Paving the Road to Cloud

Network Innovations for a Virtualized Data Center

November 2010

Cisco European Data Center Roadshow

Agenda

8:40 – 9:00	Welcome & Registration	
9:00 – 9:45	**The Data Center Journey to Virtualization and Cloud** *Cisco Data Center Business Advantage*	**Business & Strategy**
9:45 – 10:30	**Unified Network Services -** Consistency, Flexibility, Simplification *New Virtual Security Gateway with the Nexus 1000V & virtual WAAS solutions*	
10:30 – 10h45	Case Study Video & Coffee Break	
10:45 – 12:40	**Unified Fabric – Building the Network for Cloud ready Data Centers** *New Nexus 5500 and Nexus 7K innovations*	
12:40 – 13:30	Lunch buffet	
13:30 – 15:00	**Scaling the DC Architecture: be ready for the evolution to Cloud** *Network design, Fabric Path, Multi-hop FCoE and OTV*	**Technical Design**
15:00 – 15h15	Coffee Break	
15:10 – 16:45	**Addressing Server Access Networking challenges** Physical Server Networking & Virtual Server Networking considerations	
16:45	Closing	

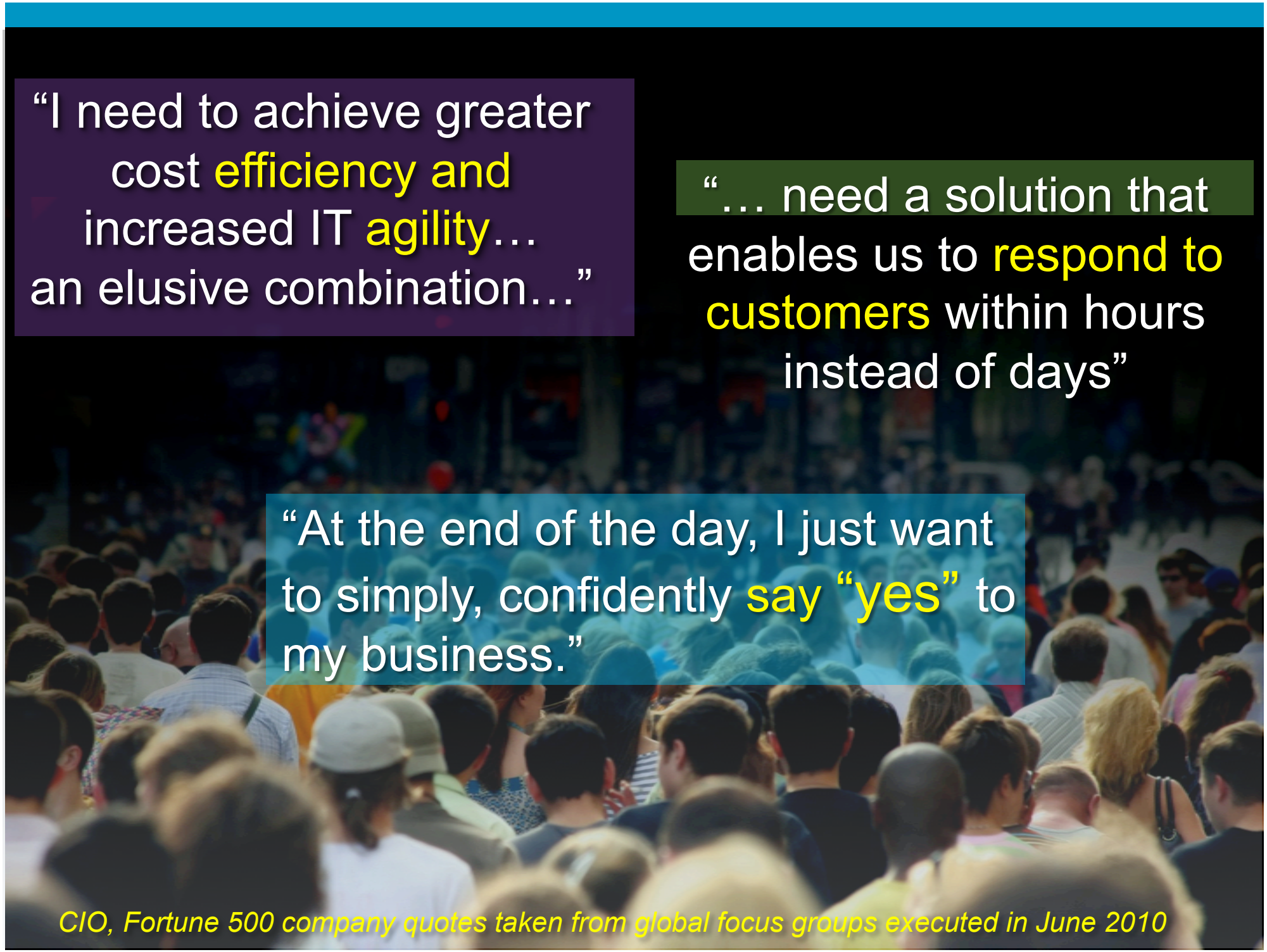
Disclaimer

Some of the products and features described herein remain in varying stages of development and will be offered on a when-and-if-available basis. The information in this Seminar is subject to change at the sole discretion of Cisco, and Cisco will have no liability for delay in the delivery or failure to deliver any of the products or features set forth in this document.

Cisco Data Center Business Advantage

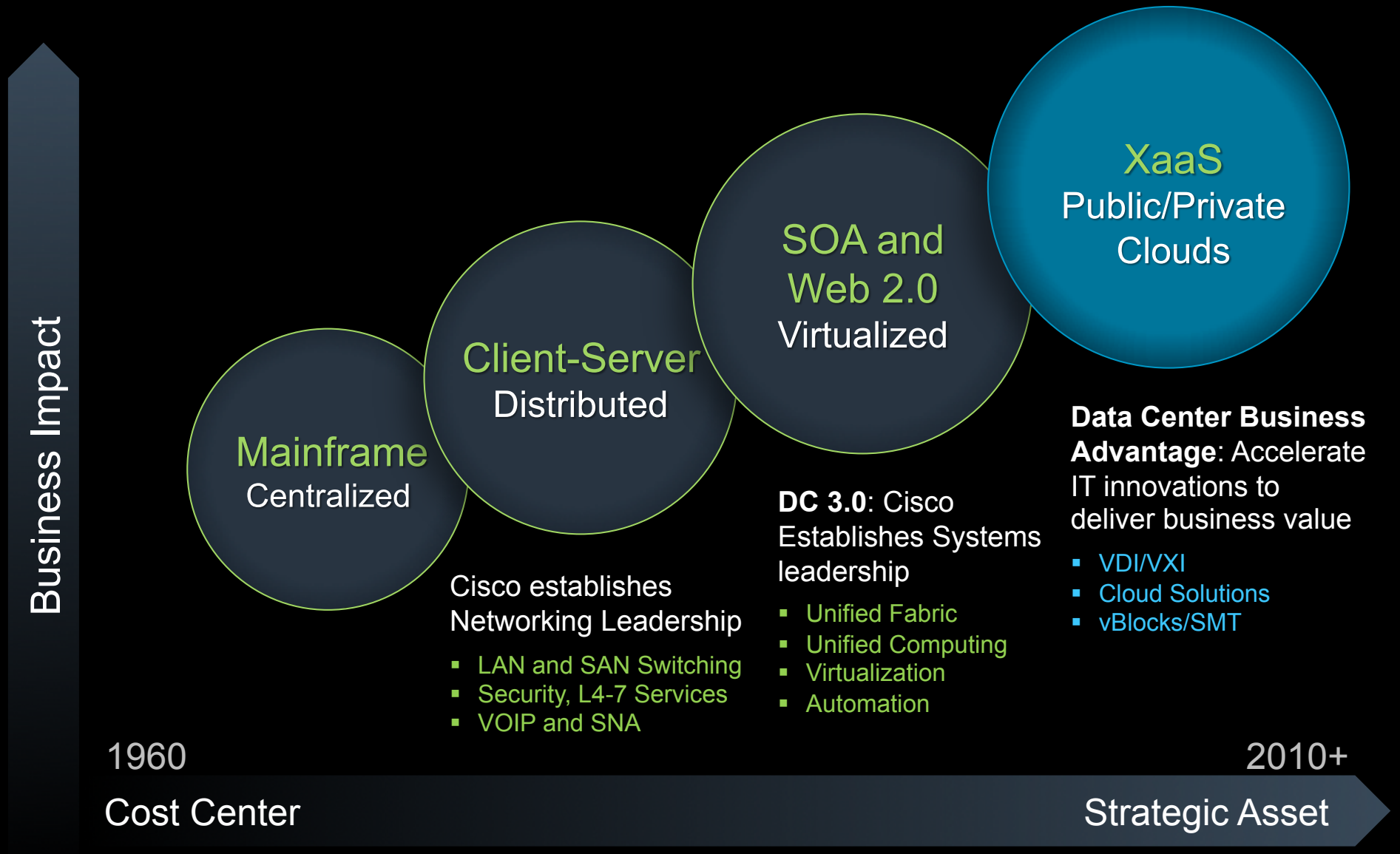
Delivering a Unified Architecture to a Virtualized Data Center

