Introduction to Unified Computing Systems

Rene Bosman
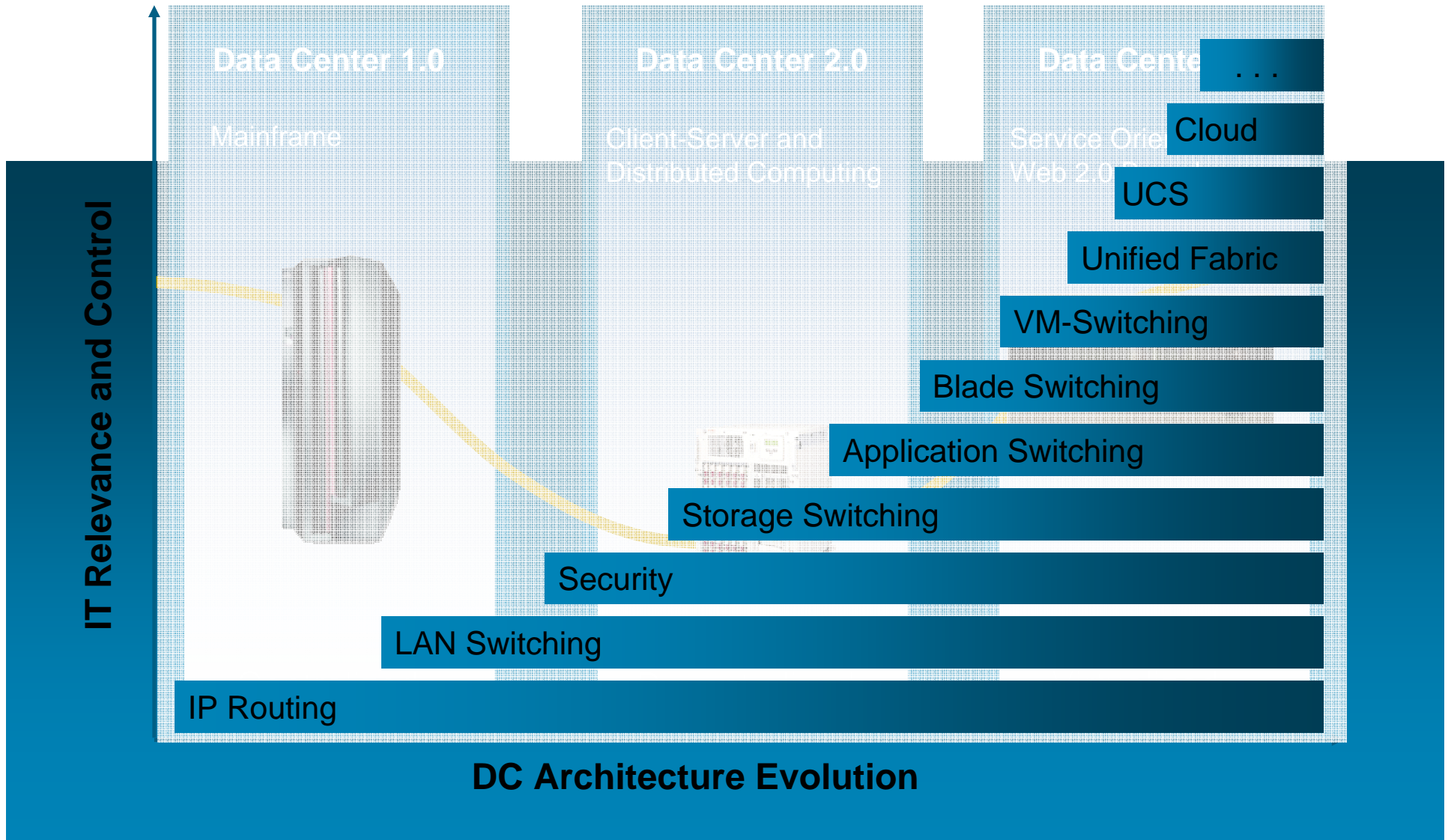
A New Architectural Approach Is Needed
Tomorrow's Data Center Can't Be Built On Yesterday's Technology

- The data center needs to evolve
  - Both computing and networking have to change
  - Management needs to be native, not an after-thought

- Virtualization is changing the focus
  - Applications no longer tied to server hardware
  - Applications are now objects moving through the network

- Cisco is leading Data Center innovation
  - Cisco Unified Fabrics was the first step
  - Cisco Unified Computing is the next step

- Cisco Unified Computing is a clean sheet approach for next generation virtualized data centers

New DC Architecture
New Infrastructure

IT Relevance and Control

Data Center 1.0 — Mainframe

Data Center 2.0 — Client-Server and Distributed Computing

Data Center ... — Service Oriented Web 2.0

- Cloud
- UCS
- Unified Fabric
- VM-Switching
- Blade Switching
- Application Switching
- Storage Switching
- Security
- LAN Switching
- IP Routing

DC Architecture Evolution

Pragmatic Adoption Path to Next-Gen DC
Incremental, Architectural Approach from Silos to Services

Infrastructure Maturity Level

Silo'd	Standardized	Virtualized	Dynamic	Service-Based
• Departmental Svrs	• Standardized Svrs	• Virtual Servers	• VM Mobility	• Elastic, Federated cloud services (Public/Private)
• Storage Silos	• Consolidate SANs	• Virtualized Storage	• VM-Aware SANs	• Policy/SLA based
• Multiple Networks	• Consolidated Nwks	• Unified Fabric	• Dynamic Provision'g	• Trust, Security
• Application Silos	• Consolidated Apps	• Web 2.0/SOA	• App/Infra Portability	• Service Hosting
• Branch IT	• Centralized IT	• Virtual Branch	• Private Ent. Clouds	

IT Initiatives

Consolidate	Virtualize	Automate	XaaS

Network Innovation

Inter-Cloud

Private Clouds

Unified Computing
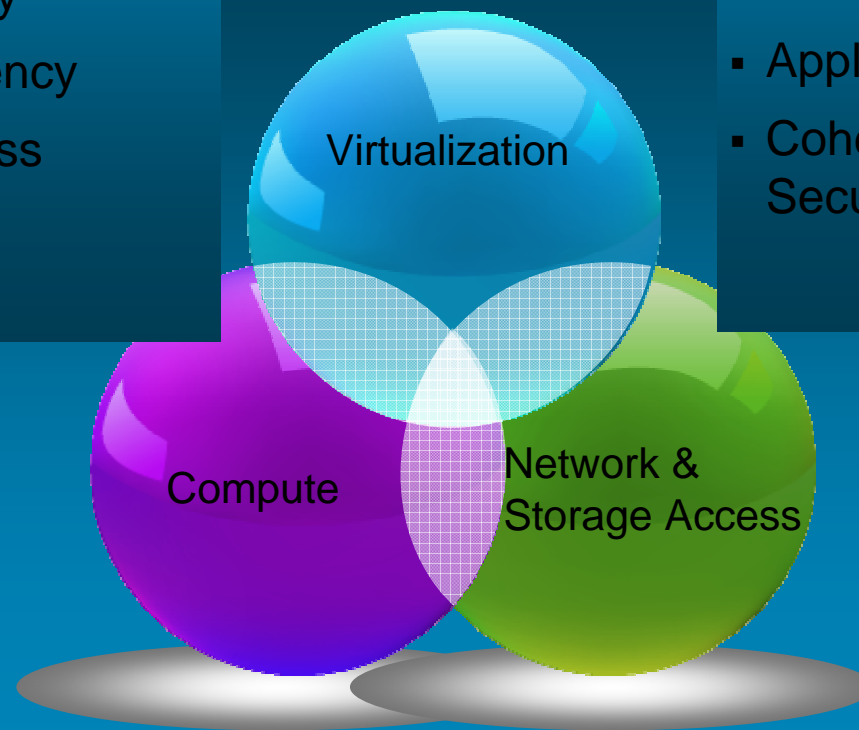
Unified Fabric

Data Center Networking

The Data Center is at a Market Transition

Transformation

- Technology Advances
- Energy Efficiency
- Economic Efficiency
- Dynamic Business Environment

