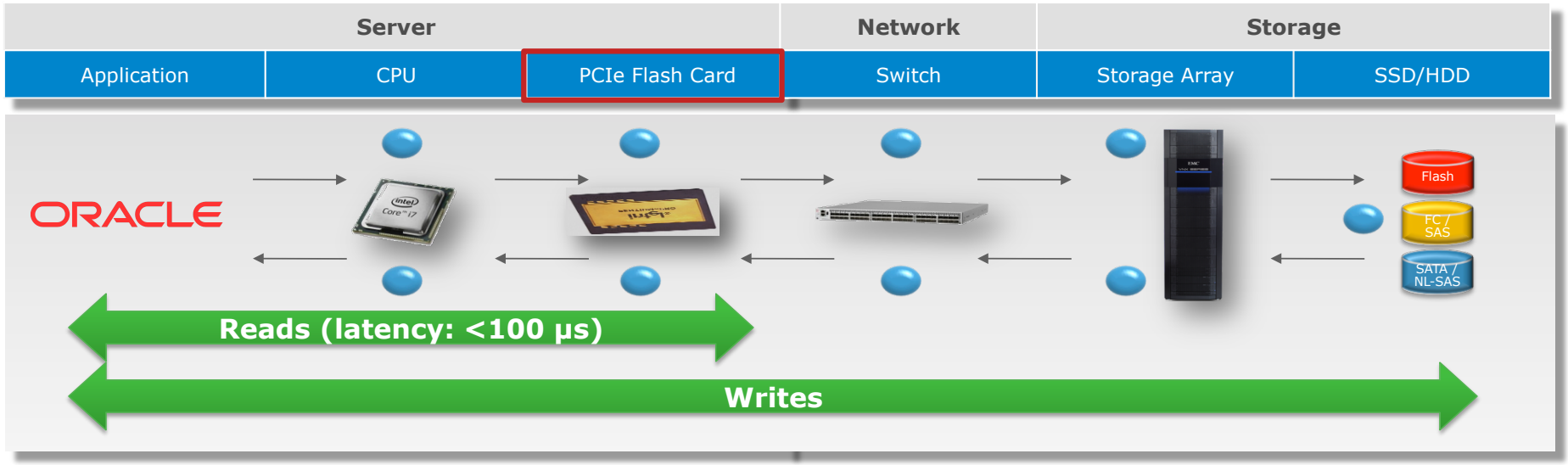
EMC²

100% transparent caching

VFCache driver extends your SAN performance



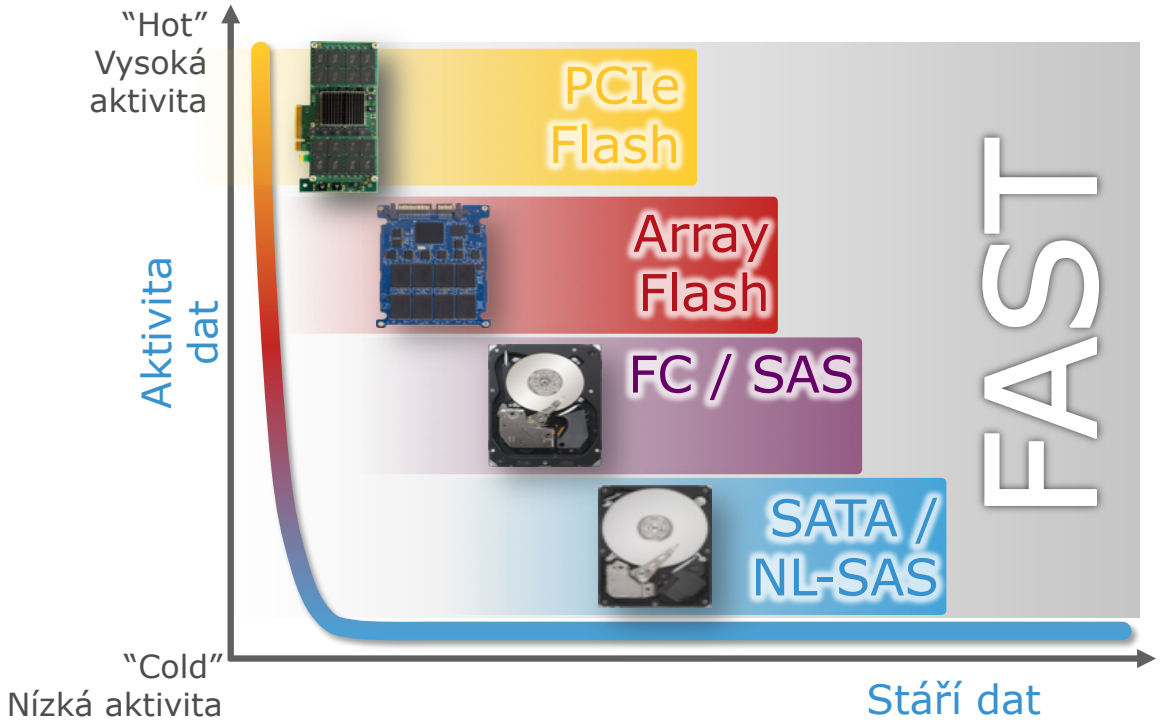
XtremSF+SW Cache architektura



- Čtení aktivních dat je realizováno z Xtrem SF — VÝKON
- Zápisy jsou ukládány na diskové pole (cache) — OCHRANA