November 2010

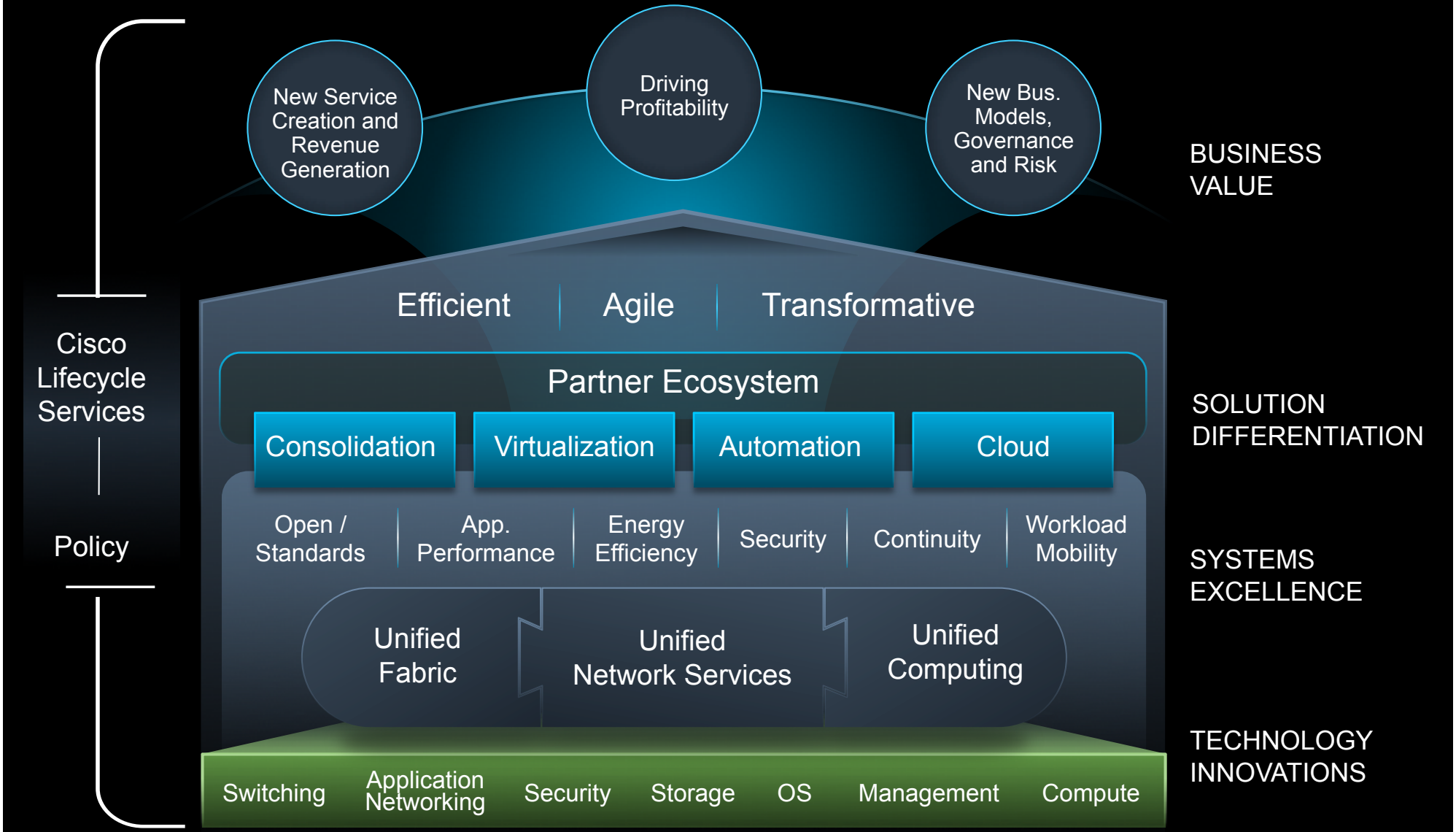


CIO, Fortune 500 company quotes taken from global focus groups executed in June 2010

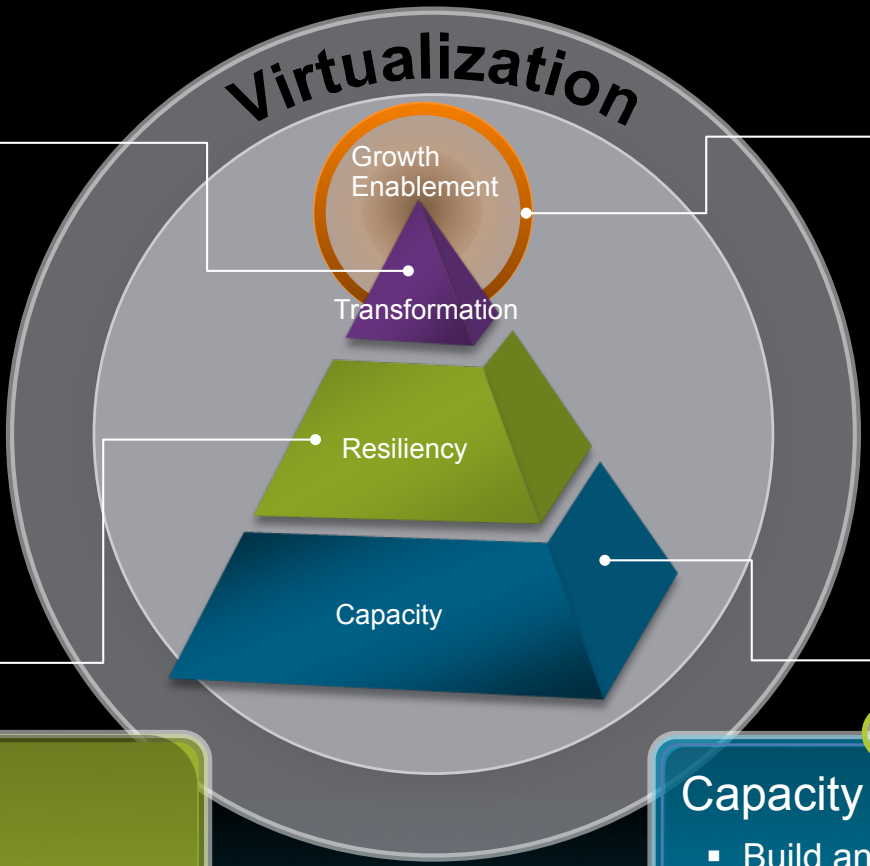
Data Center Evolution



Data Center Business Advantage
Total Solution Framework



Cisco's Internal Global Data Center Strategy



Transformation

- Run IT as a business
- Internal service provider model
- Service-oriented architecture

Growth Enablement

- New markets and business models
- Global expansion
- User experience

Resiliency

- Increase data center tiers
- Multi-site architecture
- Move out of high risk geographies
- Improve availability and recoverability

Capacity

- Build and occupy data centers
- Optimize demand
- Consolidate where appropriate

Next Generation Data Center

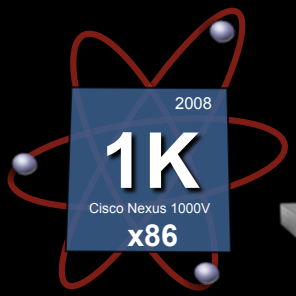
1. One Network
2. VM/Cluster Atomic Unit
3. Highly Virtual