Challenges

- Scalability
- Management Integration
- Application Migration
- Coherent Policies and Security
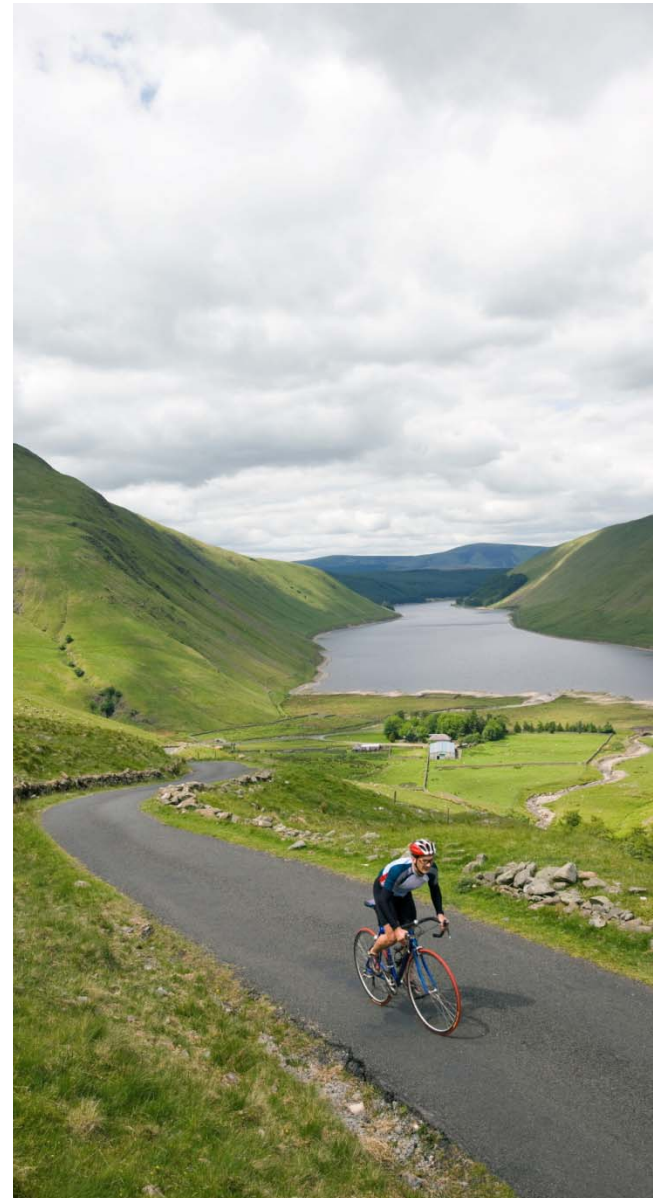
Virtualization

Compute

Network & Storage Access

Market Driver: Virtualization

- Virtualization is creating a market transition

  Servers are becoming fluid objects in the network

- Cisco has historically been successful in capitalizing on market transitions

  Data, voice and video

  Unified fabrics for LAN and SAN

- Cisco is innovating to lead this change

  Unified Fabrics was the first step….

"Virtualization is the *highest-impact* issue changing *infrastructure* and *operations* through *2012.*"

"It will change how you manage, how and what you buy, how you deploy, how you plan and how you charge. It will also shake up licensing, pricing and component management. Infrastructure is on an inevitable shift from components that are physically integrated by vendors (for example, monolithic servers) or manually integrated by users to logically composed "fabrics" of computing, I/O and storage components."

       Gartner 2008

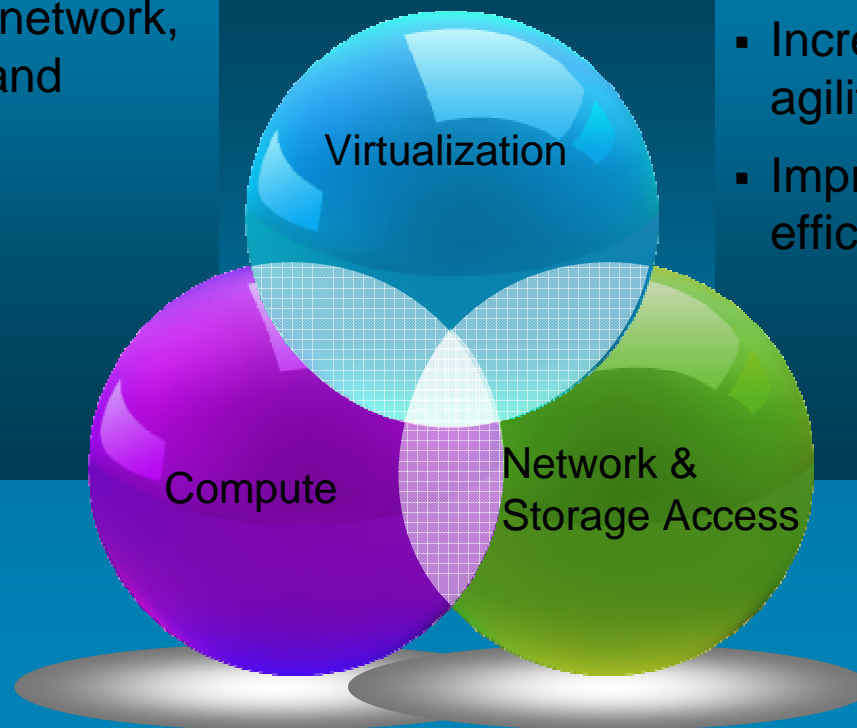# Unleashing the Full Potential of the Data Center

Unified Computing

Solution

- Cohesive system that unites compute, network, storage access and virtualization

- Management simplification

Benefits

- Reduced TCO

- Increased business agility

- Improved energy efficiency

Virtualization

Compute

Network & Storage Access

Unified Computing System

A single system that unifies

- Compute: Industry standard x86
- Network: Unified fabric
- Virtualization: Control, scale, performance
- Storage Access: Wire once for SAN, NAS, iSCSI

Embedded management

- Increase scalability without added complexity
- Dynamic resource provisioning
- Ability to integrate with broad partner ecosystem

Energy efficient

- Fewer servers, switches, adapters, cables
- Lower power and cooling requirements
- Increase compute efficiency by removing I/O and memory bottlenecks

