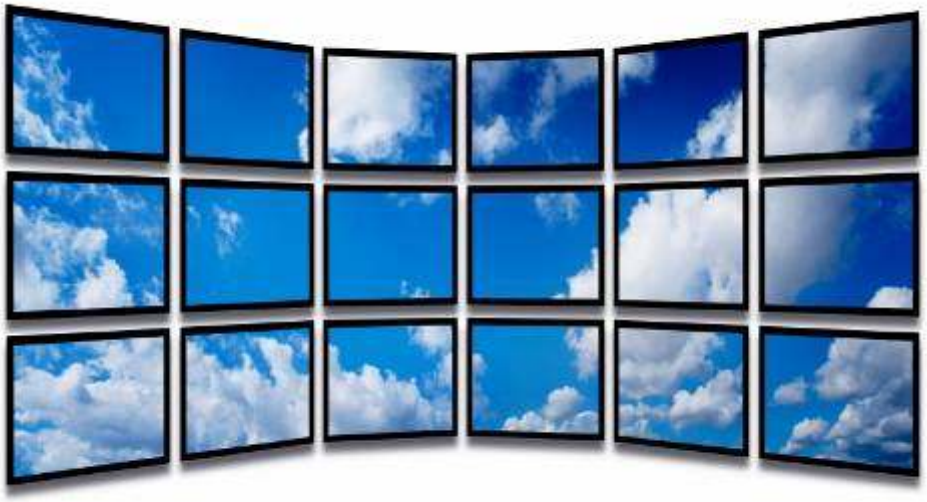
Virtualizacija 3



Silvo Lipovšek

Cisco

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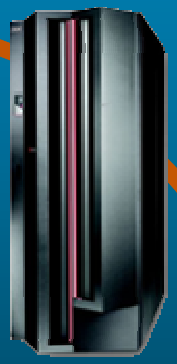
The Data Center Evolution

IT Relevance and Control

Phase 1	Phase 2	Phase 3
Mainframe	Client-Server and Distributed Computing	Service Oriented and Web 2.0 Based



Centralized

Decentralized

Virtualized

Appli

Addressing The Business Issues with IT

Consolidate

- Reduced complexity, less to manage
- Lower OPEX
- Regain control of IT resources

Virtualize

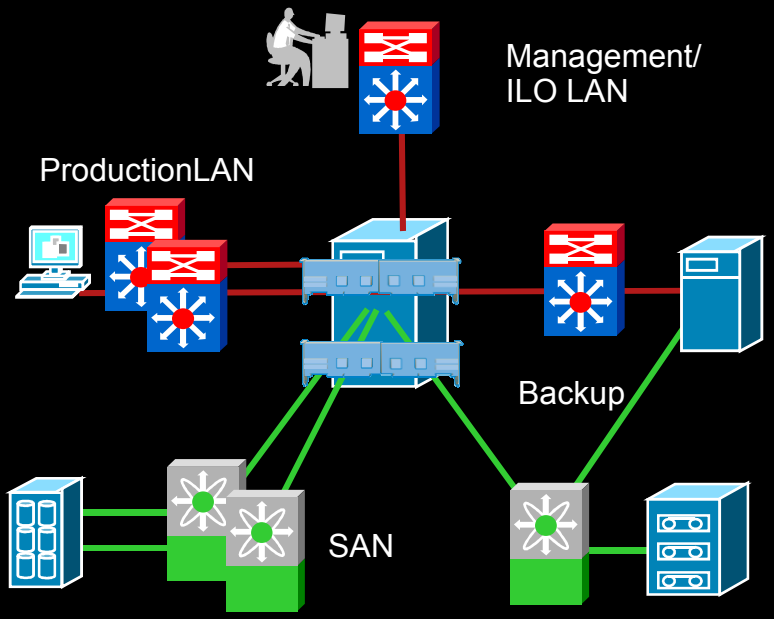
- Higher resource utilization
- Lower CAPEX
- Decouples logical from physical resources

Automate

- Dynamically allocate resources
- Simplified policy-based provisioning
- Increase IT productivity

Unified I/O and Unified Fabric

Current state

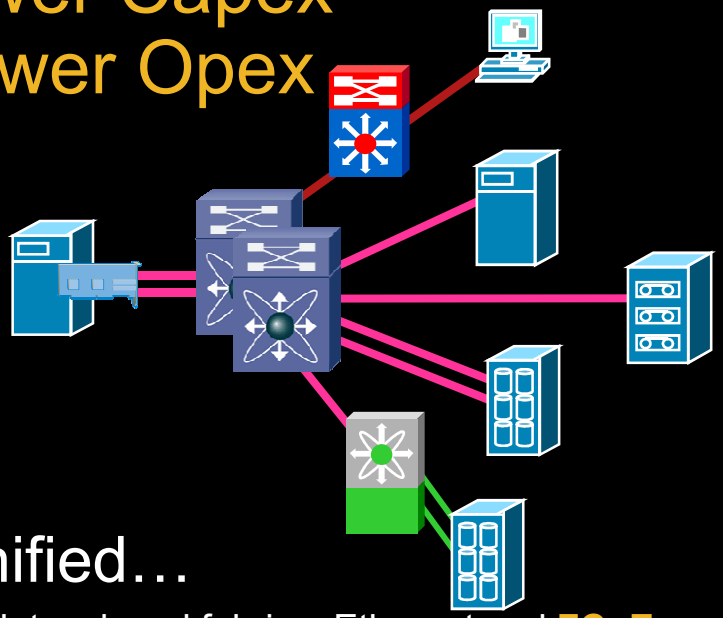


More…

- Networks and fabrics
- Switches
- Netowrk cards and HBAs
- Cables/connections
- Management tools

What we want

Lower Capex
Lower Opex



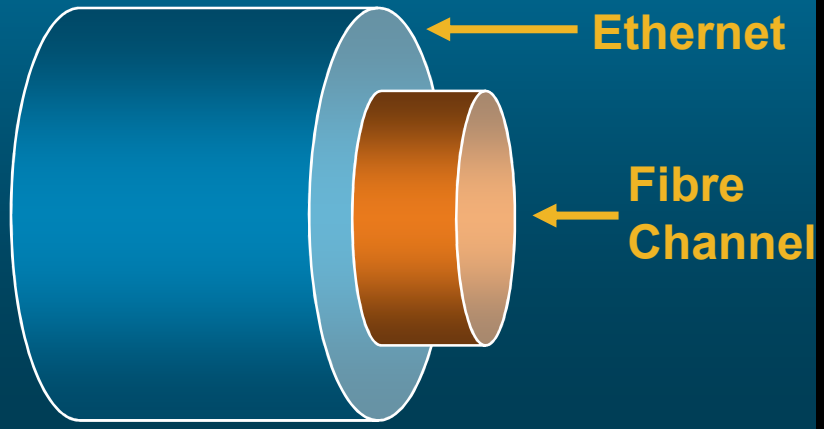
Unified…

- Network and fabric – Ethernet and **FCoE**
- Unified L2 transport
- Data Center Switches (DCB)
- Unified and virtulized I/O
- L2 Multipathing
- Converged Network Adapter
- Cables/Connections – less, faster
- Management tools – less

FC over Ethernet (FCoE)

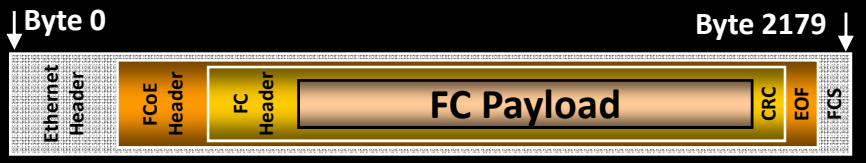
FCoE

- Mapping of FC frames over Ethernet
- Enables FC to run on a lossless Data Center Ethernet network