- Results
  - Cost/Power Efficient
  - Resilient
  - Scalable
  - Cloud Ready

Cisco Nexus Family

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

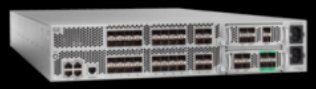
Nexus 1000V Virtual Switch



Nexus 2000 Fabric Extender

Nexus 4000

Nexus 5000

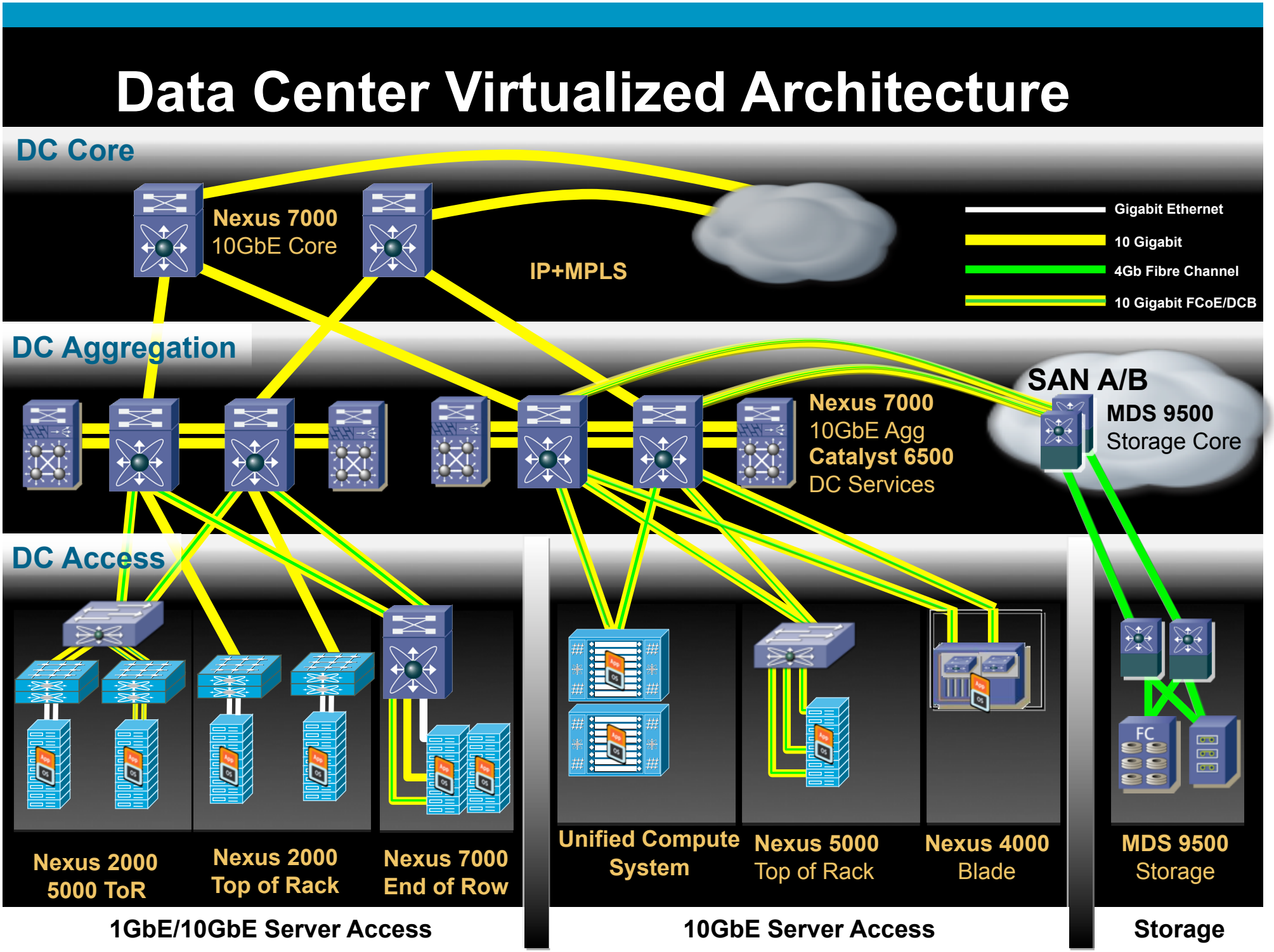


Nexus 7000

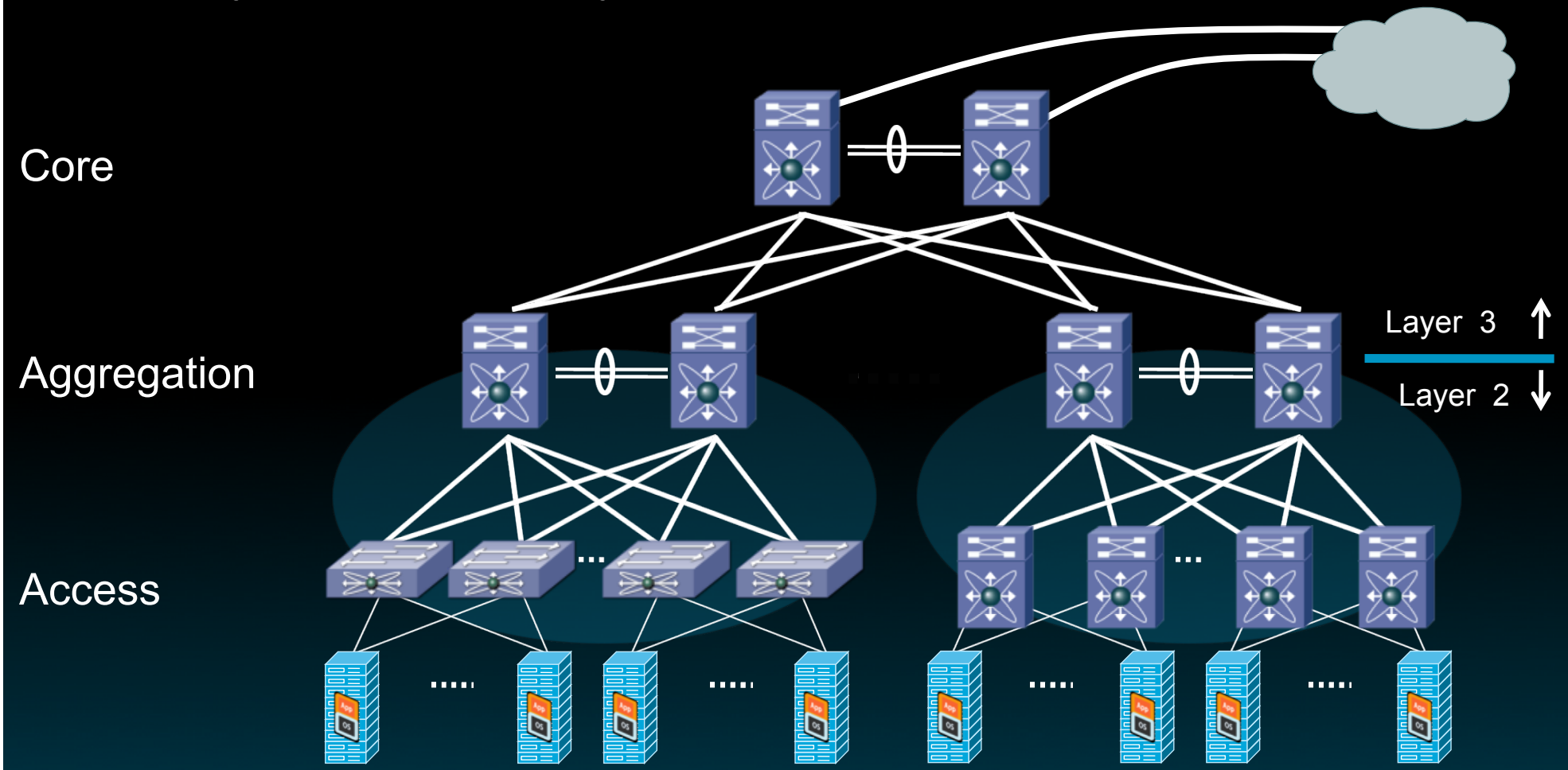
NX-OS Data Center Operating System

Data Center Network Manager

Data Center Virtualized Architecture

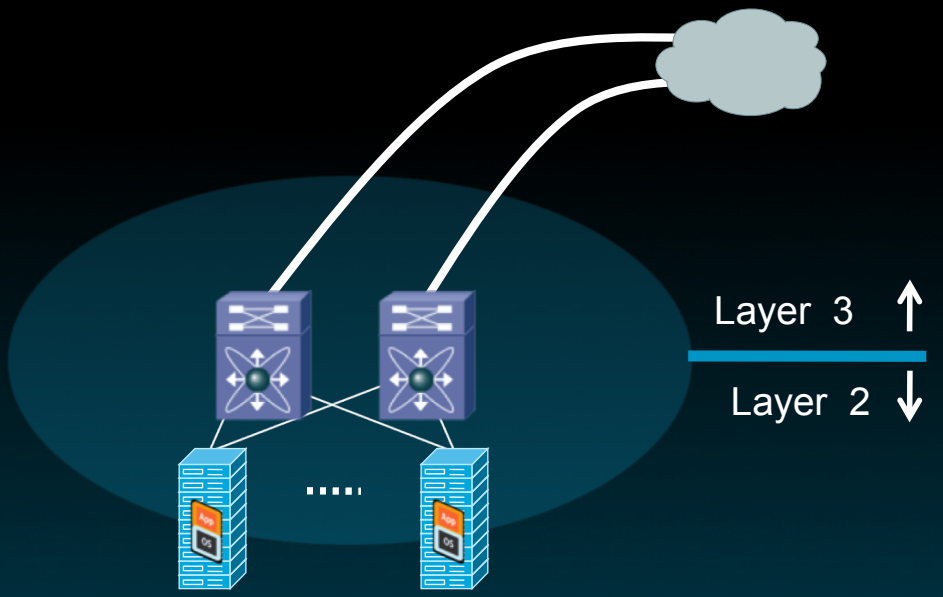


Layer 2 and Layer 3 Data Center Tiers



Collapsing Layers and Tiers

Core
Aggregation
Access



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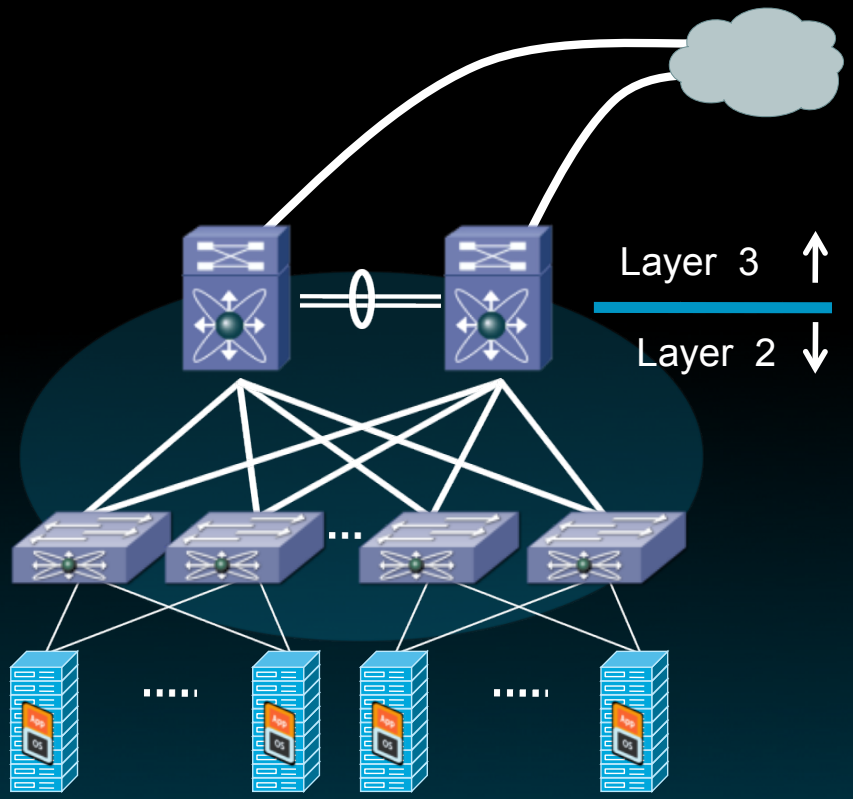