Rapid Data Center Innovation and Integration

Nexus 5000
10GbE DCB & FCoE

Nexus 2000
Fabric Extender

Nexus 1000V
VM-Aware Networking

Nexus 7000
Lossless Fabric

Cisco UCS
Integrated Compute Platform

8GB FC

Cisco MDS
VM-Aware Storage

NX-OS

4.1

4.2

2008　　　　**June**　　　　**2009**　　　　**June**

Transparency and Balance to Virtualization
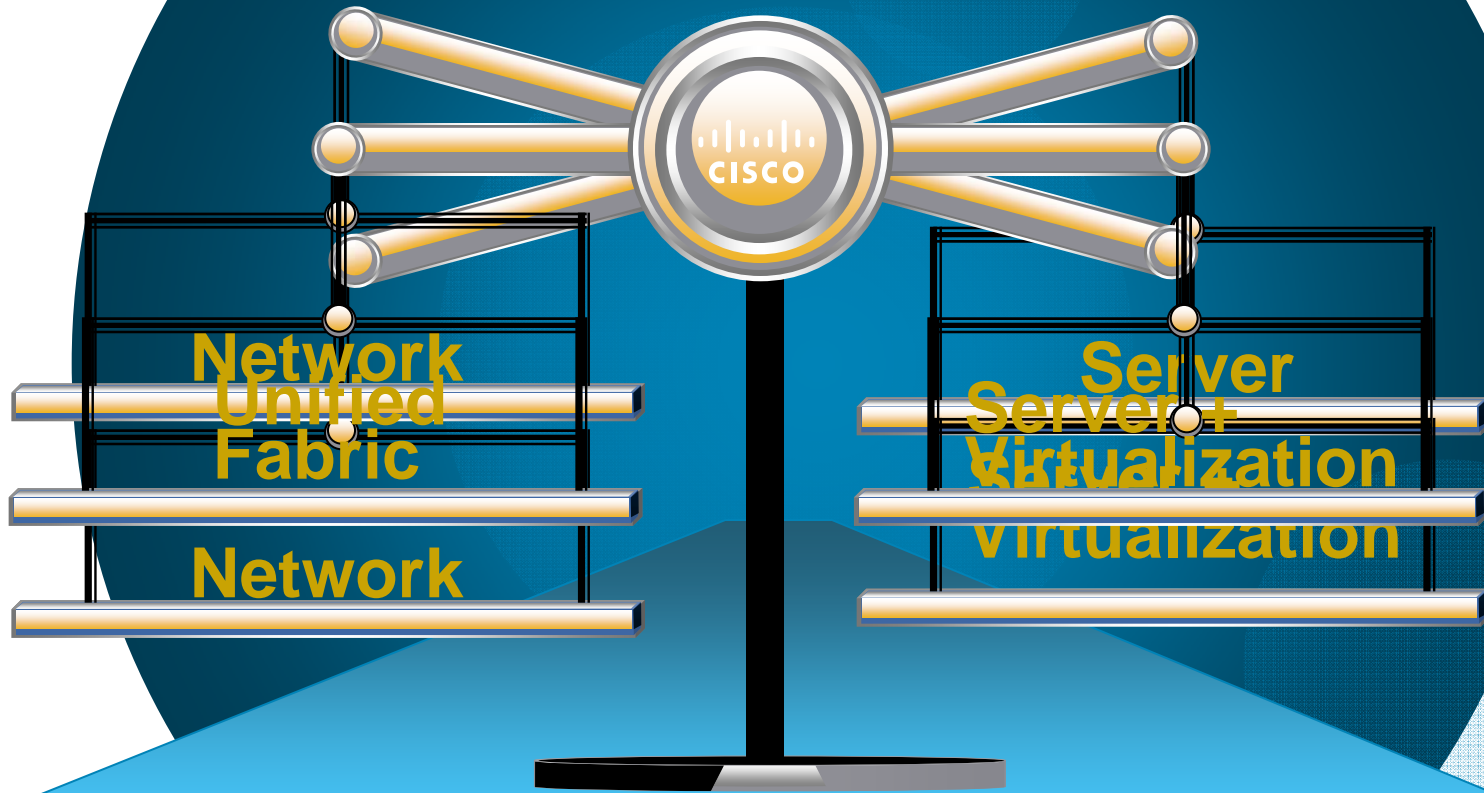
Cisco Systems Data Center 3.0
Technology Journey Leading To a Unified Data Center

1/10GE Lossless Ethernet
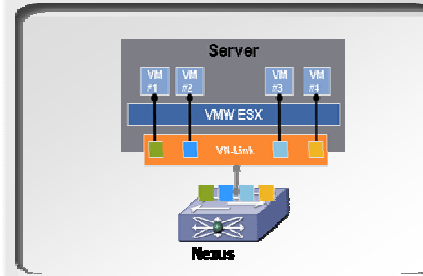
Nexus 5K, 2K-FEX

- Add Nexus 5k/2k for 1/10GE Ethernet
- Server access switch

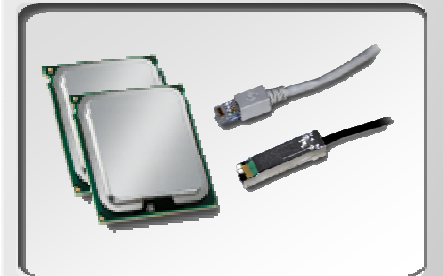
Unified Fabric

Nexus 5K, 2K-FEX

- ToR server access
- Wire once infrastructure
- Low-latency lossless
- Virtualization aware
- Standards-based

Server Virtualization

VN-Link, Nexus 1K

- Virtualization aware access layer
- Compatible with switching platforms
- Combine VM and physical network ops
- Standards-based

Unified Computing

UCS

- Industry Standard x86
- Platform for stateless computing and virtualization
- Standards-based

Server Deployment Today

Mgmt Server
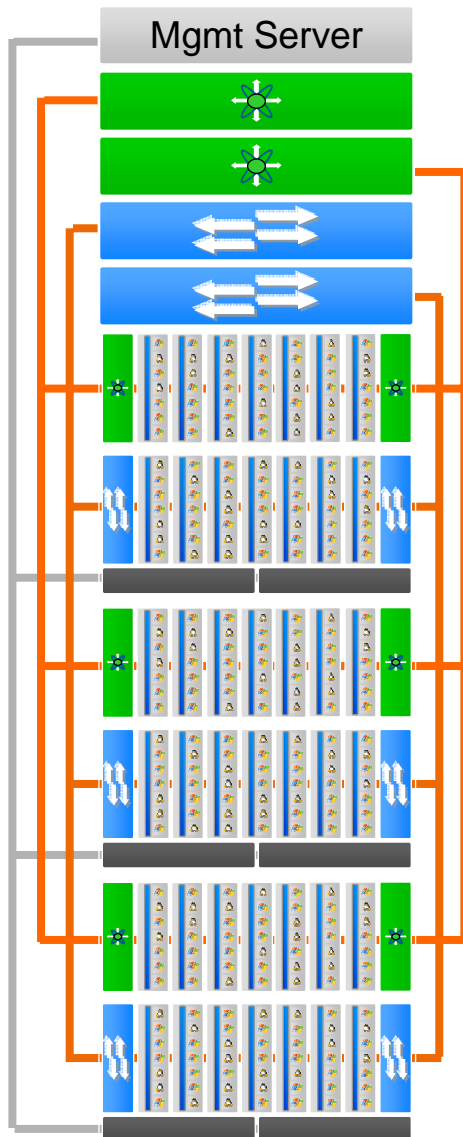
- Over the past 10 years

  An evolution of size, not thinking

  More servers & switches than ever

  More switches per server

  Management applied, not integrated

- An accidental architecture

  Still a 1980's PC model

- Result: Complexity

  More points of management

  More difficult to maintain policy coherence

  More difficult to secure

  More difficult to scale

Server Deployment Today

Mgmt Server
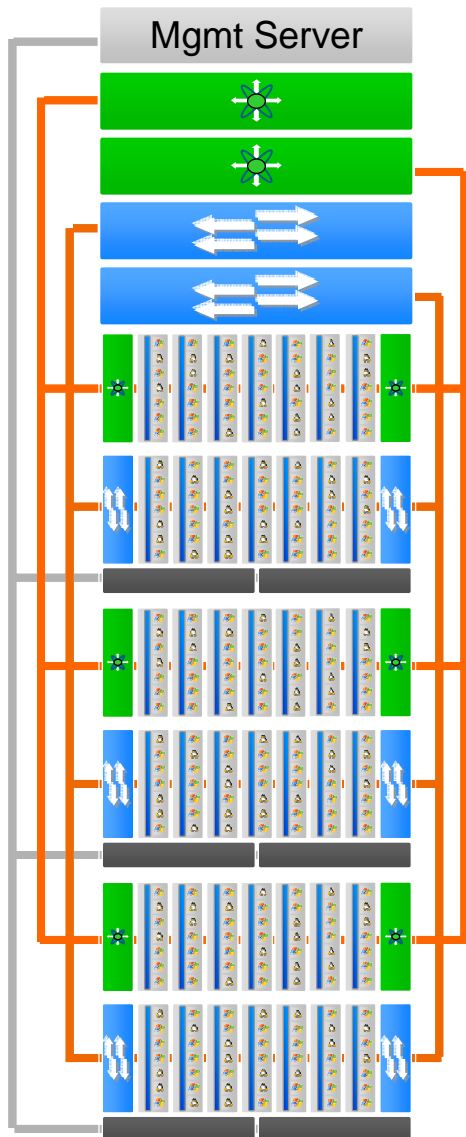
- Embed management

- Unify fabrics

- Optimize virtualization

- Remove unnecessary

    switches,

    adapters,

    management modules

- Less than 1/3rd the support infrastructure
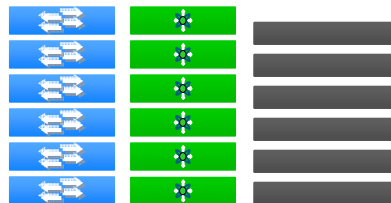
Our Solution: Cisco UCS