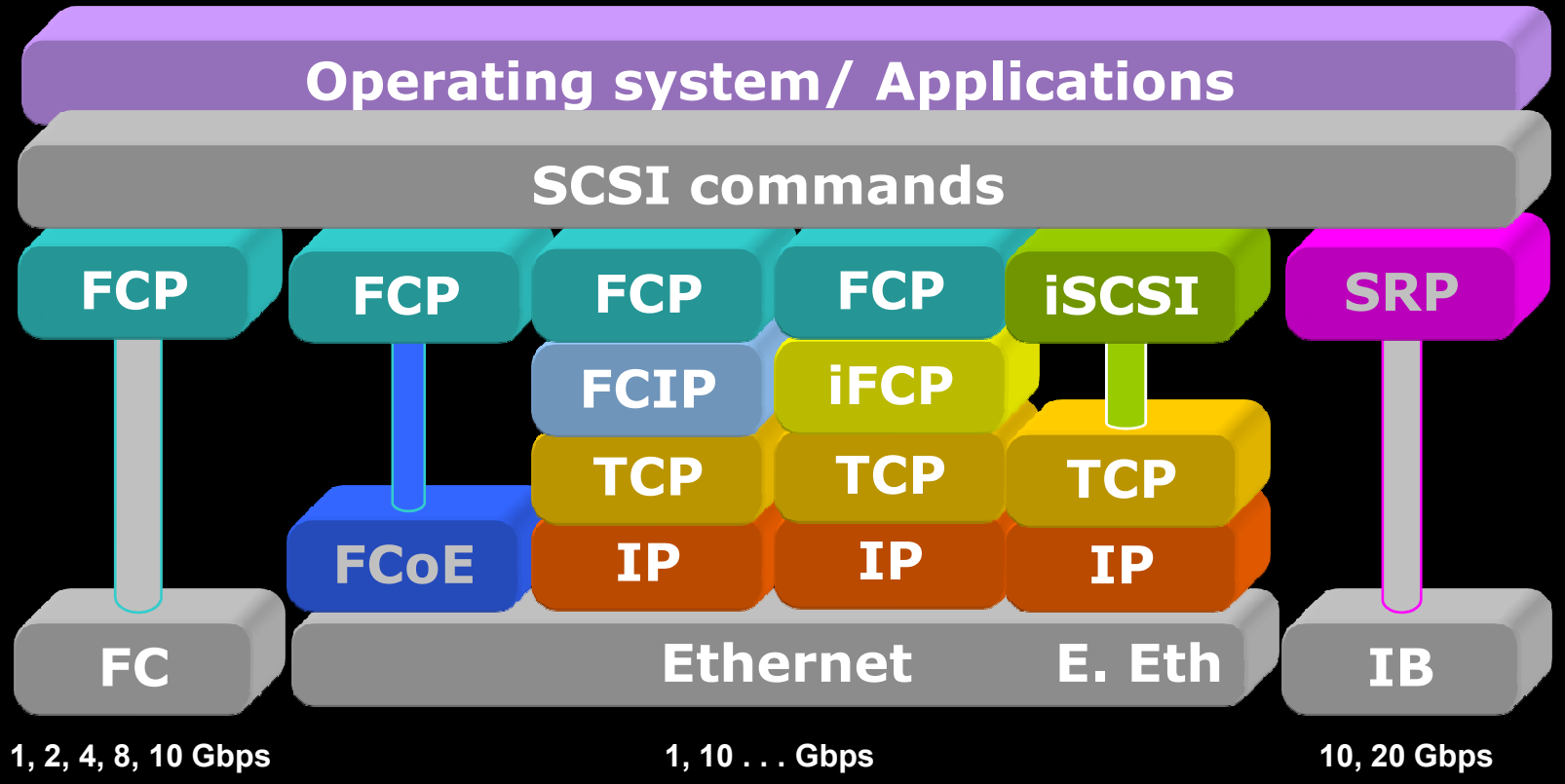


Benefits

- Wire Server Once
- Fewer cables and adapters
- Software Provisioning of I/O
- Interoperates with existing SANs
- No gateway—stateless



Protocol into protocol into protocol ...



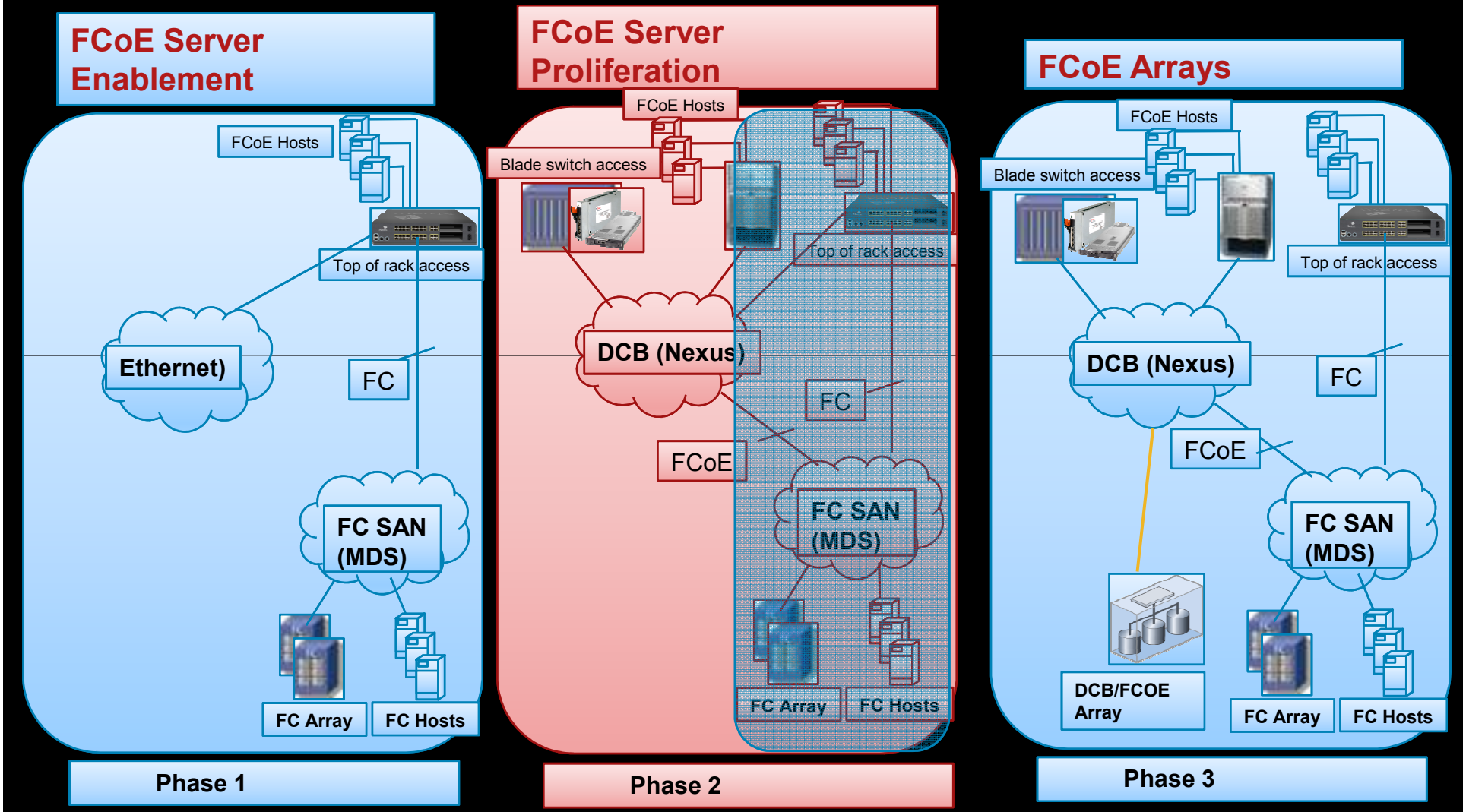
What is Data Center Bridging?

Data Center Bridging is an architectural collection of Ethernet extensions designed to improve Ethernet networking and management in the Data Center.

Data Center Bridging - DCB

Feature	Benefit
Priority-based Flow Control (PFC) IEEE 802.1Qbb(PFC)	Provides ability to manage bursty, single traffic source on a multi-protocol link
CoS BW Manager – Flexible Drop-free Scheduler IEEE 802.1Qaz (ETS)	Bandwidth Management between traffic types for Multi-protocol links
Data Center Bridging Exchange IEEE 802.1AB (DCBX)	Allows auto exchange of Ethernet parameters between peers (Switch to NIC, switch to switch)
Congestion Notification (BCN/QCN) IEEE 802.1Qau	Addresses problem of sustained congestion, driving corrective action to the edge
L2 Multi-path for Unicast & Multicast IETF - TRILL	Utilize full Bi-Sectional bandwidth of L2 topologies
Lossless Service	Allows the creation of a guaranteed delivery service for Apps that require it

FCoE Storage Networking Evolution



The Network Portfolio for Data Center

High Availability
Fault Tolerant
Self Healing

Virtualize
Modular Multi-Threaded
VM-Optimized Services

NX-OS

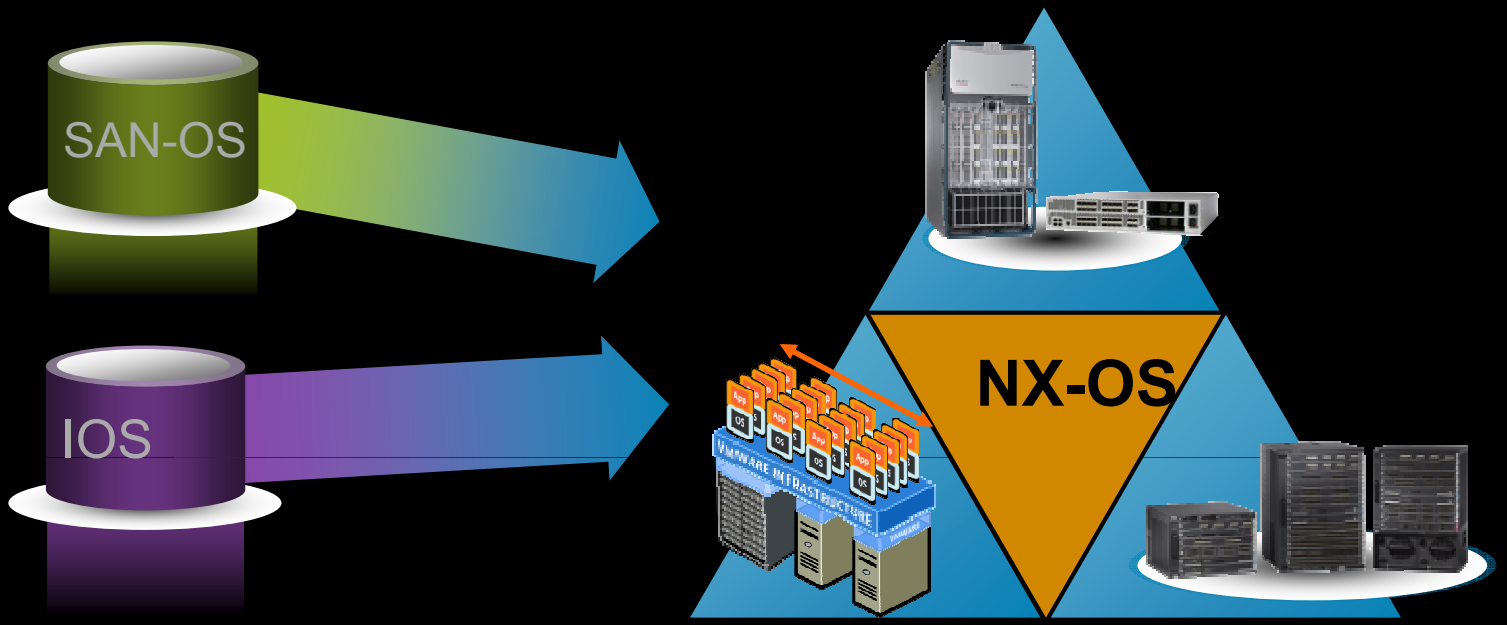
Automate
Data Center
Class platform
& operating
system