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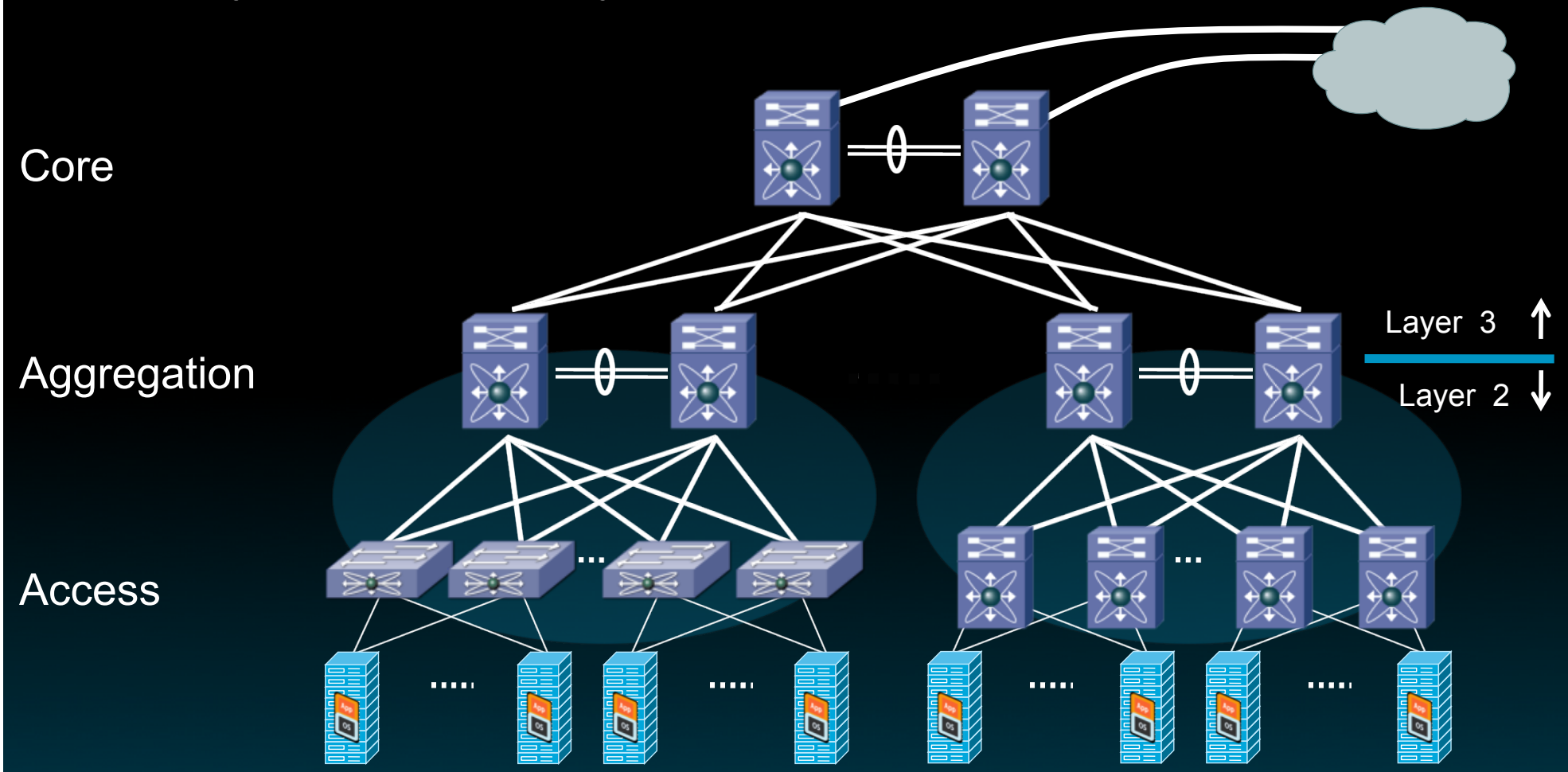
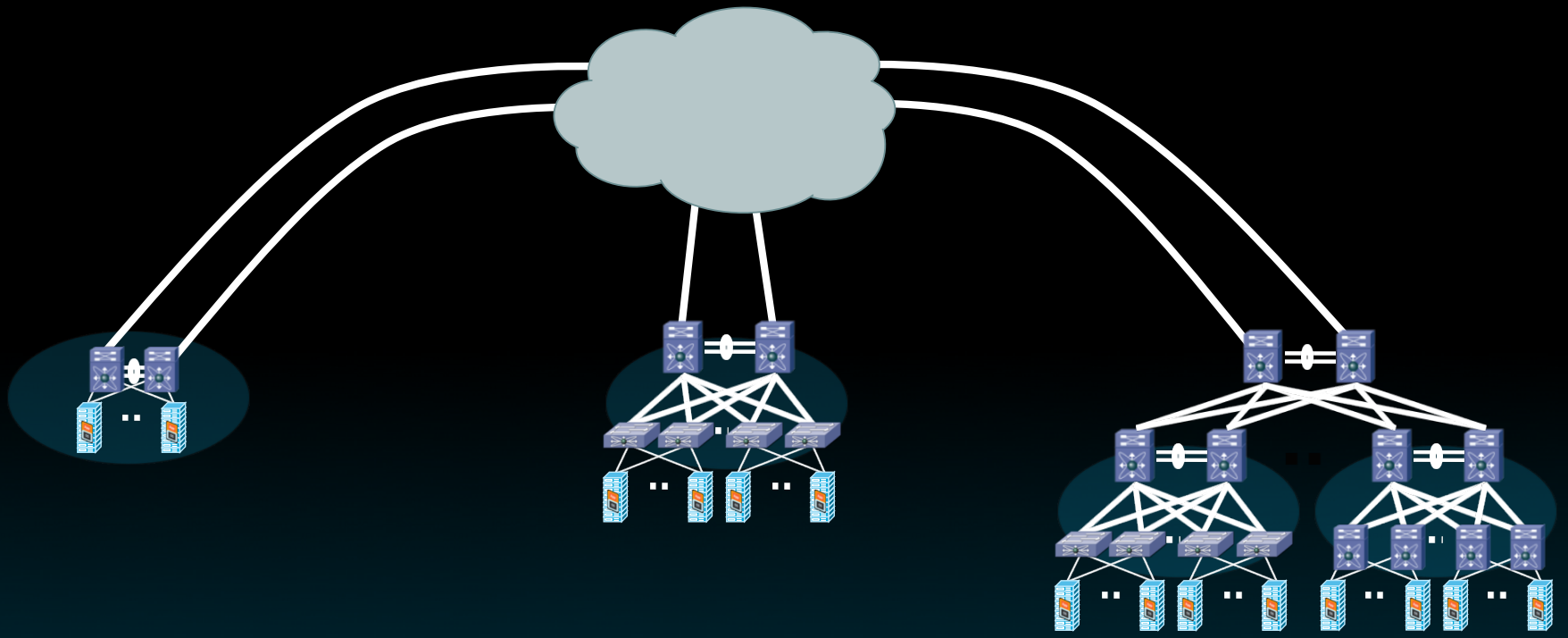
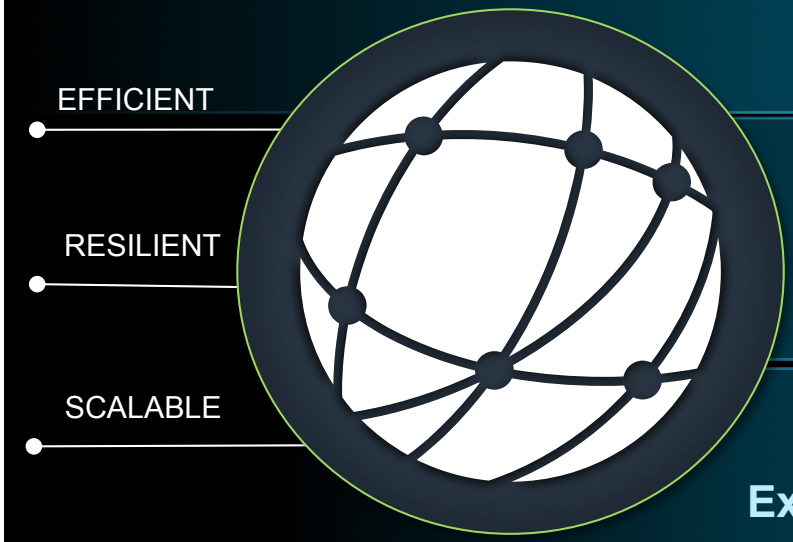


Data Center Interconnect



Unified Fabric & Unified Network Services

Keys to the Next Generation Data Centers



	Cisco Innovations
VM Proliferation & Performance Scaling **Granular Policy Enforcement** Flexible, Automated, Consistent	**N1KV** **VNlink** **Virtual Network Service**
Workload Mobility **Large L2 DC Domains** Scalable, Secure, Plug&Play	**Virtual Port Channel (VPC)** **Fabric Path/TRILL**
Disaster Recovery & DCI **Extended DC Interconnections** Optimal bandwidth, Resiliency	**OTV** **LISP**
Operational Efficiency & Cost Optimization **Converged Architectures** Data, Storage, Unified Access	**FCoE / DCB** **FEXlink** **Unified Ports**