- 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
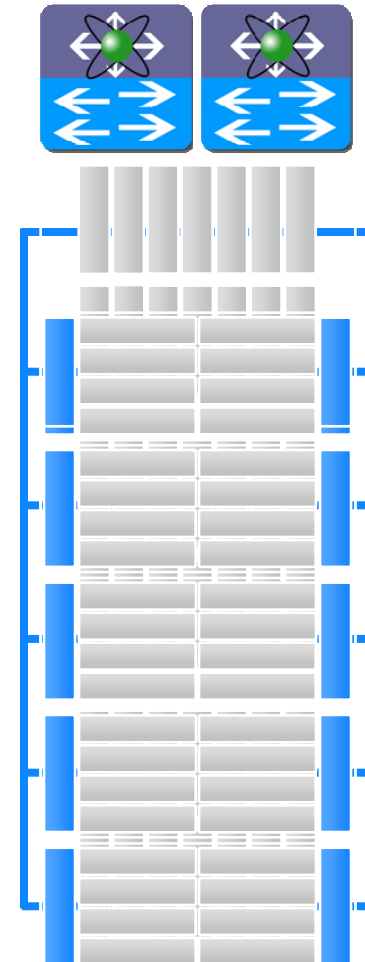
Embedded Unified Management

Tightly Coupled
Partner
Management
Tools

Existing
Customer
Management
Tools

XML API

Traditional
APIs

Unified management domain

- Management embedded in all system elements
- Integration with 3rd party tools
- Not just identity

Dynamic provisioning

- Complete infrastructure repurposing
- Seamless server mobility
- Deploy in minutes, not days

Service Profile: HR-App1
Network: HR-VLAN
Network QoS: High
MAC: 08:00:69:02:01:FC
WWN: 5080020000075740
BIOS: Version 1.03
Boot Order: SAN, LAN

Integrated Stateless Computing vLAN

- Scale out ESX clusters faster

- Fail-over service profiles for higher availability

- Scale out applications quickly

- Reduce errors from manual deployment

- Reduce the size of spare pools and share resources across applications

- With VICs - one adapter in datacenter and change the I/O profile

  - True wire once architecture

SAN

LAN

MAC : 08:00:69:02:01:FC
WWN: 5080020000075740
VLAN: 55
Boot Order, Firmware, etc

Chassis 1, Blade 1

MAC : 08:00:69:02:03:FC
WWN: 5080020000075760
VLAN: 55
Boot Order, Firmware, etc

Chassis 40, Blade 320

Chassis 5, Blade 34

Chassis 20, Blade 162
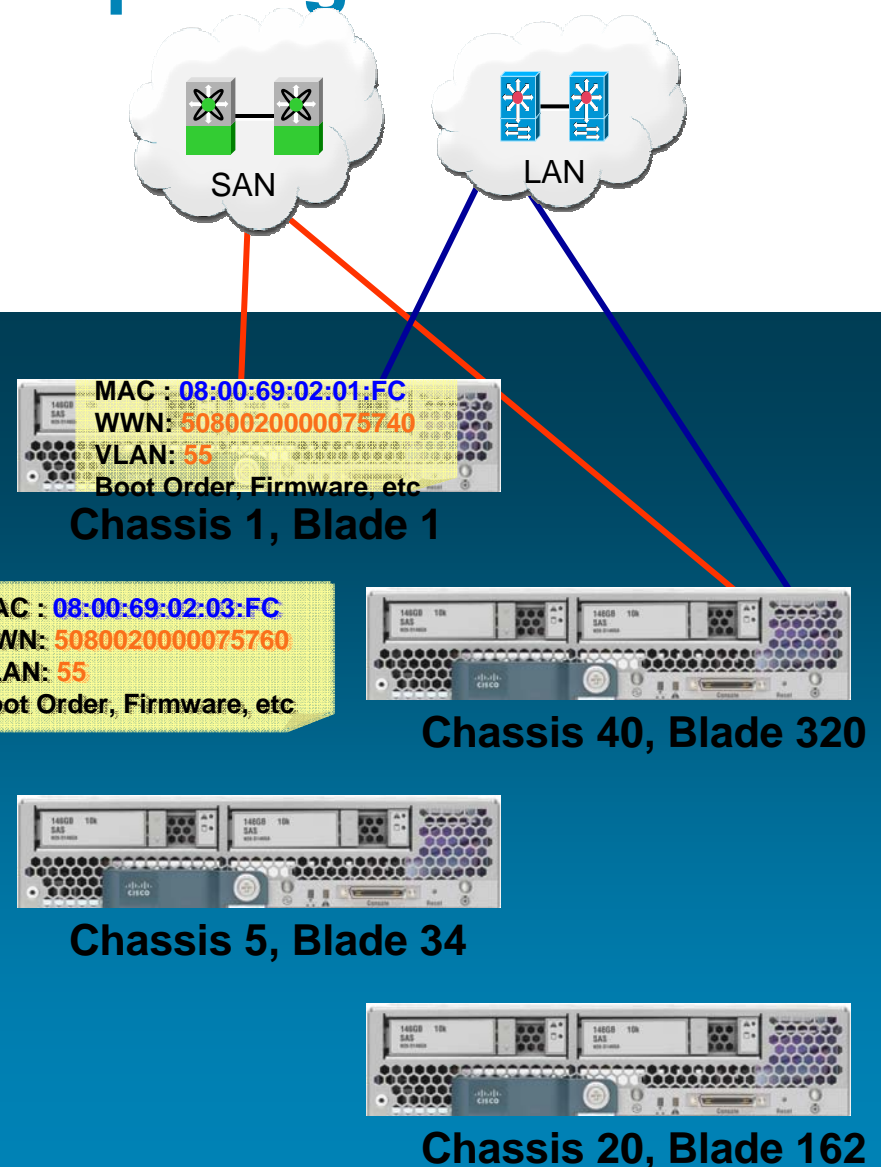
Extending the network to the Virtual Machine
VN-Link With the Cisco Nexus 1000V

Cisco Nexus 1000V
Software Based

- Industry's first 3rd-party vNetwork Distributed Switch for VMware vSphere

- Built on Cisco NX-OS

- Compatible with all switching platforms

- Maintain vCenter provisioning model unmodified for server administration; allow network administration of virtual network via familiar Cisco NX-OS CLI

BEST OF
vmworld 2008

VM   VM   VM   VM

CISCO
Nexus
1000V

vmw&Sphere

CISCO

Nexus 1000V

Policy-Based VM Connectivity

Mobility of Network & Security Properties

Non-Disruptive Operational Model
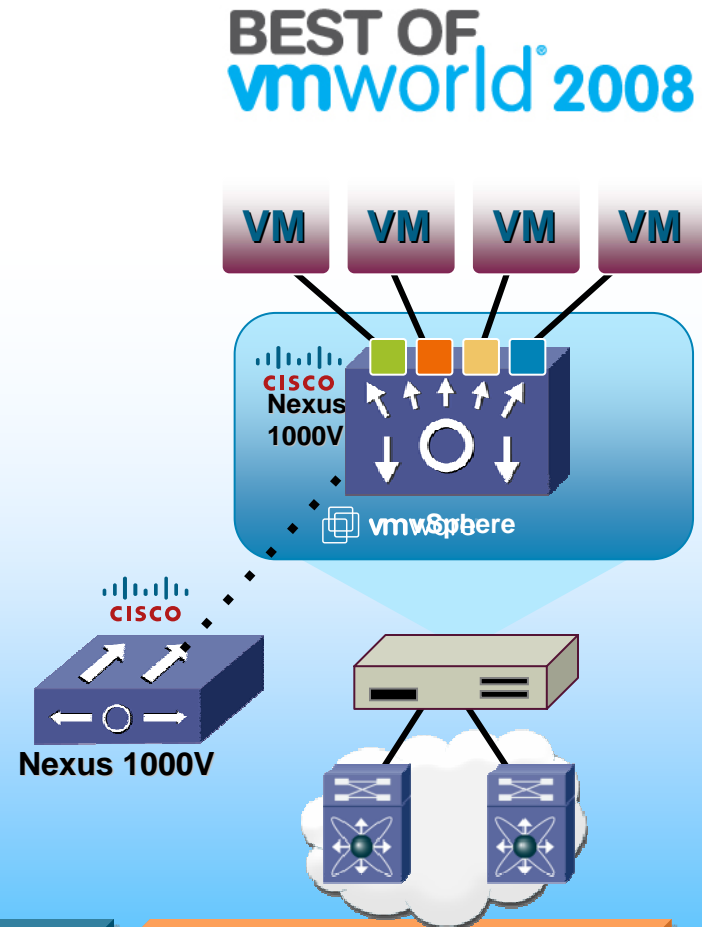
Case for a Unified Data Center