Purpose
Built
For the
Data Center

Unified
Fabric

Consolidate
10GbE Scalable
Single Fabric
Solution

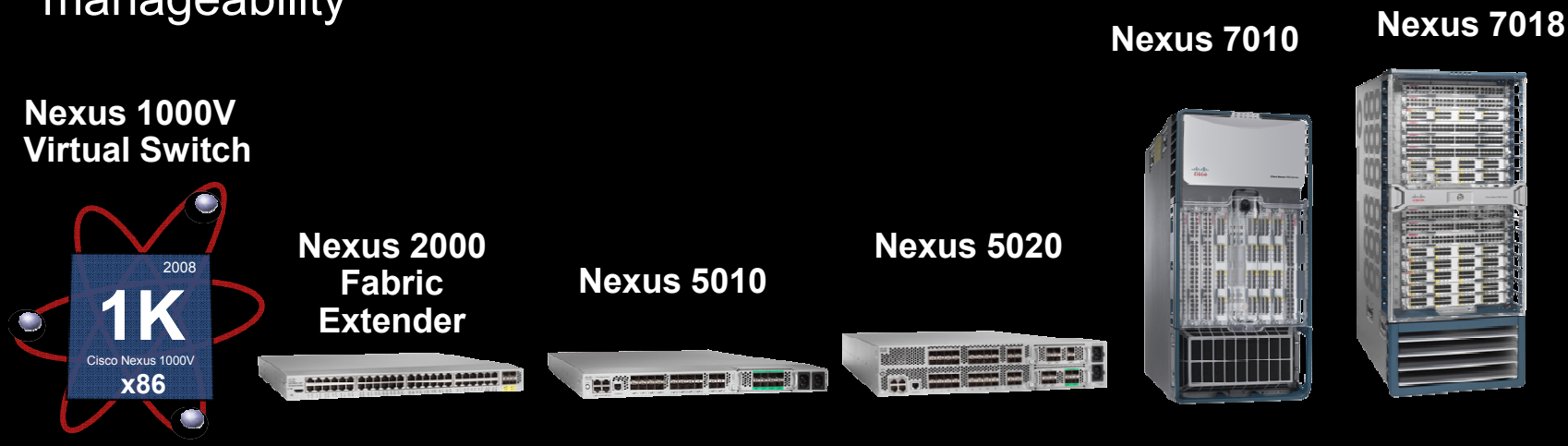
NX-OS is the Data Center Operating System



- Simplifies the data center environment
- Brings server, storage and network closer than ever
- Lays the foundation for unified fabric
- Re-Branding SAN-OS in recognition of common codebase

Cisco Nexus Family

- Complete data center class switching portfolio
- Consistent data center operating system across all platforms
- Infrastructure scalability, transport flexibility and operational manageability



NX-OS Data Center Operating System

Data Center Network Manager

Introducing Cisco Nexus 7000 Series
Data Center Class Switches

Zero Service Disruption design via Hot Code Loads

Unified fabric (lossless) - 10GB today and 40Gb and 100Gb investment protection

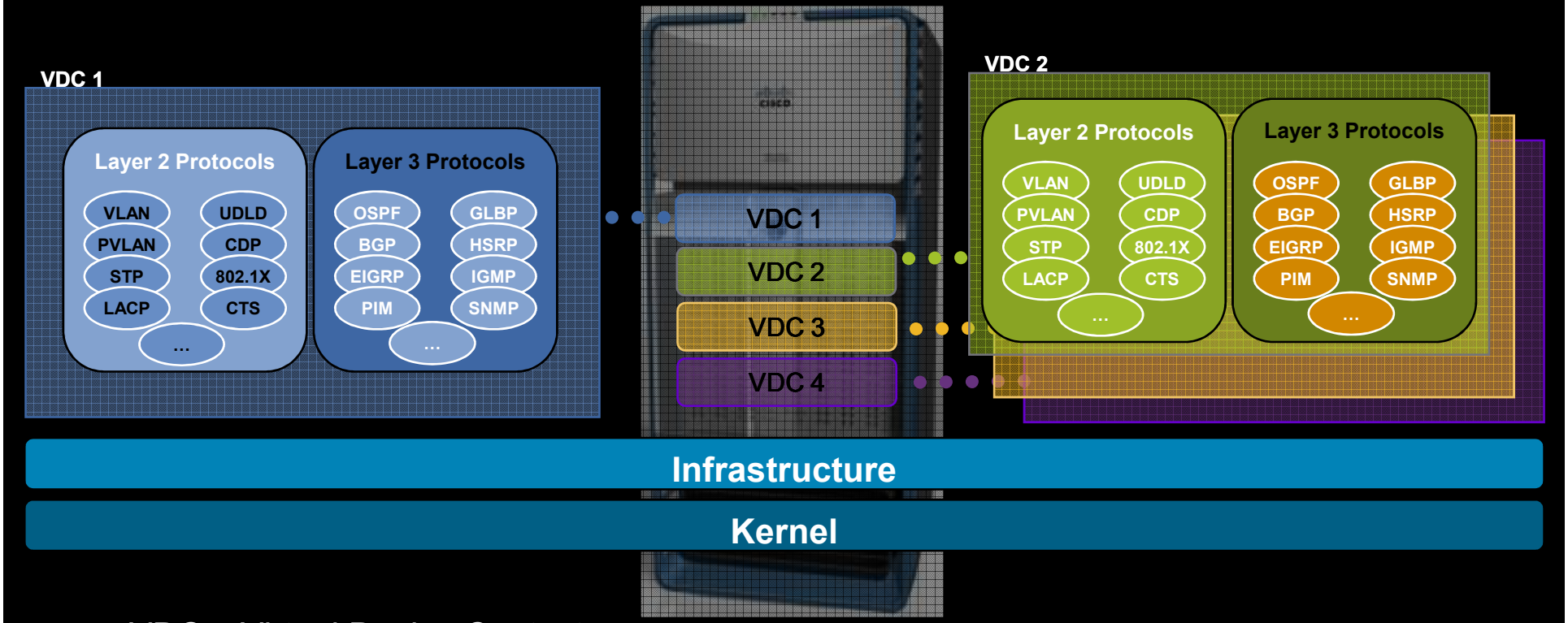
Virtualized control and data plane

Operational Continuity

Transport Flexibility

Infrastructure Scalability

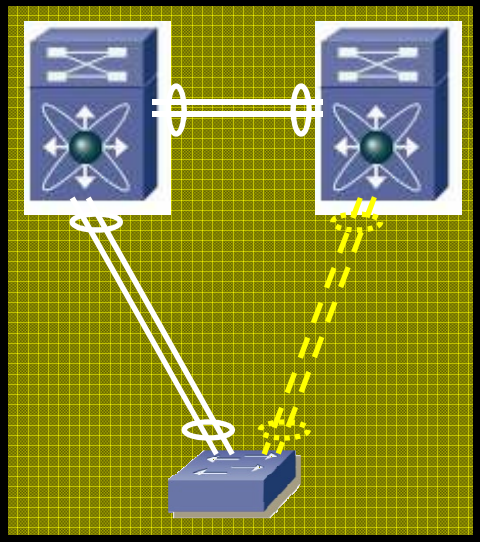
Virtualization with VDCs

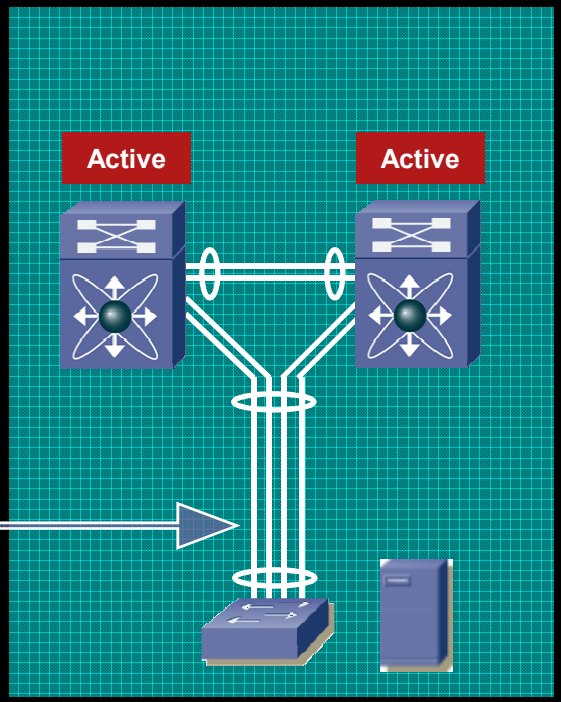


VDC – Virtual Device Context

- Flexible separation/distribution of hardware resources and software components
- Complete data plane and control plane separation
- Complete software fault isolation
- Securely delineated administrative contexts
- Forwarding engine scalability with appropriate interface allocation

Reverse virtualisation: Virtual Port-Channel





- Data plane and control plane are independent.
- Active/Active data links.
- Doble bandwith – no STP blocked ports
- vPC is transparent to servers and switches – fast convergence.