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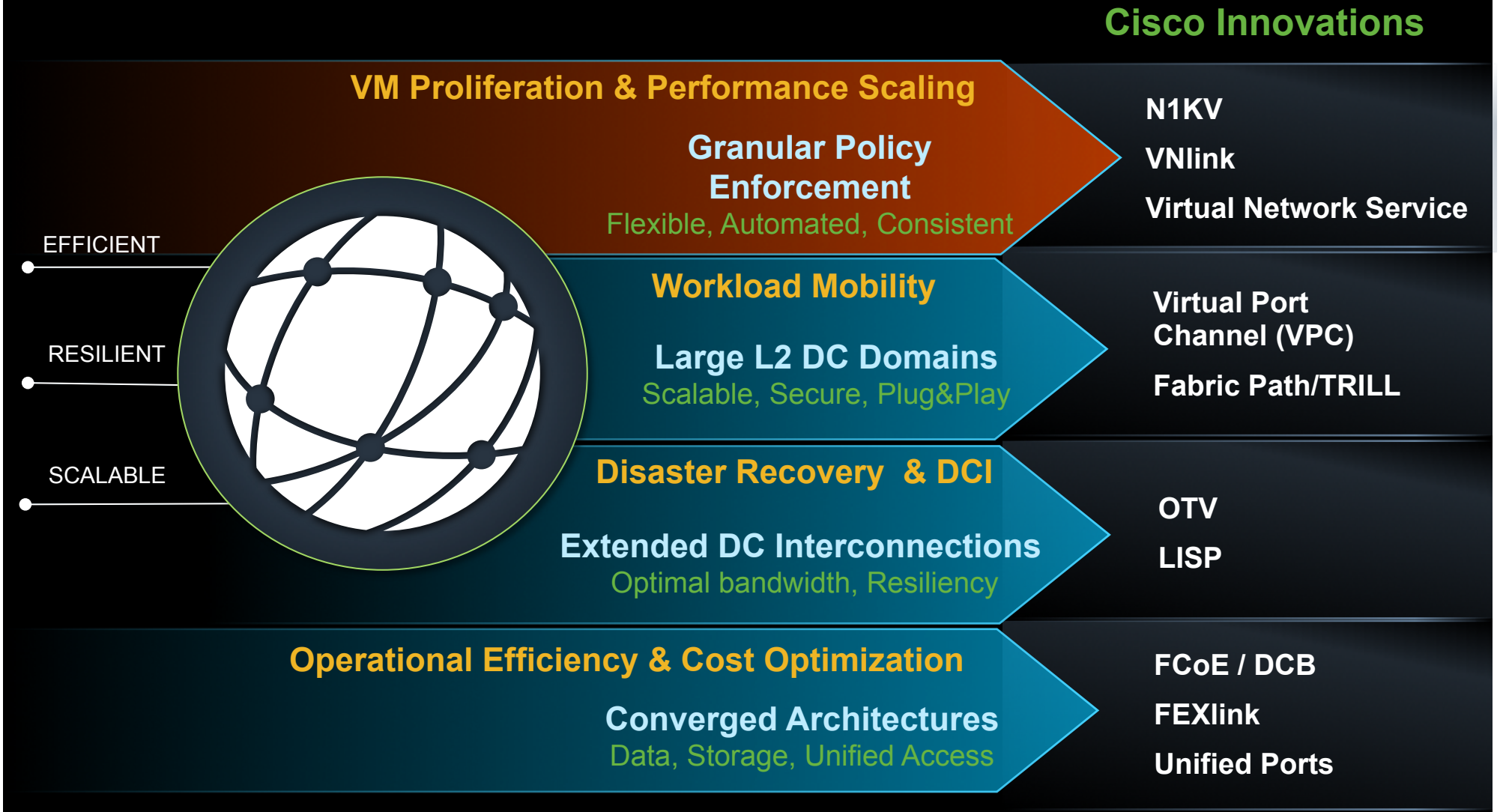
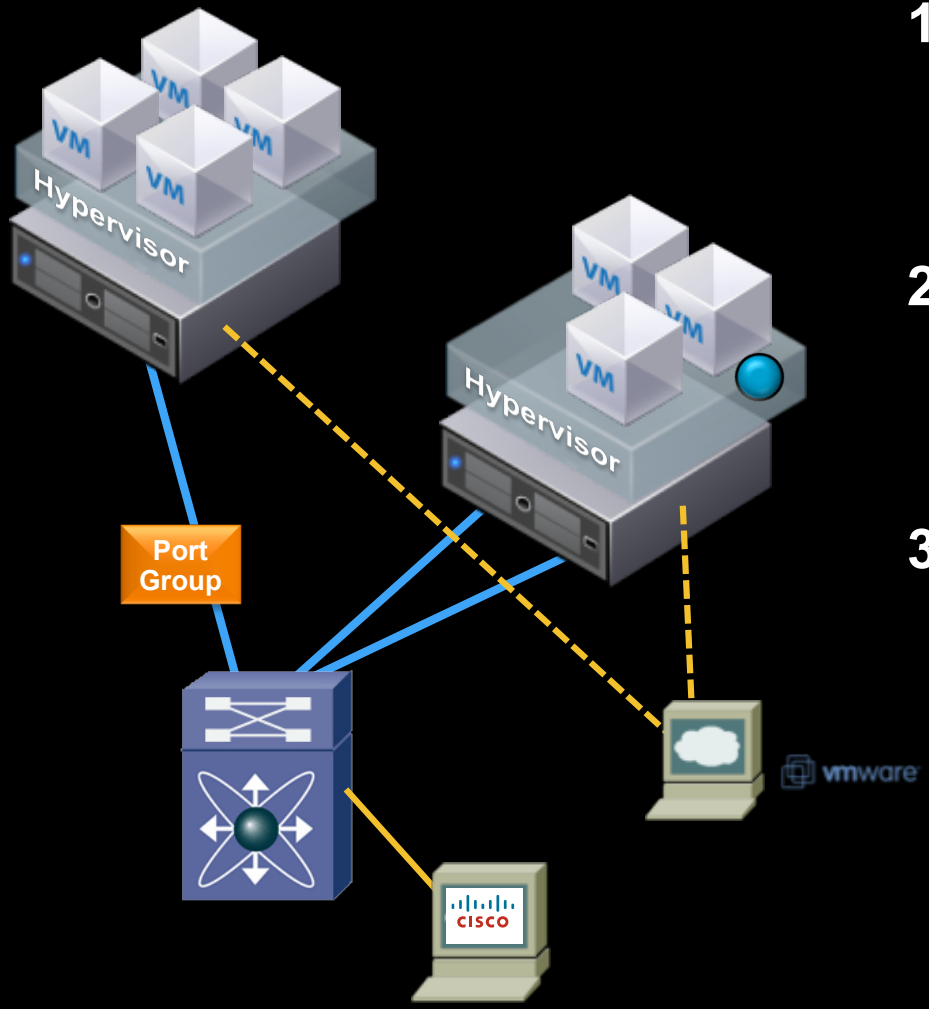


Server Virtualization Issues

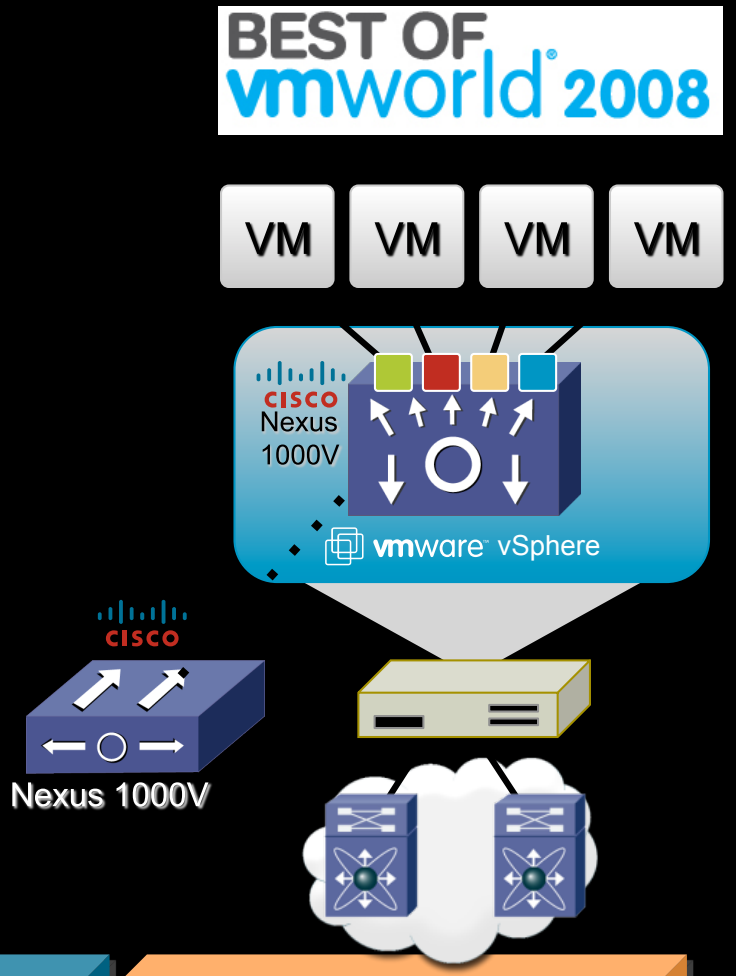


1. vMotion moves VMs across physical ports—the network policy must follow
2. Impossible to view or apply network policy to locally switched traffic
3. Need shared nomenclature for security policies between network and server admin