From ad hoc and inconsistent…

…to structured, but siloed, complicated and costly…

…to simple, optimized and automated

Sample Configuration – 8 Blades

Legacy System	
• Blades	$45,528
• Adapters	$5,992
Total Blade	**$51,520**
• Chassis, Fan, PSUs	$8,713
• Networking	
• 10Gb Eth Switch	$24,398
• 4Gb FC Switch	$18,998
• Management Software	$7,000
Total Infrastructure	**$59,109**
Overall Total	**$110,629**

Unified Computing System	
• Blades	$45,320
• Adapters	$5,992
Total Blade	**$51,312**
• Chassis, Fan, PSUs	$4,197
• Networking	
• Fabric Interconnect	$36,592
• Fabric Extender	$3,998
• Management Software	0
Total Infrastructure	**$44,787**
Infrastructure Savings	**$14,322**
	24%
Overall Total	**$96,099**
Savings	**$14,530**
%	**13%**

Sample Configuration – 320 Blades
Savings at Scale – 1/3 the Infrastructure Cost

Legacy System	
• Blades	$1,821,120
• Adapters	$239,680
Total Blade	**$2,060,800**
• Chassis, Fan, PSUs	$174,260
• Networking	
• 10Gb Eth Switch	$487,960
• 4Gb FC Switch	$379,960
• Management Software	$554,400
Total Infrastructure	**$1,596,580**
Overall Total	**$3,657,380**

Unified Computing System	
• Blades	$1,812,800
• Adapters	$239,680
Total Blade	**$2,052,480**
• Chassis, Fan, PSUs	$167,880
• Networking	
• Fabric Interconnect	$138,182
• Fabric Extender	$159,920
• Management Software	0
Total Infrastructure	**$465,982**
Infrastructure Savings	**$1,130,598**
	71%
Overall Total	**$2,518,462**
Savings	**$1,138,918**
%	**31%**

Unified Computing Building Blocks
Unified Fabric Introduced with the Cisco Nexus Series