Automatický tiering od A do Z

Rozšíření FAST Architektury

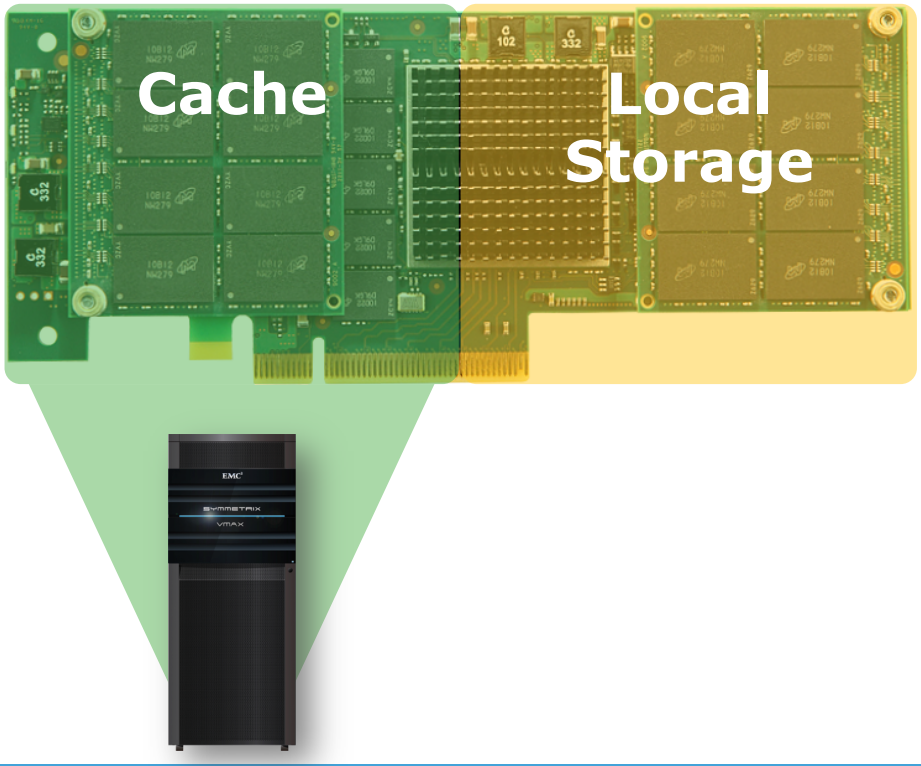


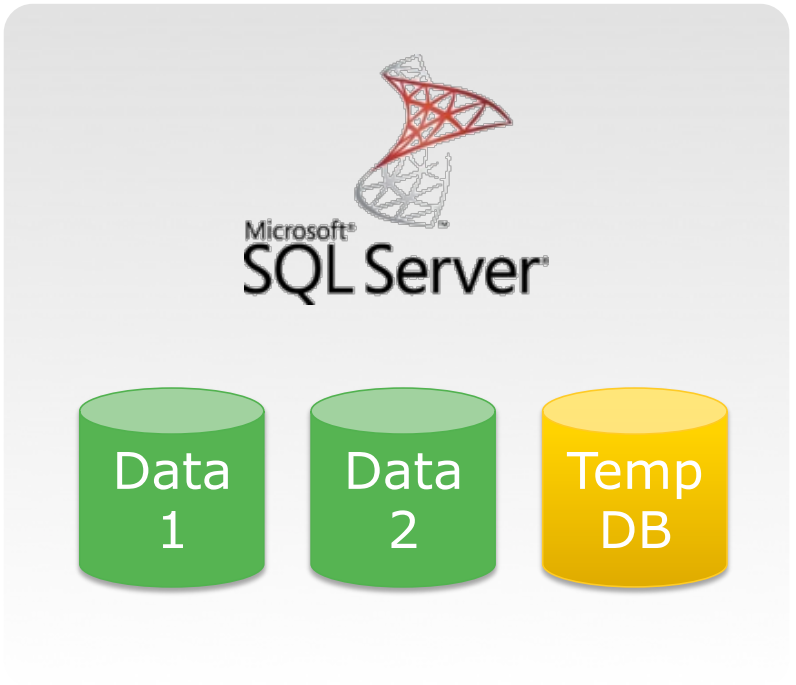
Fast algoritmus

Řídí uložení dat od ExtremeSF až po SATA/NL-SAS kapacity

Nejaktivnější data jsou uložena v ExtremeSF.

XtremSF/SW Cache Split Card Mode





Inline Cache de-duplikace

Větší kapacita za stejnou cenu

- **Efektivnější cena/GB:** efektivní kapacita větší než kapacita fyzická
- **Prodloužení životnosti:** snížení počtu zápisů a přepisů pamětí

Velikost VFcache	Kapacita
Fyzická kapacita	300 GB
Efektivní kapacita (20% de-duplikační poměr)	360 GB

Nejlepší výkon a kapacita ve své třídě

	550 GB eMLC	2.2 TB eMLC	350 GB SLC	700 GB SLC
Read Bandwidth	1.36 GB/s	2.47 GB/s	2.9 GB/s	2.9 GB/s
Write Bandwidth	512 MB/s	1.1 GB/s	756 MB/s	1.8 GB/s
Random 4K Read IOPS	174K	343K	715K	712K
Random 4K Write IOPS	49K	105K	95K	197K
Random 4K Mixed IOPS	96K	206K	267K	411K
Read Access Latency	87 µs	87 µs	50 µs	50 µs
Write Access Latency	37 µs	30 µs	13 µs	13 µs

- Nejlepší výkon eMLC kapacitní karty—**340K IOPS** a **30µs** latence
- Rozměrově nejmenší karta v poměru ke kapacitě na trhu


EMC²

Otázky a odpovědi

Prosíme, ohodnoťte tuto přednášku.

Děkujeme za pozornost.