Network World Independent Test Summary

- Zero Packet Loss when Upgrading and Downgrading the software image - ISSU
- Zero Packet Loss when removing Fabric Cards
- Zero Packet Loss when killing and restarting OSPF

Test Conditions: Nexus 7000 I/O modules load balance all of the traffic across all 5 Fabric Cards. The test was performed with 51,200 OSPF routes, 256 OSPF neighbors (one on each 10GbE port), every packet going through a security ACL of 7000 lines, every packet being rewritten using a 500 line QOS ACL, each line cards was doing 48 Mpps lookup, and Cisco Netflow to track up to 512,000 flows . (See "How we did it" in the Article)

Cisco's Nexus 5000/2000 Access Layer Switches

Cisco Nexus 5000 Server Access Switch

Delivering Unified Fabric Today

56-Port L2 Switch

- 40 fixed ports 10GE/FCoE/ Data Center Ethernet
- 16x1GE
- 2 Expansion Modules

28-Port L2 Switch

- 20 fixed ports 10GE/FCoE/ Data Center Ethernet
- 8x1GE
- 1 Expansion Module

Ethernet

- 6 ports 10 Gigabit Ethernet/ FCoE/DataCenterEthernet

Ethernet + FC

- 4 Ports 10 Gigabit Ethernet/ FCoE/DataCenterEthernet
- 4 ports 1/2/4G FC

Fibre Channel

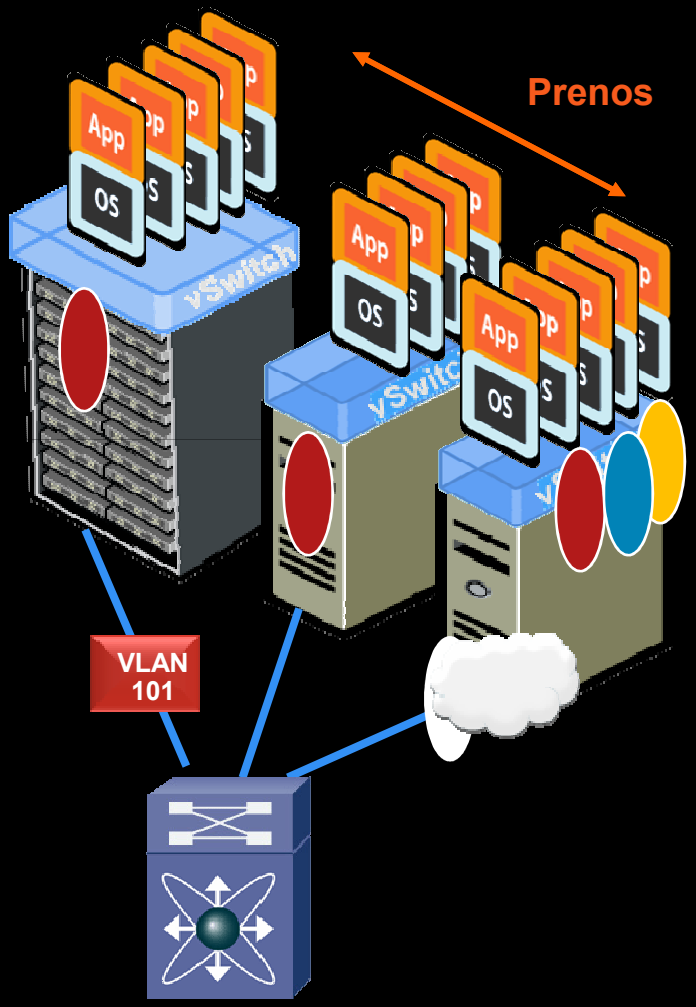
- 8 ports 1/2/4G FC

NX-OS

DC-NM and Fabric Manager

Cisco
Nexus 1000V

VN-Link – Detailed view of VM



Problems:

- After Vmotion, VM is seen on different switchport.
- Policy must follow VM.

- Traffic is not seen by the switch, so no policy can be enforced.

- All traffic comes together on one port. Hard to differentiate.

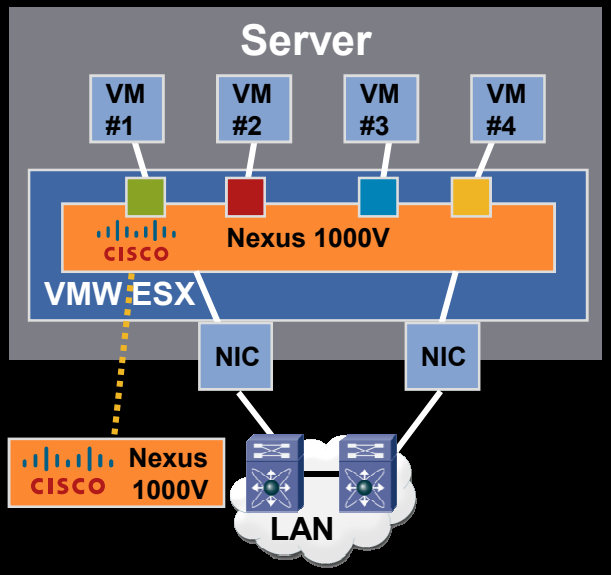
VN-Link:

- Brings network to the VM
- Consistent view of the network
- Easier management

Cisco Nexus 1000V

Cisco Nexus 1000V
Software Based

- Industry's first third-party ESX switch
- Built on Cisco NX-OS
- Compatible with switching platforms
- Maintain VirtualCenter provisioning model unmodified for server administration but also allow network administration of Nexus 1000V via familiar Cisco NX-OS CLI



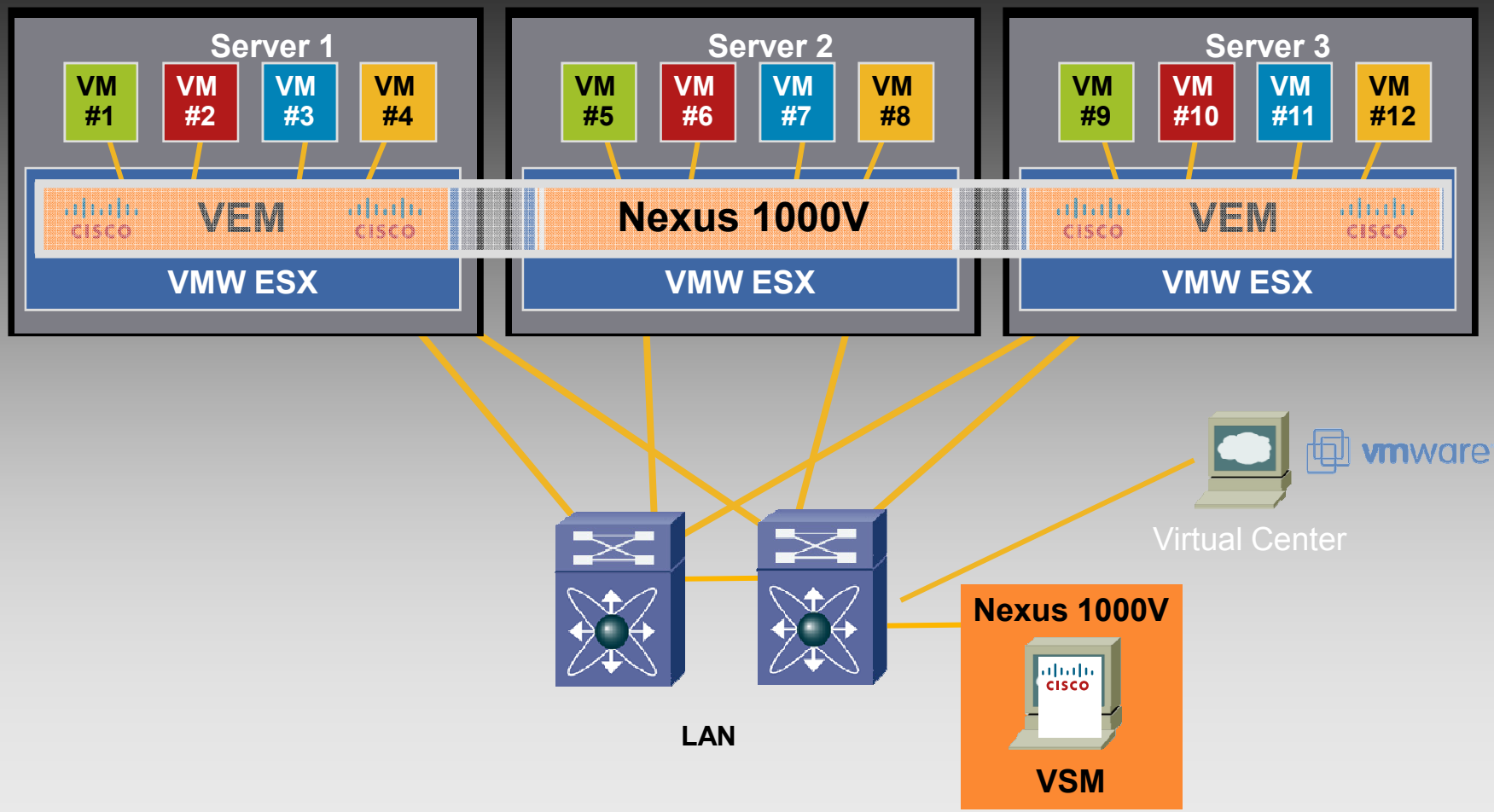
BEST OF vmworld 2008

Policy-Based VM Connectivity

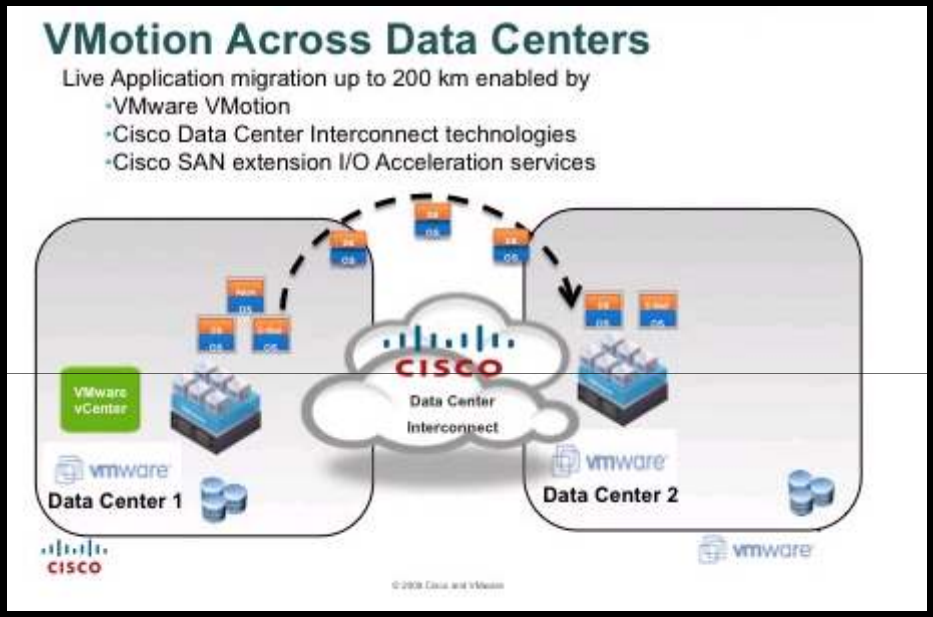
Mobility of Network and Security Properties