Virtual

Ethernet

Fibre Channel
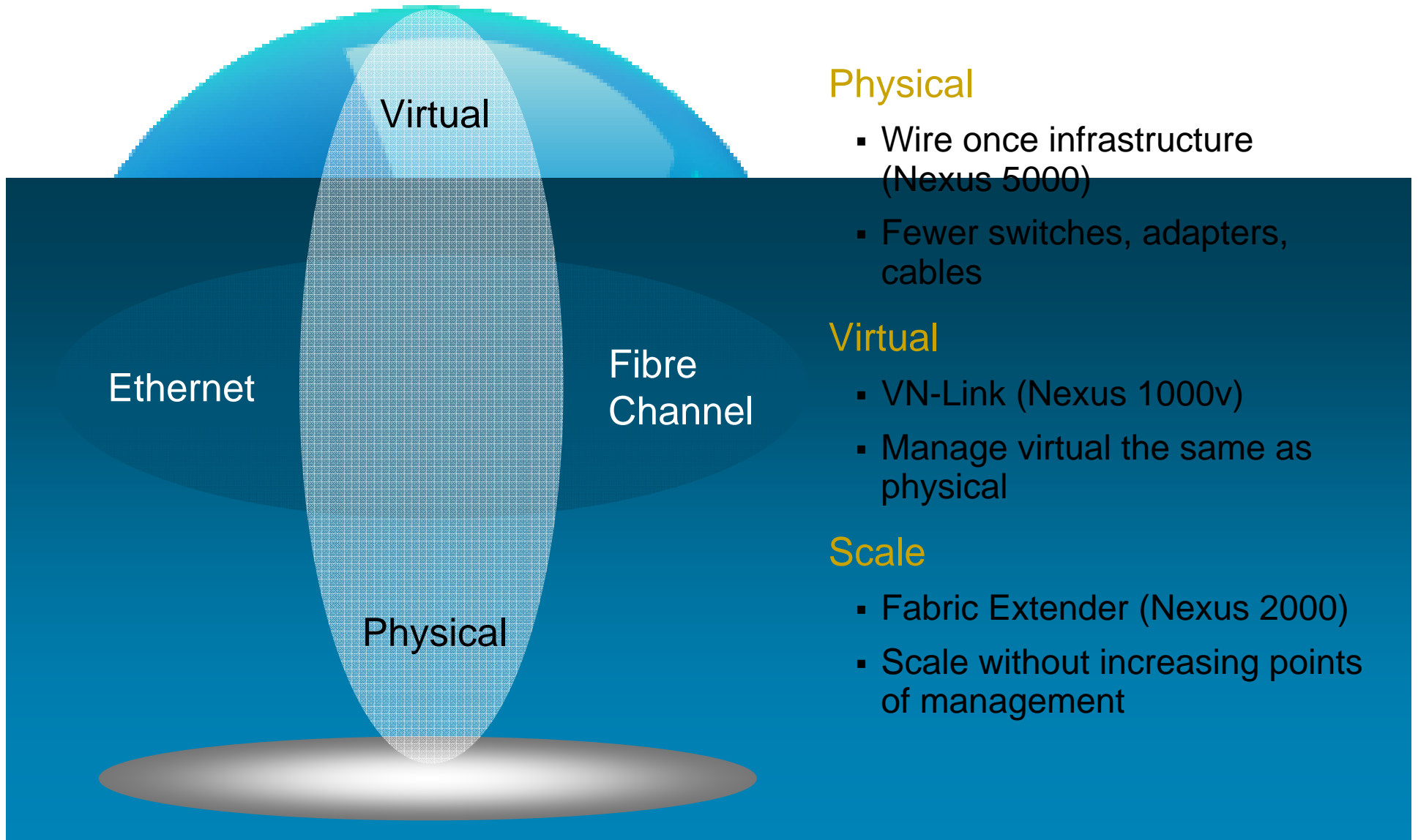
Physical

Physical

- Wire once infrastructure (Nexus 5000)
- Fewer switches, adapters, cables

Virtual

- VN-Link (Nexus 1000v)
- Manage virtual the same as physical

Scale

- Fabric Extender (Nexus 2000)
- Scale without increasing points of management

UCS and Nexus in the Data Center

Nexus 7010

Core Layer

Nexus 7010

Distribution Layer

10GE

Access Layer

Nexus 5000

10GE

FEX

10GE Servers

1GE to Servers
Rack 1

Rack 12

UCS and Nexus in the Data Center

Nexus 7010

Core Layer

Nexus 7010

Distribution Layer

10GE

Access Layer

Nexus 5000

UCS 6100

10GE

FEX

10GE Servers

1GE to Servers
Rack 1

Rack 12
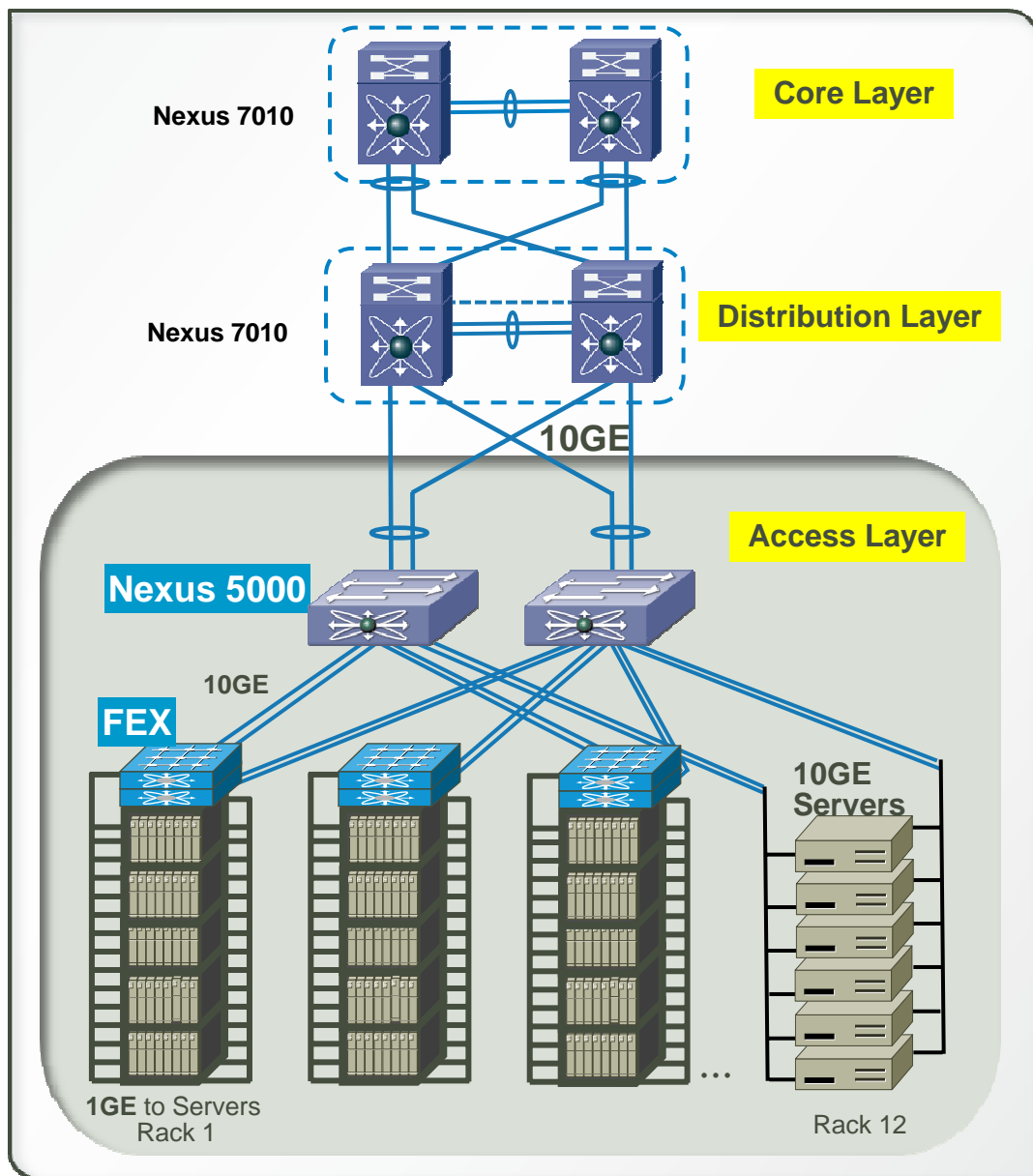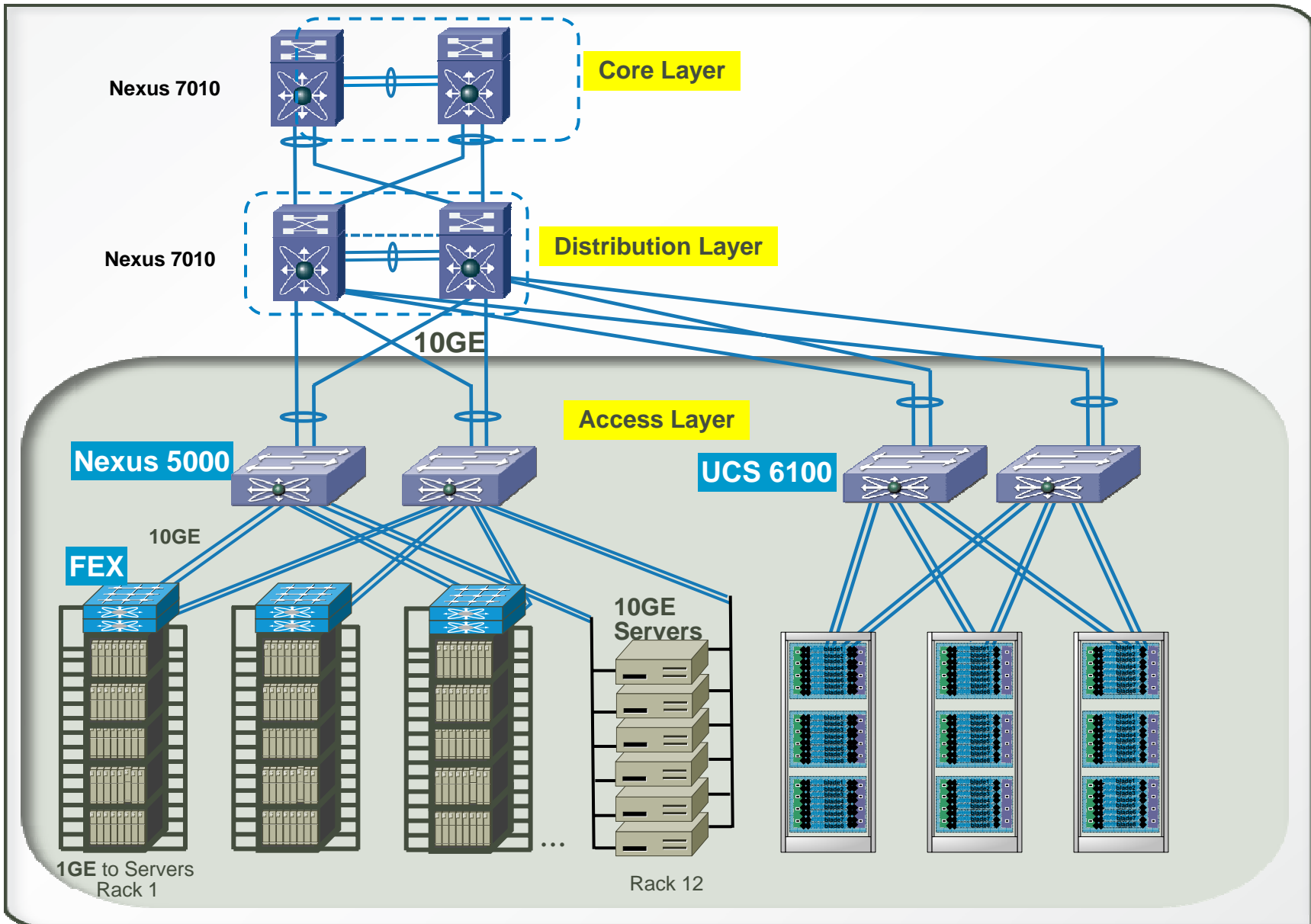
Multiprotocol SAN Evolution