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



Policy-Based VM Connectivity

Mobility of Network & Security Properties

Non-Disruptive Operational Model

Mobility with Policy & Services Application

Network Scale Virtualization w/ VN-Link

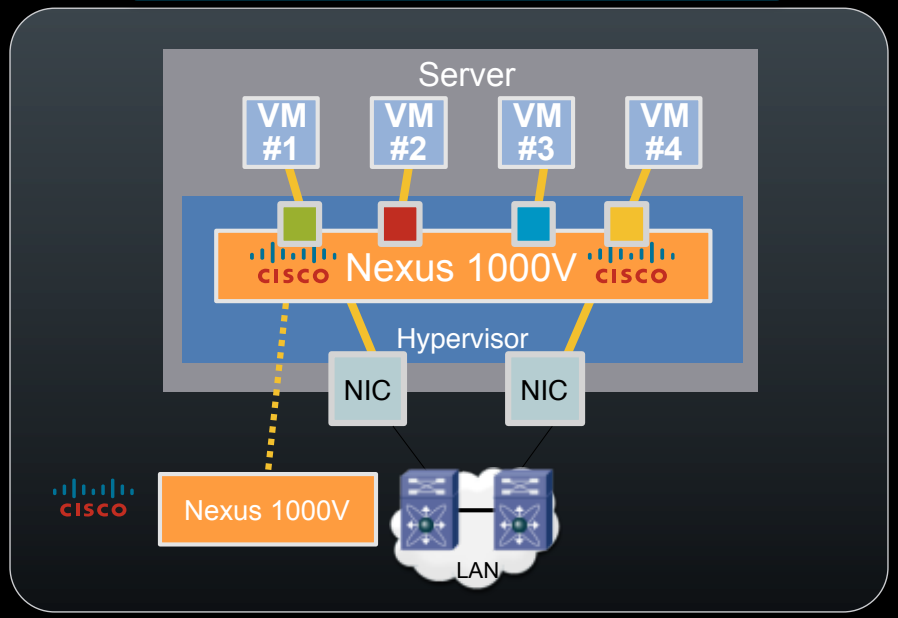
Policy-based VM Connectivity with Mobility and Security

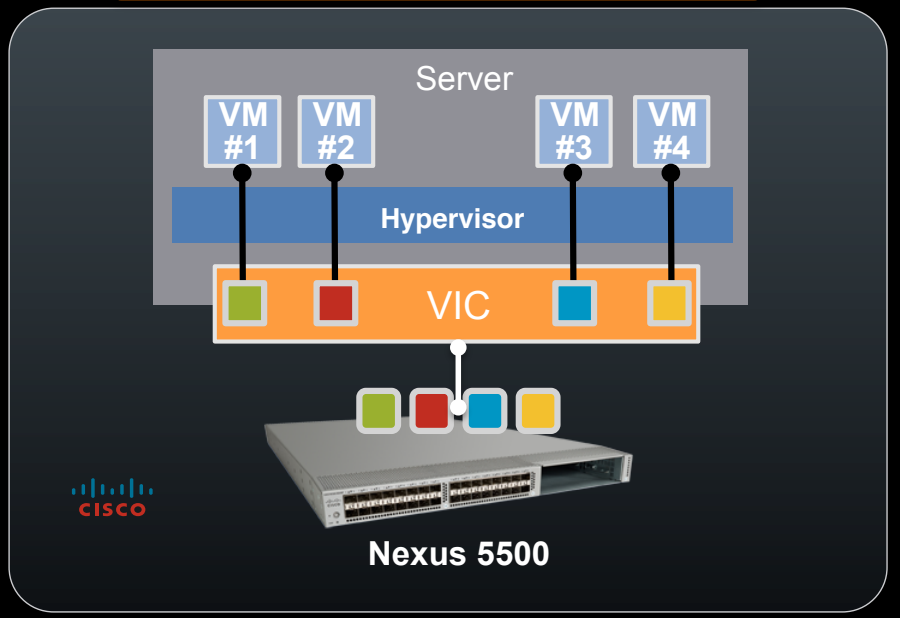
Nexus 1000V

- Software Hypervisor Switching
- Tagless (802.1Q)
- Feature set Flexibility

Nexus 5500

- External Hardware Switching
- Tag-based (Pre-standard 802.1Qbh)
- Performance Consolidation





Policy-Based VM Connectivity | Mobility of Network and Security Properties | Non-Disruptive Operational Model

Unified Network Services Product Innovations

Virtual Security Gateway (VSG)

On Nexus 1000V

Virtual Network Management Center (VNMC)

Virtual WAAS

ESX ESXi Hypervisor w/ Nexus 1000V

UCS /x86 Servers

vPath

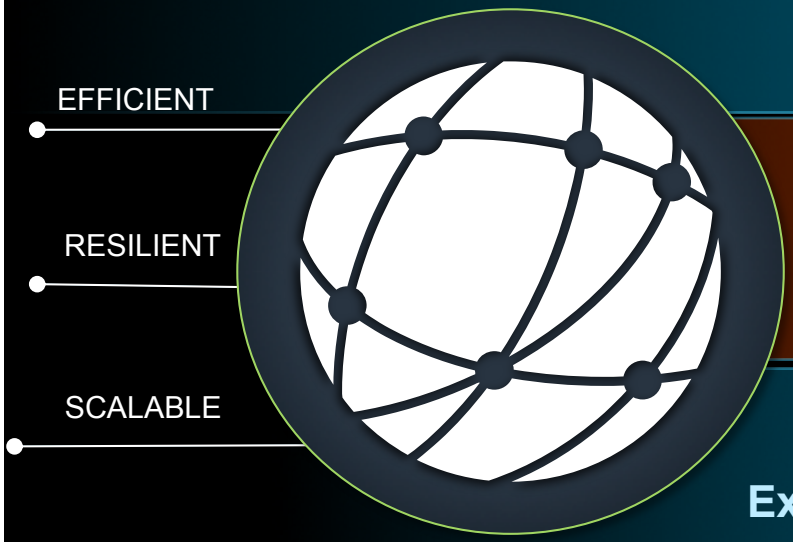
Nexus 1000V

vPath: Fabric Intelligence for Virtual services

- Traffic interception/redirection, Fast-path off-load

Unified Fabric & Unified Network Services

Keys to the Next Generation Data Centers



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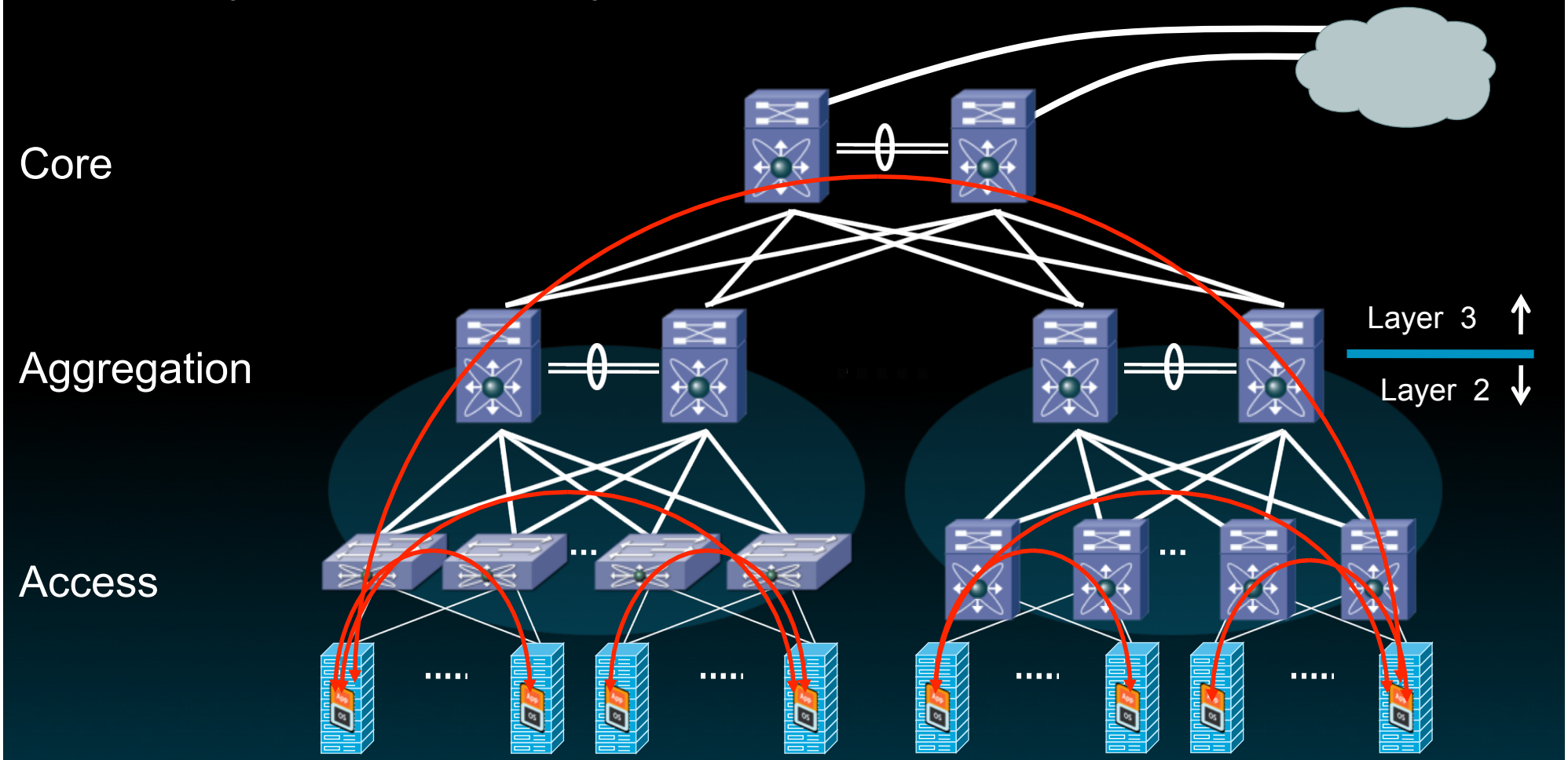
Layer 2 and Layer 3 Data Center Tiers