Non-Disruptive Operational Model

Cisco Nexus 1000V architecture

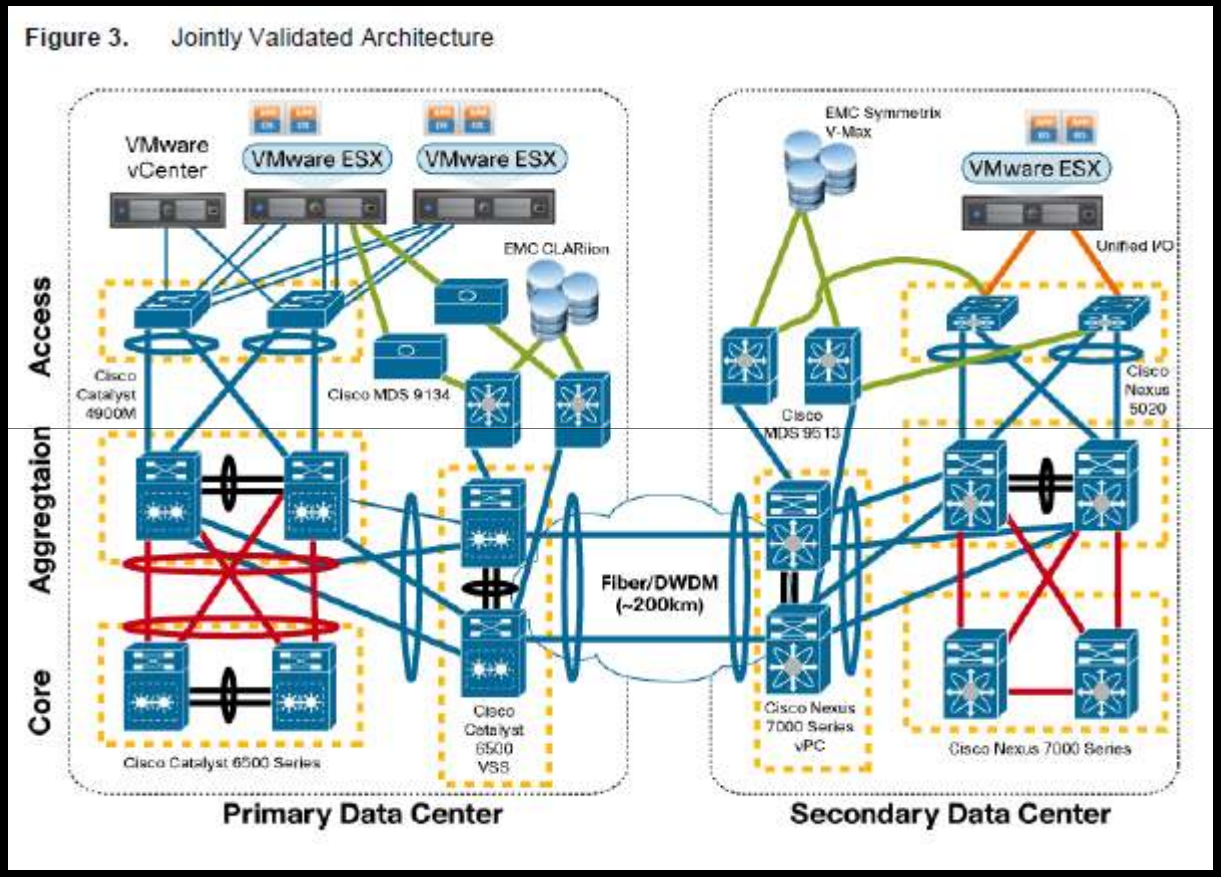


VMotion Across Data Center



1. Mobility at layer 2
2. Mobility of the data, since there is seldom value in moving the workload if it loses access to the data it needs
3. Mobility at layer 3 and of services

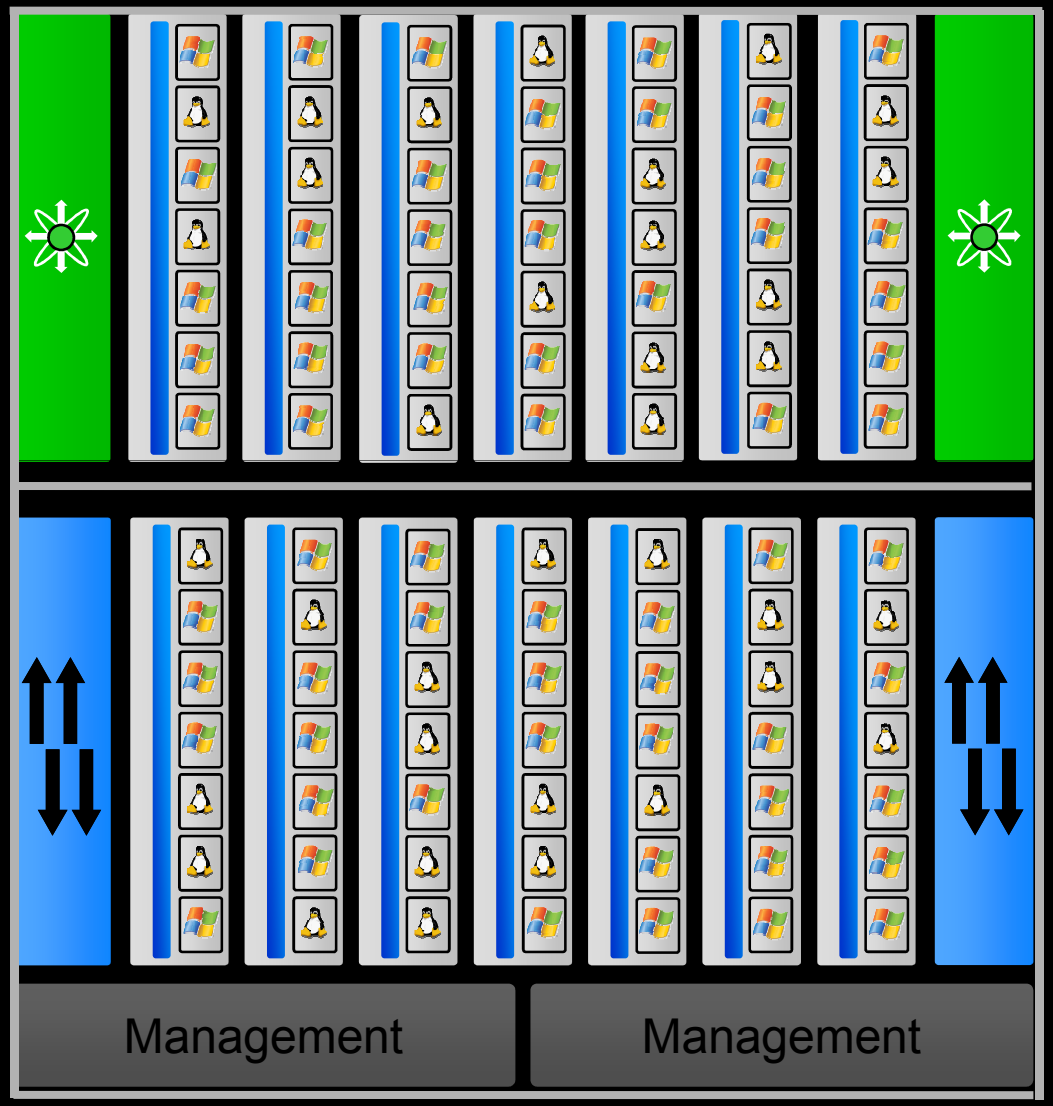
DC Architecture



Wite paper
http://www.cisco.com/en/US/solutions/collateral/ns340/ns517/ns224/ns836/white_paper_c11-557822.pdf