FC — High Performance Data Center Connectivity

FICON — Mainframe Connectivity

iSCSI — Low Performance Connectivity

Remote DC / **FCIP** — Long Distance Replication Connectivity

FCoE — Unified Fabric Data Center Connectivity

SAN

Phase 1
FCoE Server
Enablement

Phase 2
FCoE Server
Proliferation

Phase 3
FCoE Arrays
and SANS

2008   2009   2010   2011
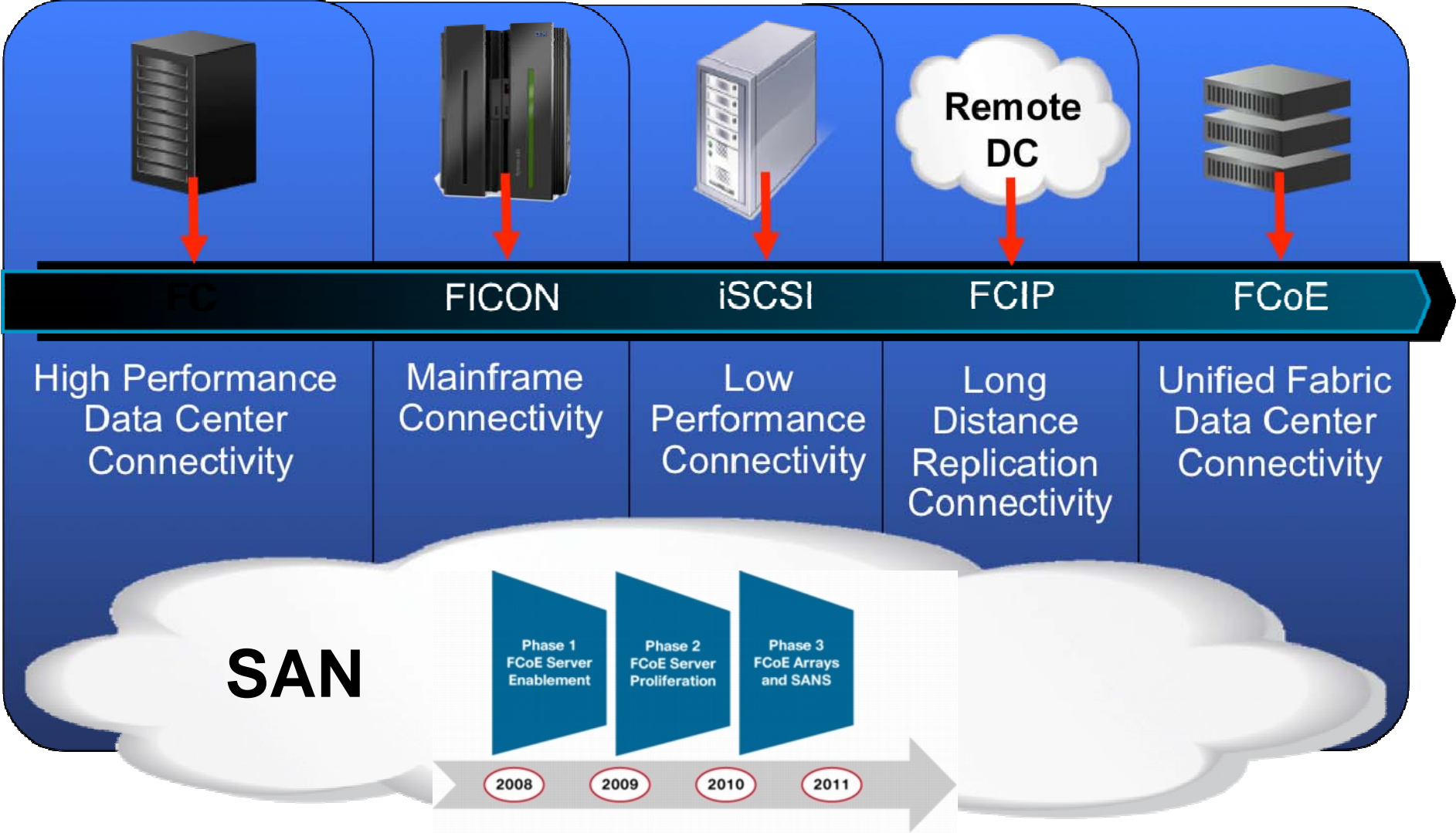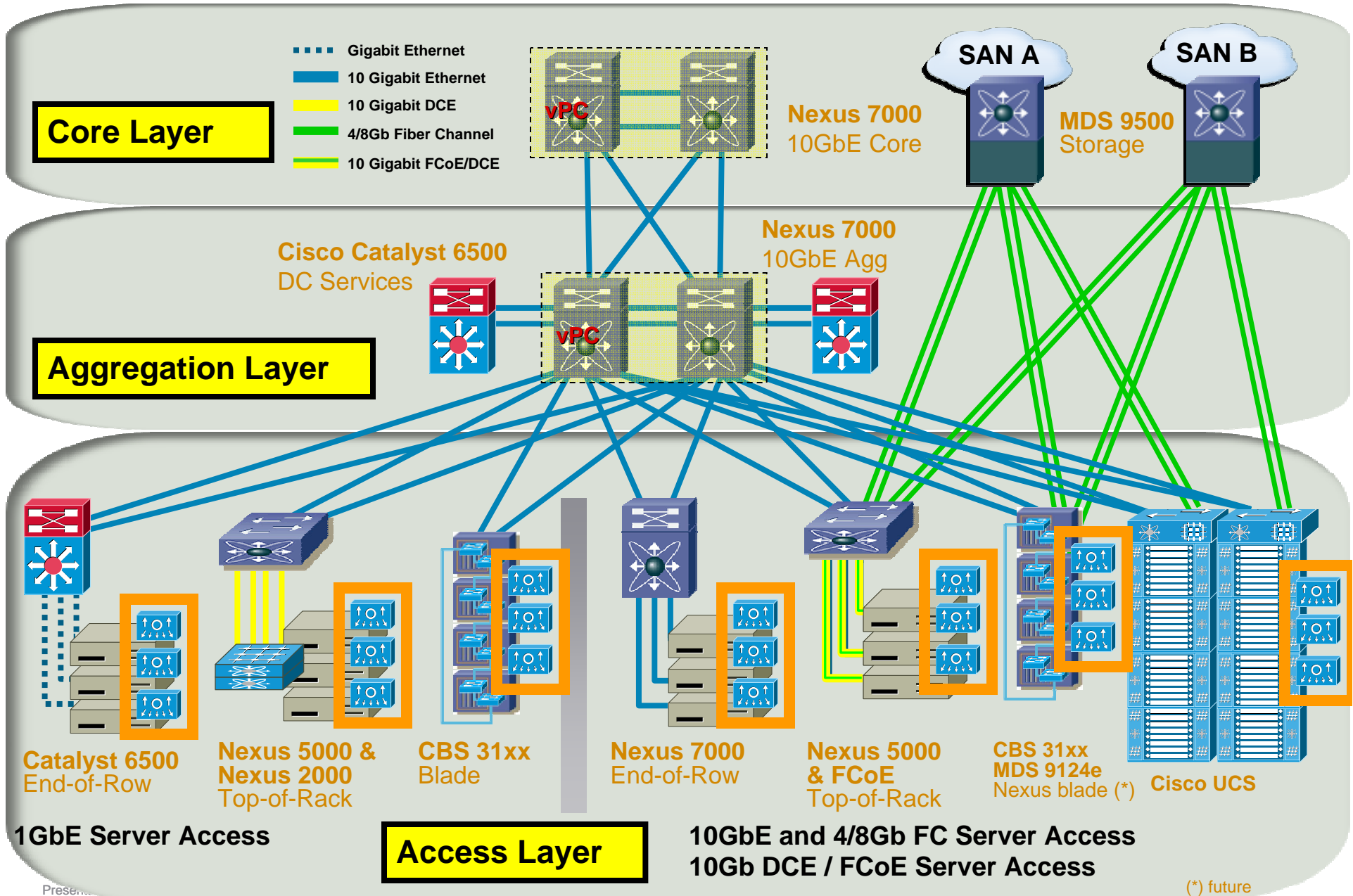
Service Providers
Large South African Service Provider

Challenges

- Deregulation introduced new SP challengers that would threaten SPs customer base
- Increase revenues and meet current customer demands

Technical:

- Legacy infrastructure was inhibiting the acceleration of new services

Solution

- Implemented Cisco DC 3.0 Architecture
- Highly flexible and virtualized DC infrastructure based on Cisco Nexus technology
- VMware for server virtualization
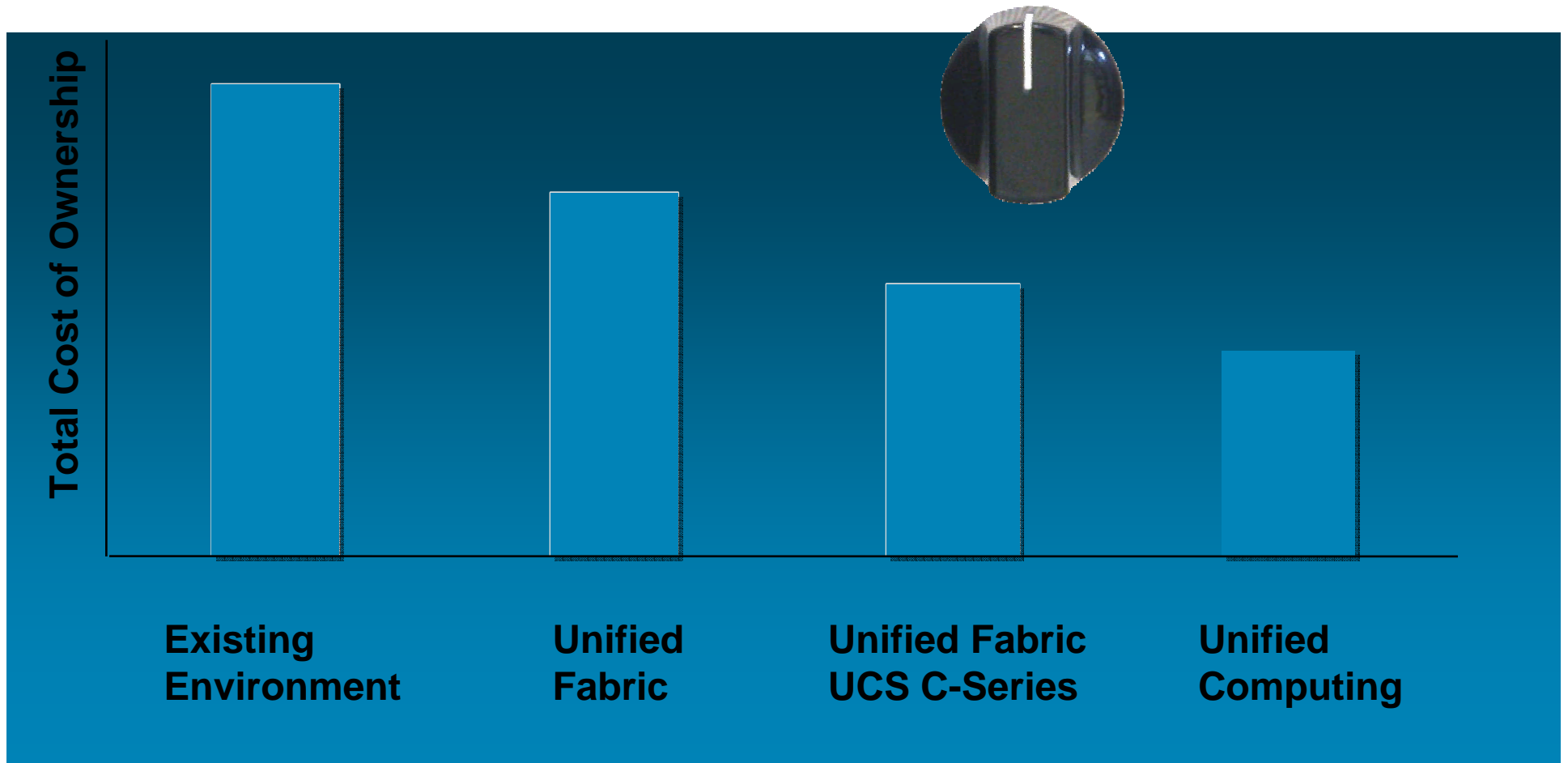- EMC Tiered storage solutions with Cisco virtualized SAN network

Business Value

- Business service creation of multiple SLA's and flexible, tiered pricing models
- Delivered next-generation services and captured new opportunities for wholesaling platform capabilities

Customer Choice:
Dial In to Reduce Costs at Any Stage
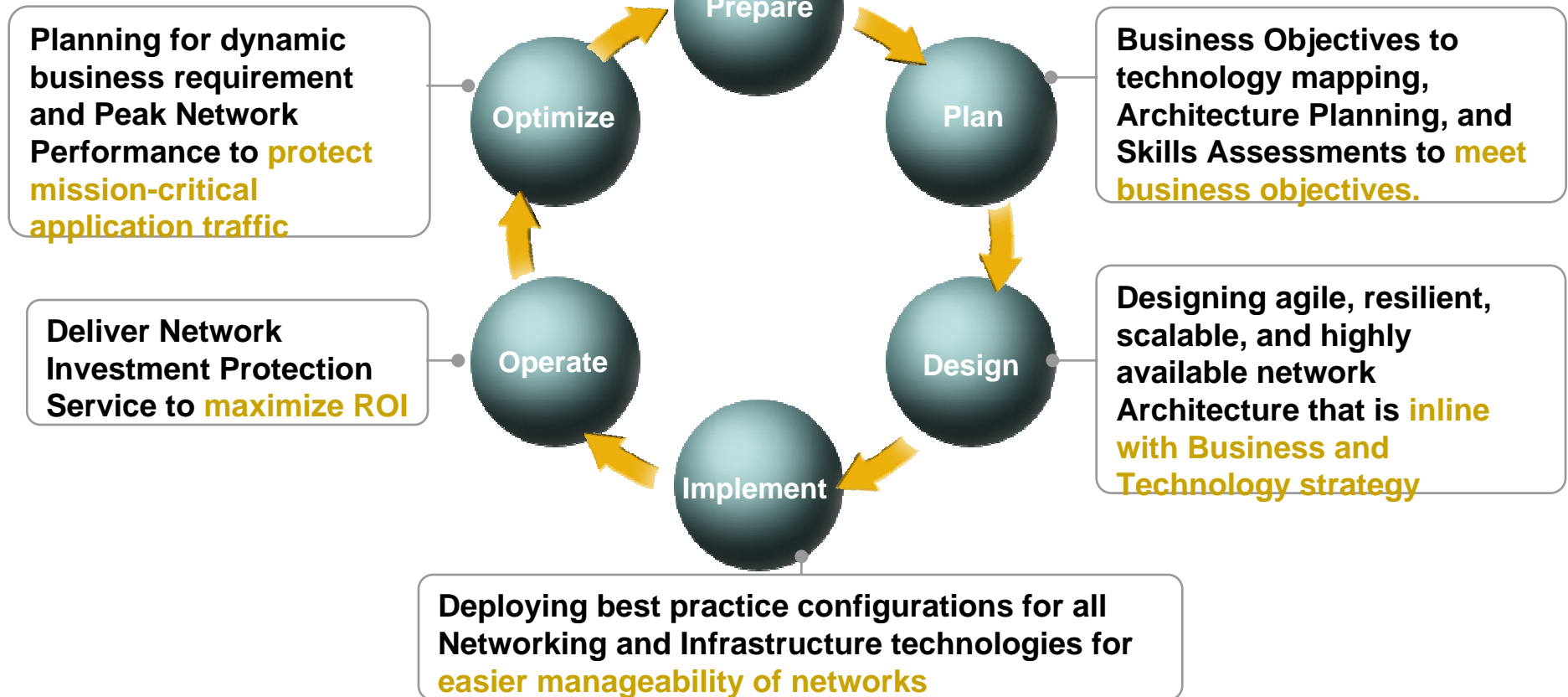
Every IT organization is unique. Each is in a different place with workloads, environment, budget, and IT investment cycles.
Customers have the flexibility and choice to deploy technology at whatever point makes sense for their environment.

Total Cost of Ownership

Existing Environment

Unified Fabric

Unified Fabric UCS C-Series

Unified Computing

Data Center Networking Lifecycle Services

Delivering a Technology Vision and Architecture Principles Consultancy Services to align with Business Vision.

Planning for dynamic business requirement and Peak Network Performance to protect mission-critical application traffic

Deliver Network Investment Protection Service to maximize ROI

Business Objectives to technology mapping, Architecture Planning, and Skills Assessments to meet business objectives.

Designing agile, resilient, scalable, and highly available network Architecture that is inline with Business and Technology strategy

Deploying best practice configurations for all Networking and Infrastructure technologies for easier manageability of networks

Prepare

Plan

Optimize

Design

Operate

Implement

What is Cisco's Sustainable Differentiation?

- Build on Cisco's core competence

  - Networks, convergence of data, voice and video, virtualization

- It's the right time to converge compute and networking with Unified Computing

  - Cisco is best positioned to enable a new compute model, no legacy and new innovation in network services

- The network is what makes the data center virtual

- End to End Data Center solutions

  - Networks, Compute, Storage Access, Branch and virtualization

- Cisco Advanced Services

Recommended next steps:

- Develop a virtualization strategy and involve server, storage, facilities and network architects

- Develop a 10GE Unified Fabric strategy in your Data Center and evaluate physical design considerations: End of Row, Middle of Row, Top of Rack

- Develop a managed services strategy with Cisco and partners

- Partner with Cisco, Vmware, EMC

  - Virtual Cloud Environment: vBlock architectures

- Plan for technical design workshops with Cisco Advanced Services and partners

  - Network designs

  - Server access and virtualization

  - Storage services

  - Application services

- Cisco Advanced Services