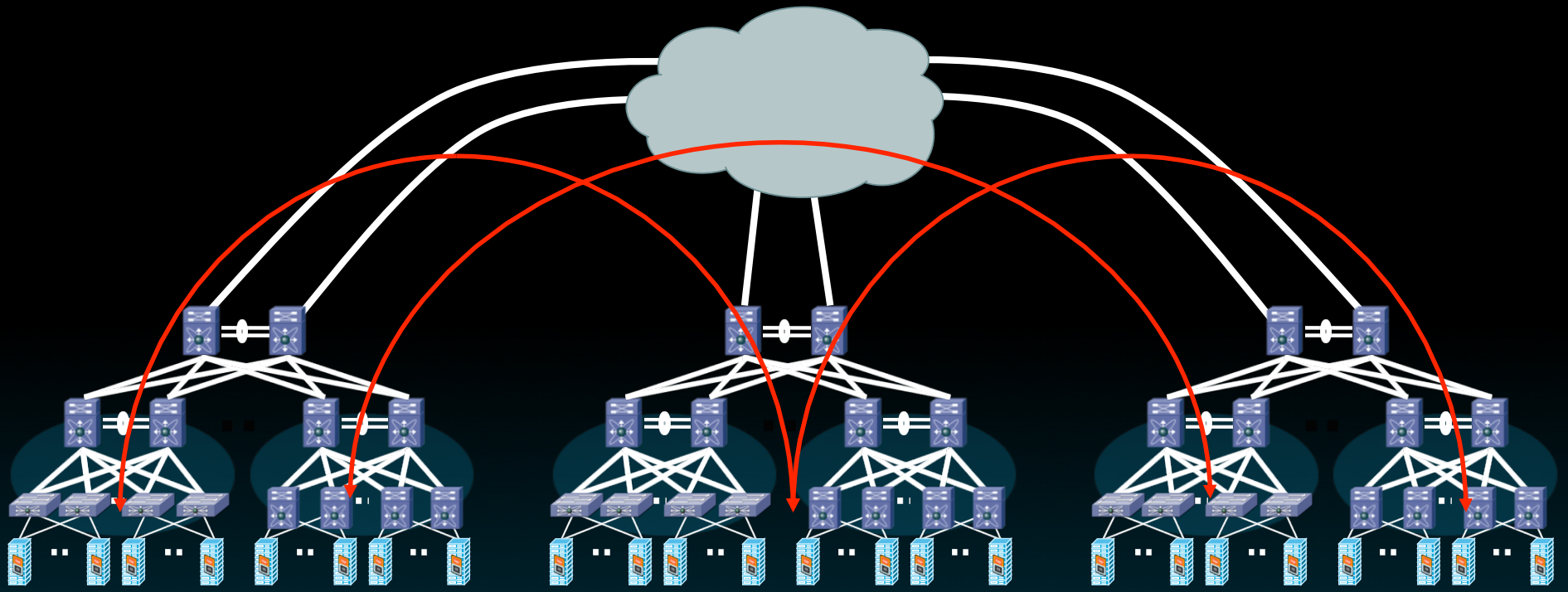


VM motion can be restricted because current L2 architectures can't scale

FabricPath scales L2 for Faster, Simpler, Flatter L2 Networks

OTV for Layer 2 Extension over Layer 3 within a data center

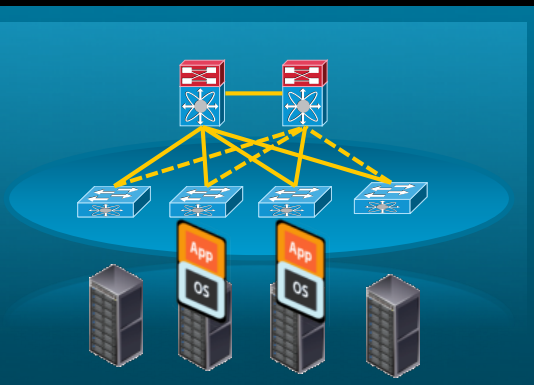
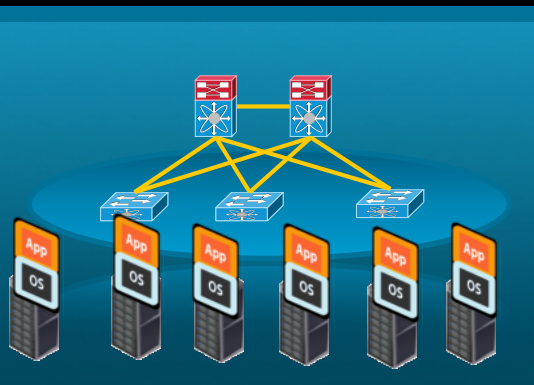
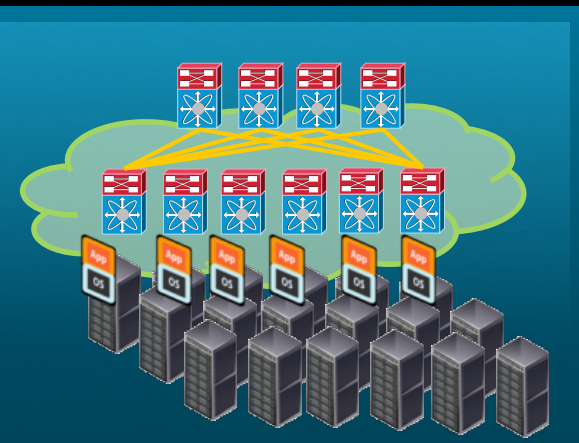
Data Center Interconnect



OTV for L2 Extension over Layer 3 across data centers

Scalable L2 Domains Expansion

Architecture Flexibility Through NX-OS

	Spanning-Tree	vPC	FabricPath
			
Active Paths	Single	Dual	16 Way
POD Bandwidth	Up to 10 Tbps	Up to 20 Tbps	Up to 160 Tbps

Layer 2 Scalability

Infrastructure Virtualization and Capacity

FabricPath
Shipping, Tested and Published Solution

"Cisco FabricPath enables faster, simpler, flatter data center networks" By David Newman, Network World October 25, 2010

http://www.networkworld.com/reviews/2010/102510-cisco-fabricpath-test.html

"Fast Fabric failover
For networking in general and data centers in particular, resiliency is an even more important consideration than high performance. …"

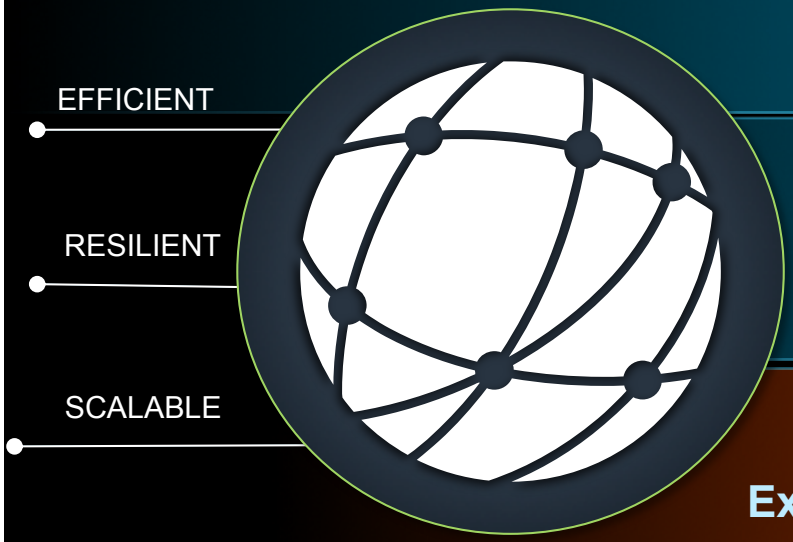
"Impressive performance
Our tests examined FabricPath functionality in five ways. All these involved six Nexus 7010 chassis linked to create one FabricPath network connecting 12,800 emulated hosts…."