Cisco UCS Solution

Server Deployment Today

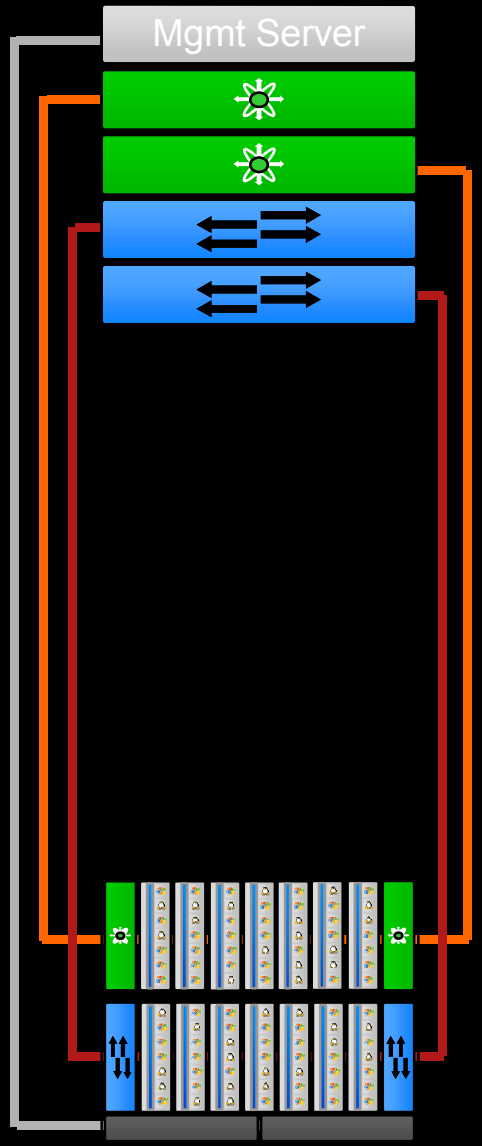


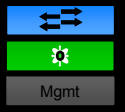
Ethernet blade switch

Fibre Channel blade switch

Mgmt Management Module

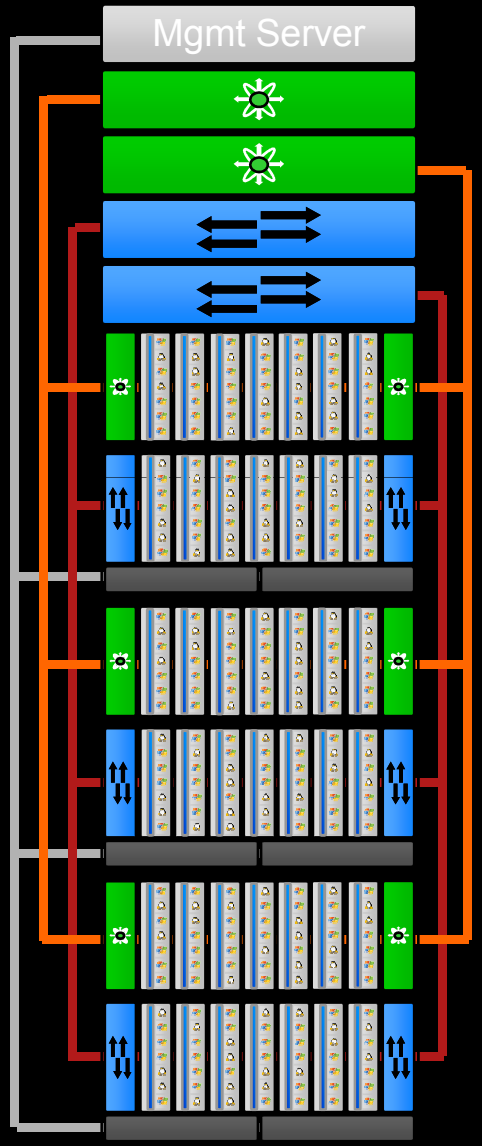
Server Deployment Today





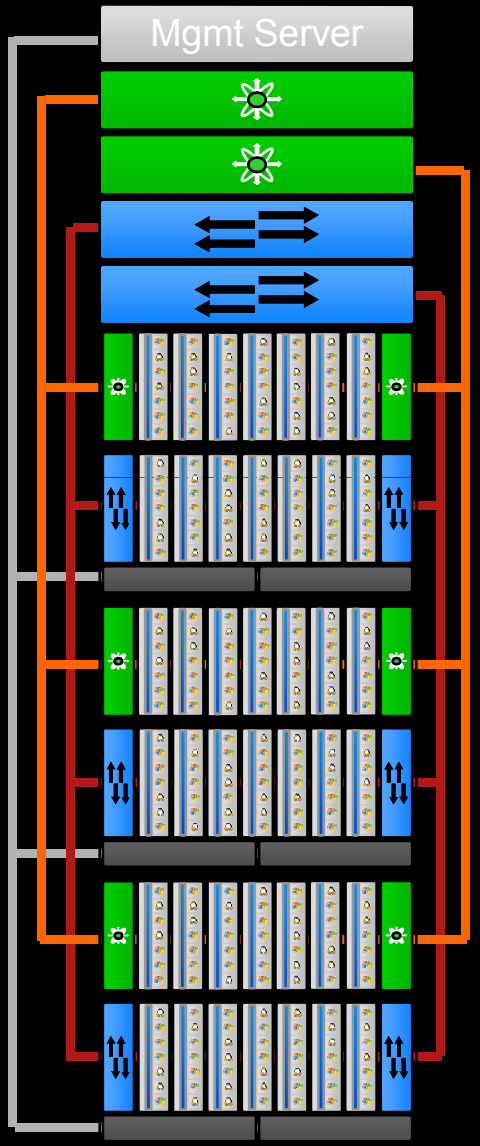
Ethernet blade switch
Fibre Channel blade switch
Management Module

Server Deployment Today



Ethernet blade switch
Fibre Channel blade switch
Mgmt Management Module

Server Deployment Today



Over the past 10 years

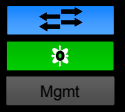
- An evolution of size, not thinking
- More servers & switches than ever
- More switches per server
- Management applied, not integrated

Result

- More points of management
- More difficult to maintain policy coherence
- More difficult to secure
- More difficult to scale

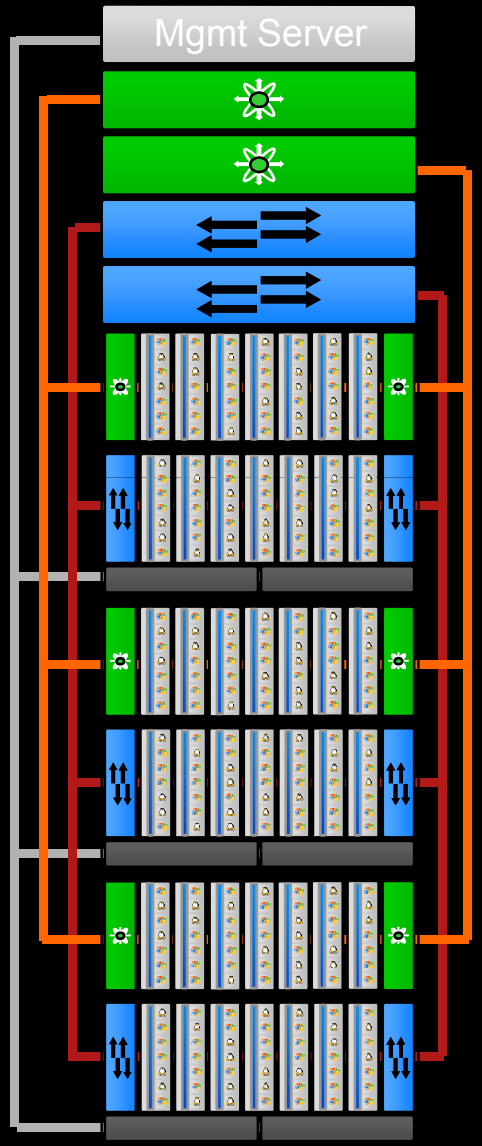
Still a 1980's PC model

- An Accidental Architecture

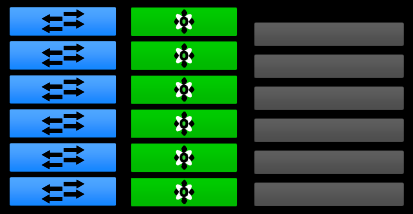


Ethernet blade switch
Fibre Channel blade switch
Management Module

Our Solution

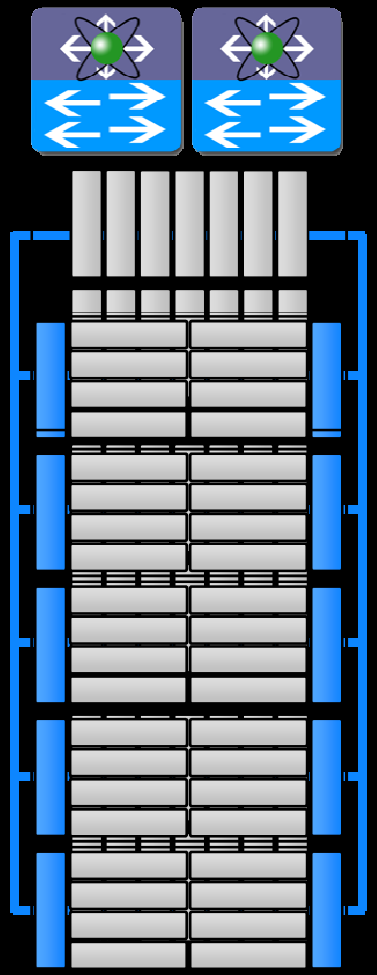


- Embed management
- Unify fabrics
- Optimize virtualization
- Remove unnecessary
  - –switches,
  - –adapters,
  - –management modules
- Less than 1/3rd the support infrastructure

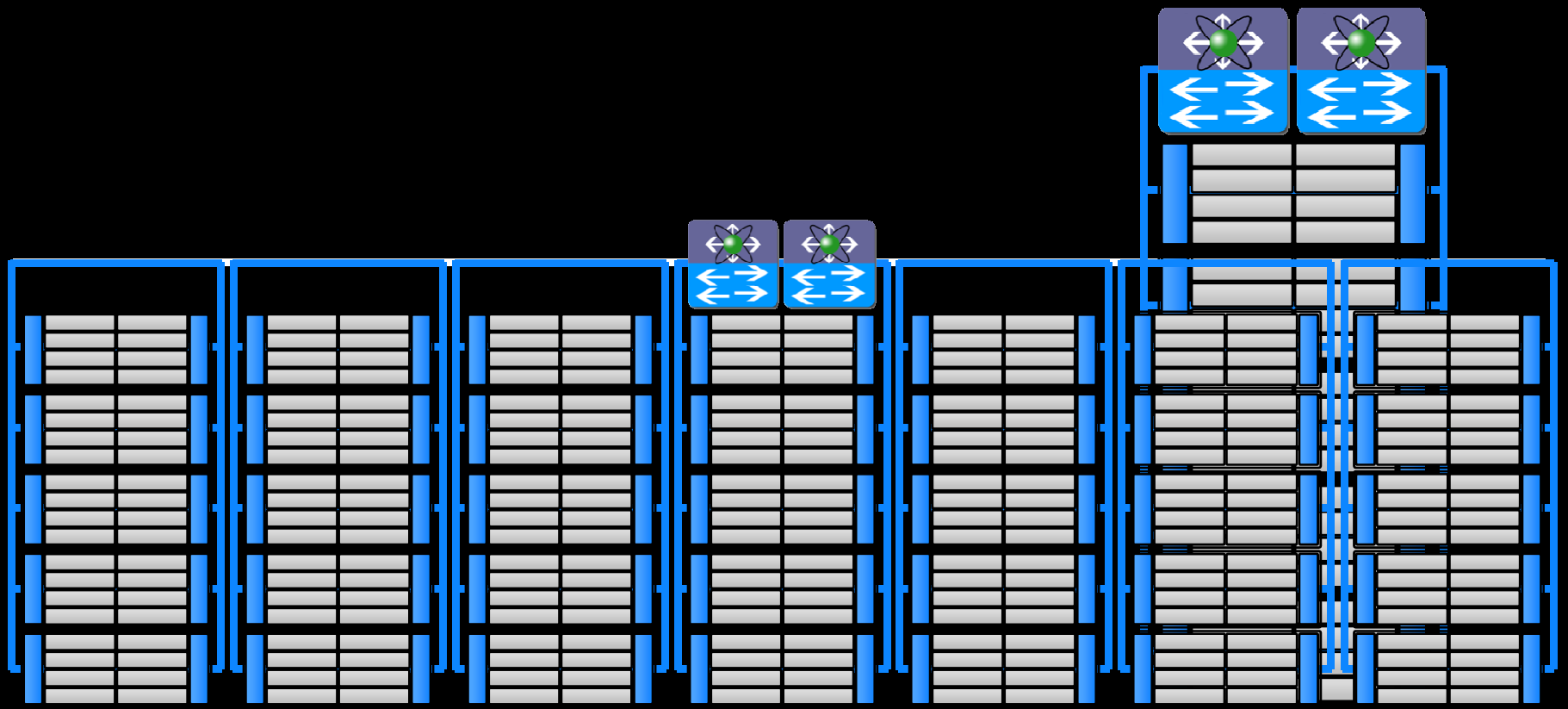


Our Solution: Cisco UCS

- A single system that encompasses:
  - –Network: Unified fabric
  - –Compute: Industry standard x86
  - –Virtualization optimized
- Unified management model
  - –Dynamic resource provisioning
- Efficient Scale
  - –Cisco network scale & services
  - –Fewer servers with more memory
- Lower cost
  - –Fewer servers, switches, adapters, cables
  - –Lower power consumption
  - –Fewer points of management



Our Solution: Cisco UCS



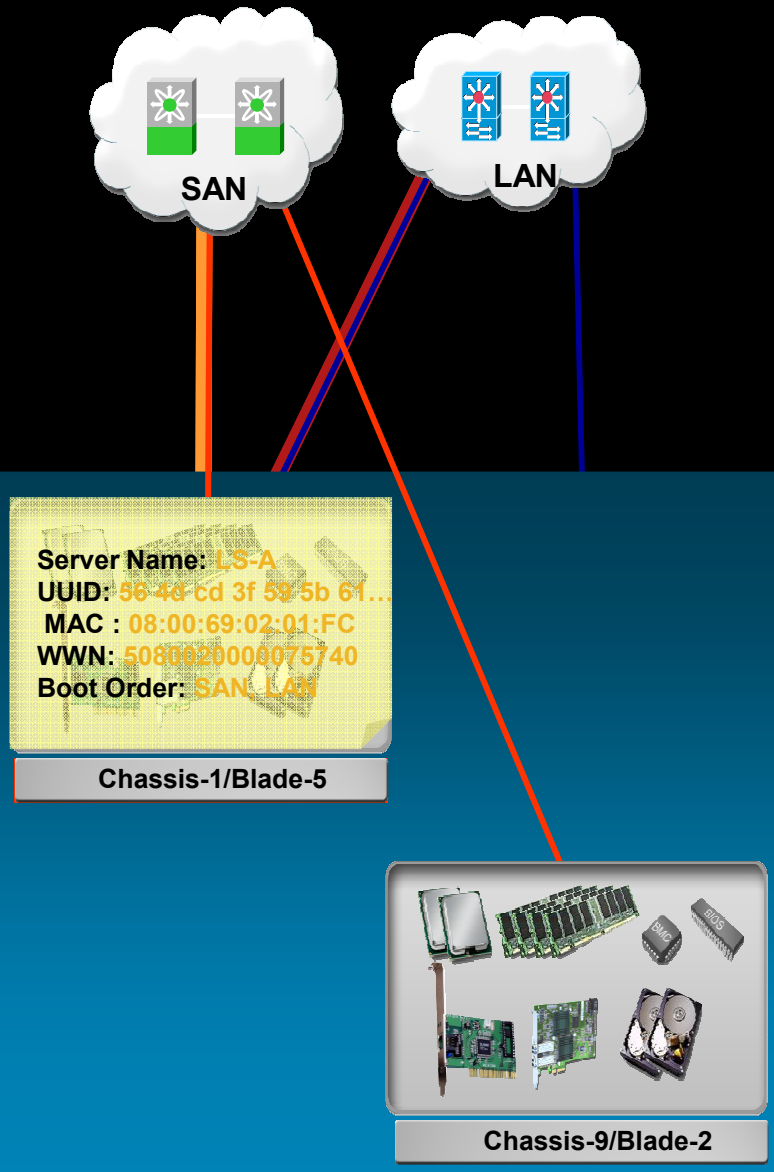
Integrated Stateless Computing

Attributes no longer tied to physical hardware

- Not just identity
- Seamless server mobility
- Within interconnect domain

Dynamic Provisioning

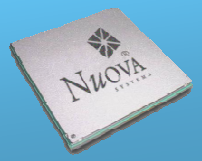
- Complete infrastructure repurposing
- Integrated with 3rd part tools



UCS has Nexus Technology Components

UCS Building Blocks

UCS Manager
Embedded in Fabric Switch

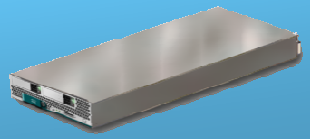


Fabric Switch
20 Port 10Gb FCoE
40 Port 10Gb FCoE

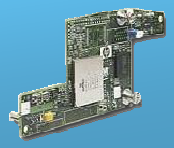
Fabric Extender
Logically part of Fabric Switch
Inserts into Blade Enclosure

Blade Enclosure
Flexible bay configurations
Logically part of Fabric Switch

Blade(s)
Three blade types
Mix blade types within enclosure



Adapters
Three adapter options
Mix adapters within blade



Nexus Products

Nexus 5000 Unified Fabric

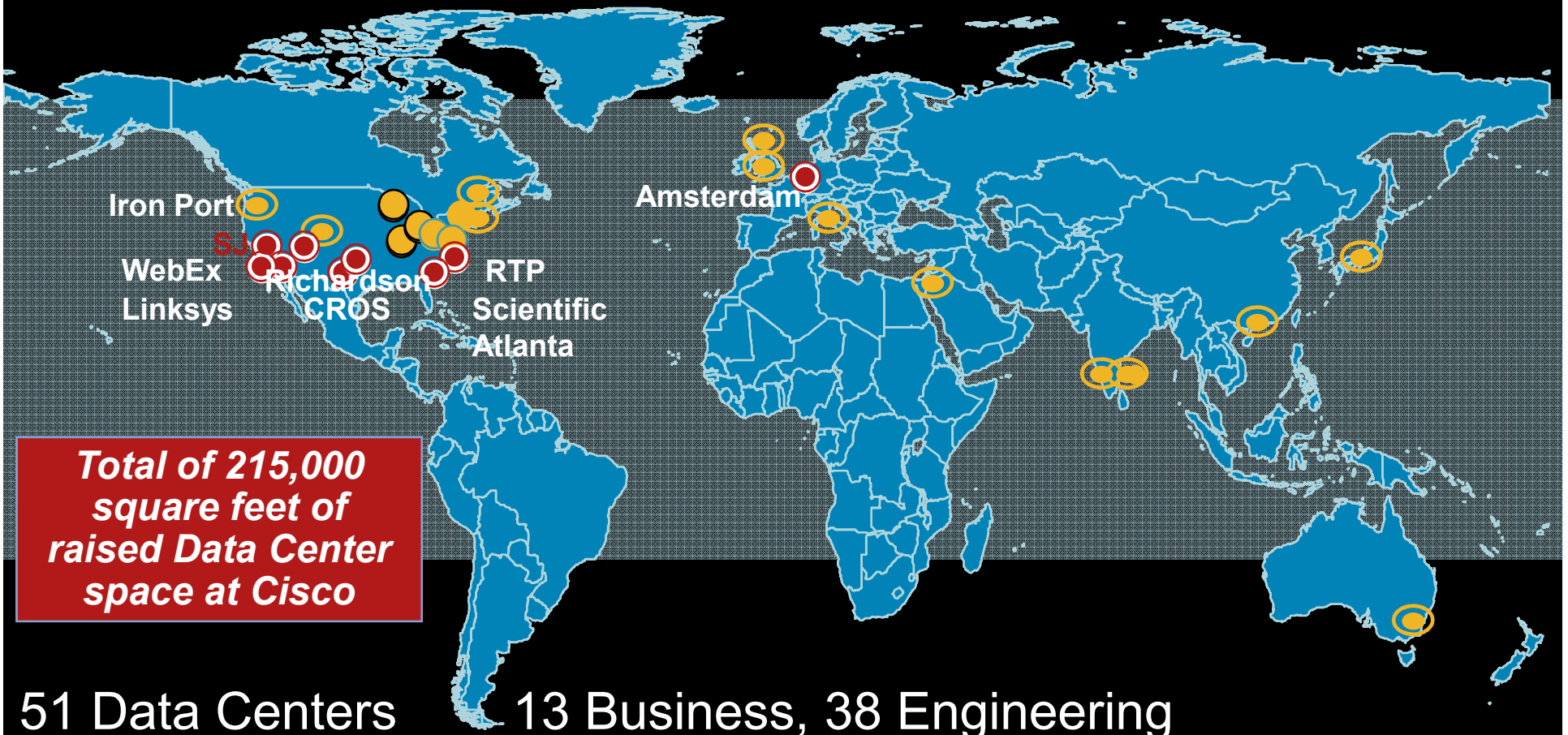
Nexus 2148 Fabric Extender

Nexus 1000V

CNAs with FCOE

Foundation for the Virtualized Data Center

Cisco Data Centers

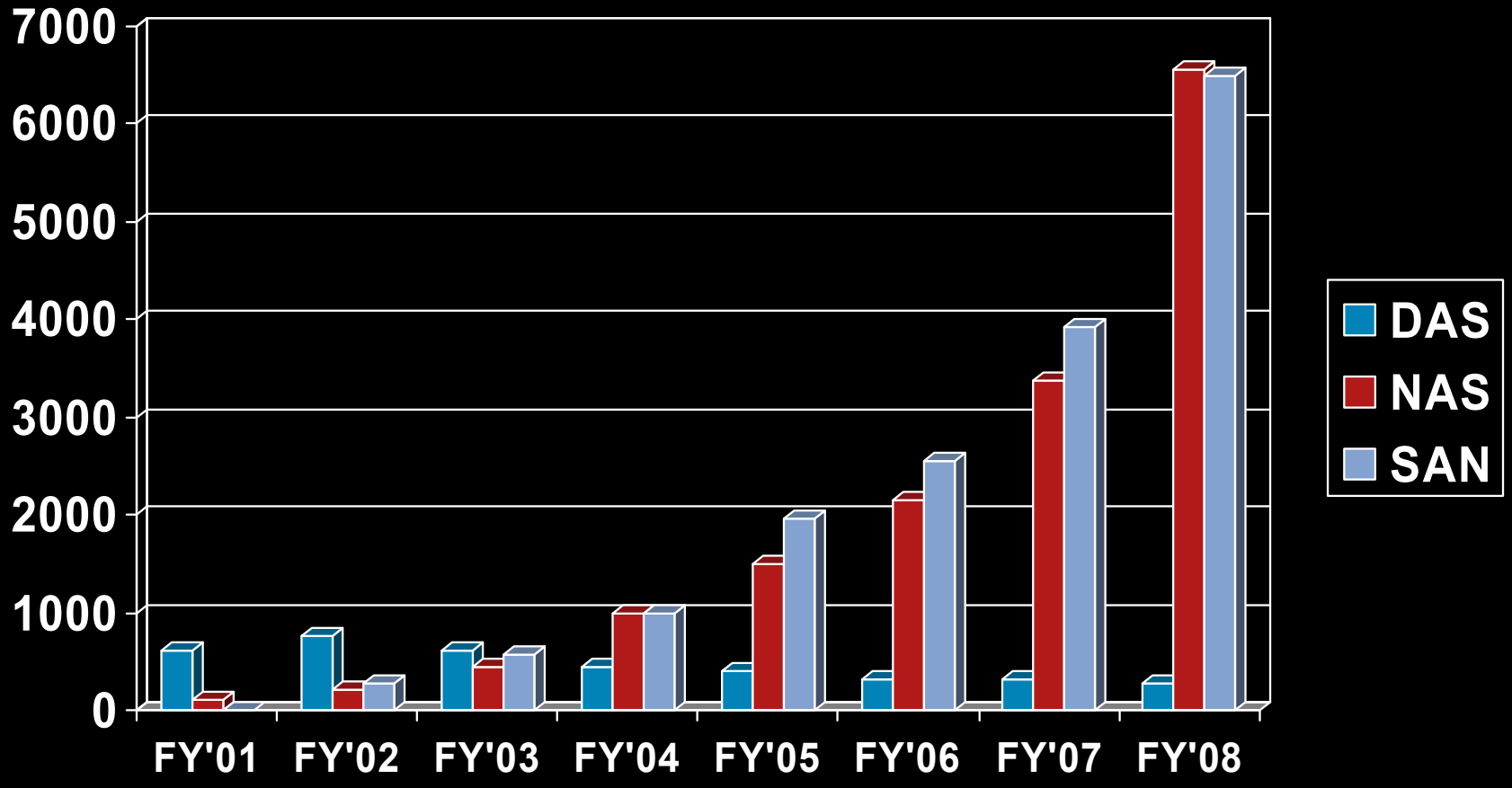


Total of 215,000 square feet of raised Data Center space at Cisco

51 Data Centers — 13 Business, 38 Engineering

Data Centers — Business Data Center — Engineering R&D Data Center

Cisco Data Center Storage Growth

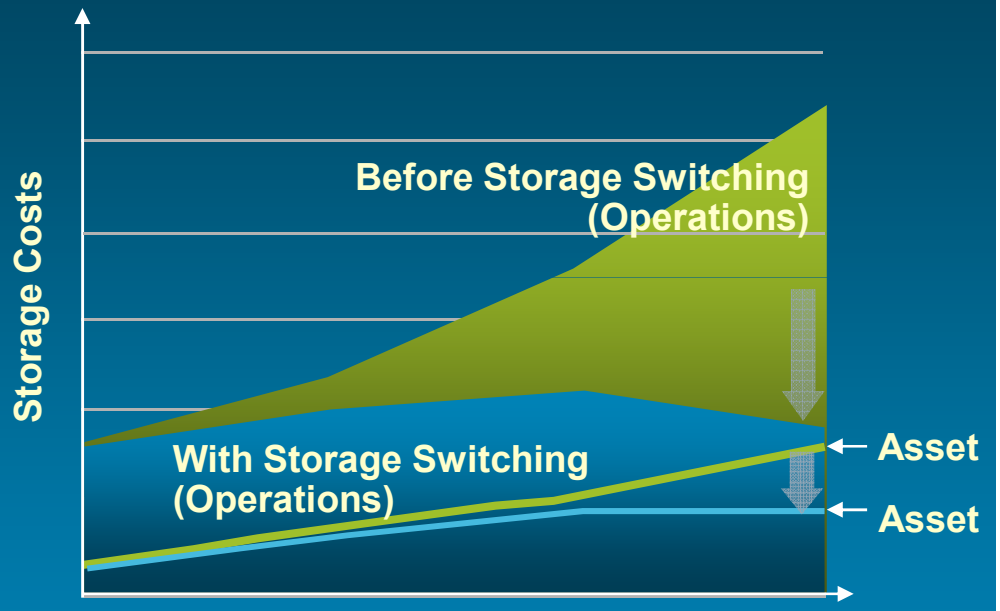


Over 13 petabytes of raw storage
~ 2000% Growth over the last 8 years

Improved TCO, Operations, Responsiveness

Storage Consolidation

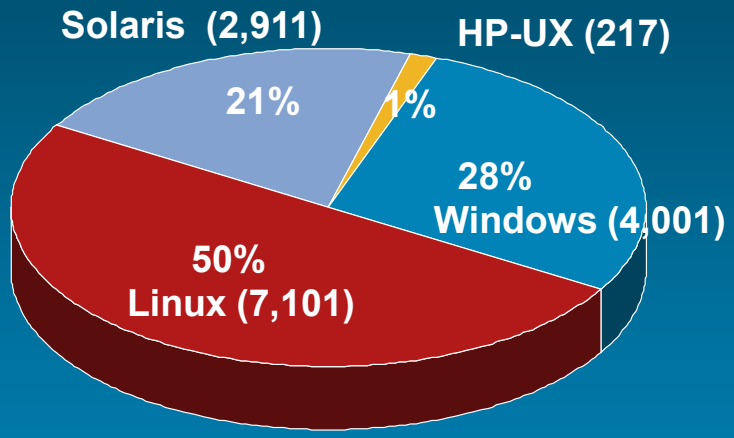
- 13+PB of storage, growing at ~50% per year
- TCO reduced from $0.21/MB to $0.01/MB over 6 years
- Managed storage per FTE increased from 25 TB to 600 TB
- Overall utilization increased from 20% to 68%
- *$71 Million in cost avoidance over last 4 years*



Improved TCO, Operations, Responsiveness

Server Consolidation

- 14,250 servers, 3,780 applications
- 50% of existing, 75% of all new server environments virtualized
- 2,720 VM's installed
- $19+ Million in cost avoidance and reductions to date
- Deployment time reduced from 8-12 weeks to 3 days



Nexus - Foundation for the Virtualized DC