"No multicast performance penalty
Cisco also claims FabricPath load-shares multicast source-receiver trees across multiple spine switches, compared with the single tree formed in STP networks…"

How we tested Cisco FabricPath :
http://www.networkworld.com/reviews/2010/102510-cisco-fabricpath-test-how.html?source=NWWNLE_nlt_cisco_2010-10-25

Unified Fabric & Unified Network Services

Keys to the Next Generation Data Centers



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Datacenter Interconnect L2 or L3

Introducing Overlay Transport Virtualization (OTV)

Simplifying Data Center Interconnect (DCI)

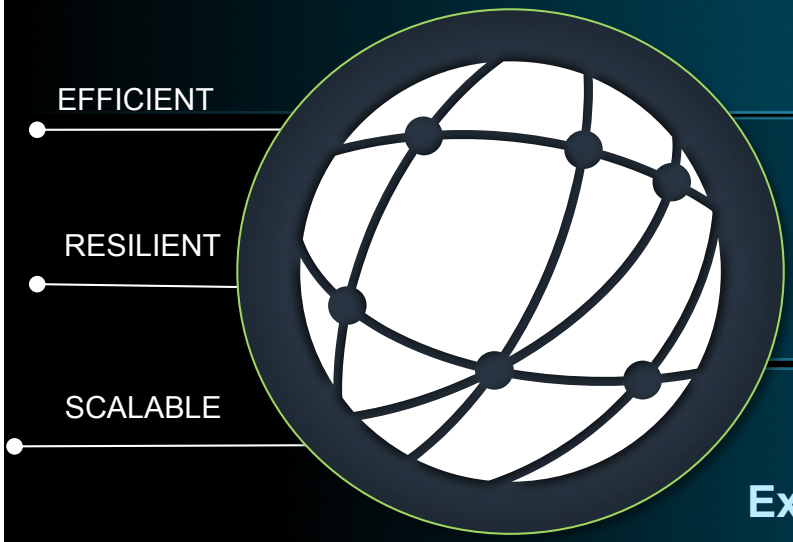
- Ethernet LAN Extension over any Network
  - Works over dark fiber, MPLS, or IP
  - Multi-data center scalability
- Simplified Configuration & Operation
  - Seamless overlay - No network re-design
  - Single touch site configuration
- High Resiliency
  - Failure domain isolation
  - Seamless Multi-homing
- Maximizes available bandwidth
  - Automated multi-pathing
  - Optimal multicast replication

Many physical sites –
One logical Data Center

Any Workload, Anytime, Anywhere
Unleashing the full potential of compute virtualization

Unified Fabric & Unified Network Services

Keys to the Next Generation Data Centers



Cisco Innovations

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Granular Policy Enforcement
Flexible, Automated, Consistent

- N1KV
- VNlink
- Virtual Network Service

Workload Mobility

Large L2 DC Domains
Scalable, Secure, Plug&Play

- Virtual Port Channel (VPC)
- Fabric Path/TRILL

Disaster Recovery & DCI

Extended DC Interconnections
Optimal bandwidth, Resiliency

- OTV
- LISP

Operational Efficiency & Cost Optimization

Converged Architectures
Data, Storage, Unified Access

- FCoE / DCB
- FEXlink
- Unified Ports

Operational Efficiency & Cost Optimization

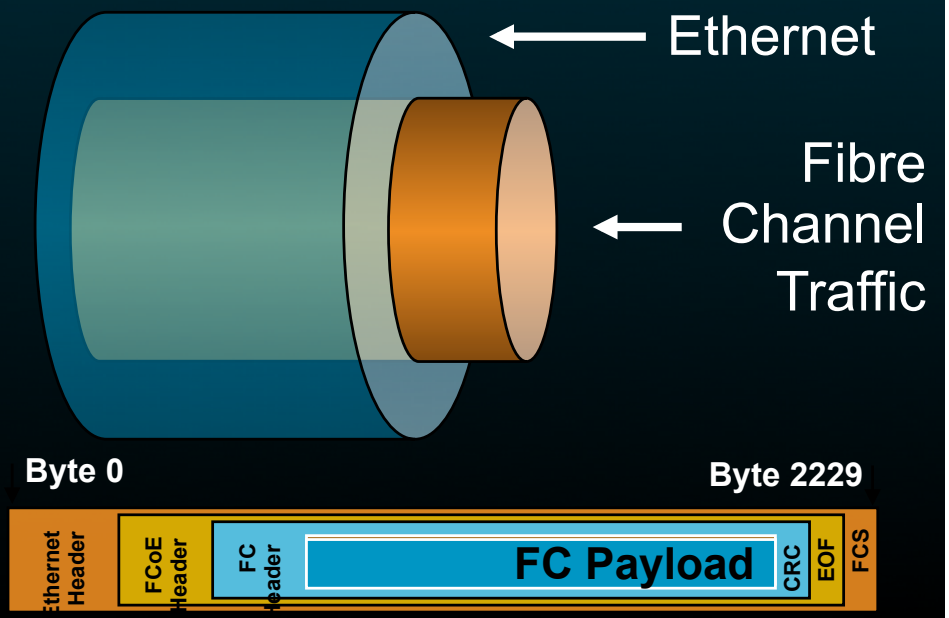
Nexus Enables DataCenter Bridging (DCB)
DCB Enables FCoE

IEEE DCB

- Priority Flow Control IEEE 802.1Qbb creates lossless Ethernet with classes of service
- Bandwidth Management IEEE 802.1Qaz allows flexible bandwidth sharing for LAN and SAN
- Data Center Bridging Exchange Protocol IEEE 802.1Qaz provides device-device communication on resources

FCoE

- Mapping of Fibre Channel frames over Ethernet
- Enables Fibre Channel to run on a lossless Ethernet



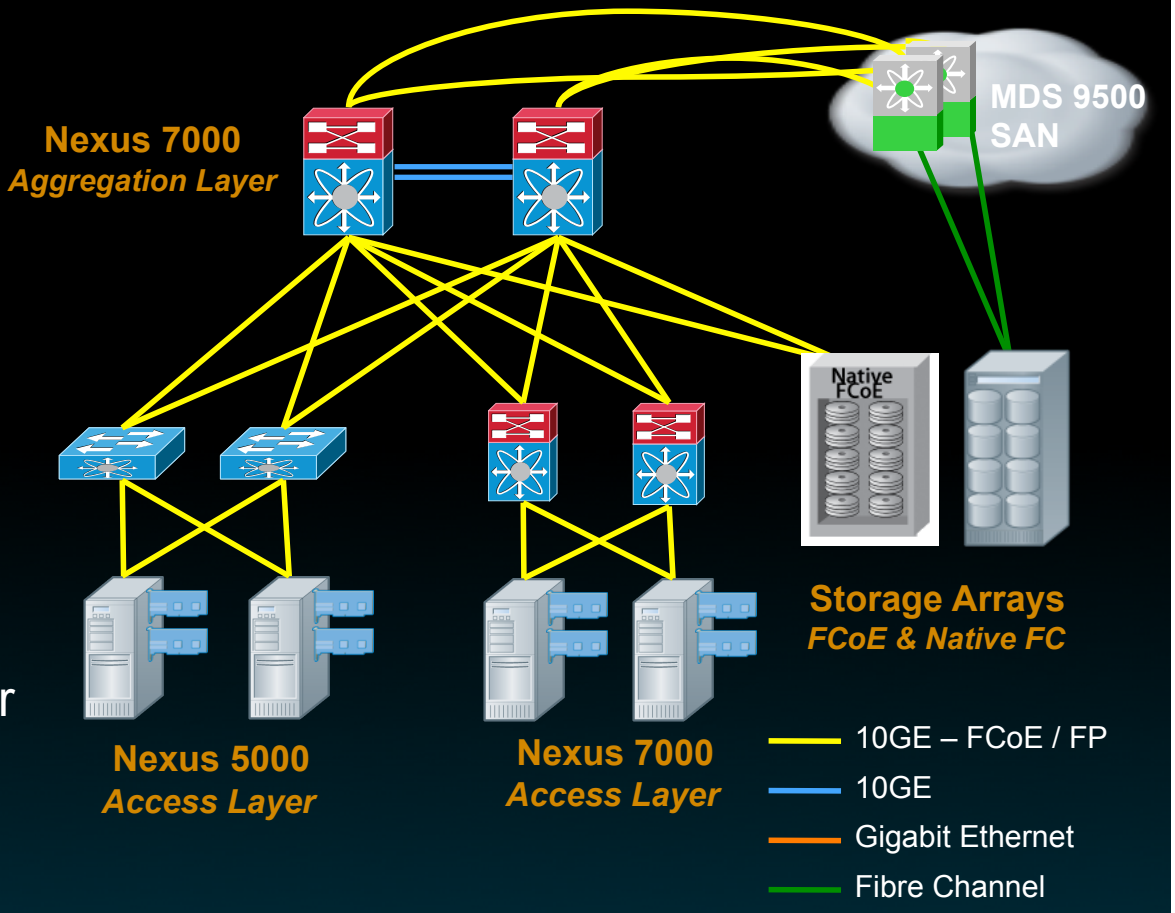
Operational Efficiency & Cost Optimization

FCoE Multi-Hop Enables Fabric Consolidation

MDS
FCoE Modules on MDS
FCoE to FC gateway on MDS

Nexus 7000
FCoE Modules on Nexus 7000
Unified I/O
FCF on Nexus 7000
Separate VDCs for FCoE and LAN

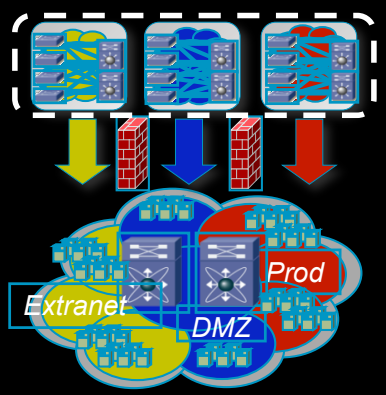
- Storage Array
  FCoE capable arrays connect to N7K
- Access layer N5K, UCS, N7K connects to N7K Aggregation over 10GE, FCoE



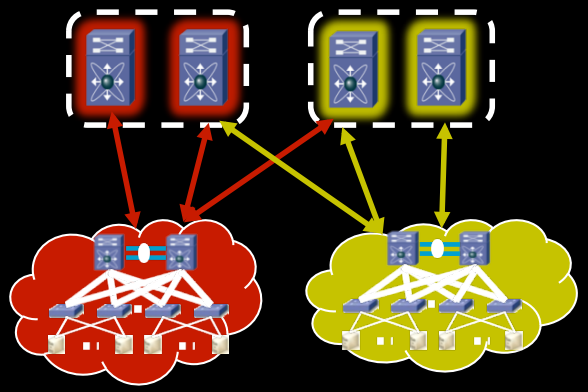
Nexus 7000 to support FCF & FC Director functionality

Virtual Device Context

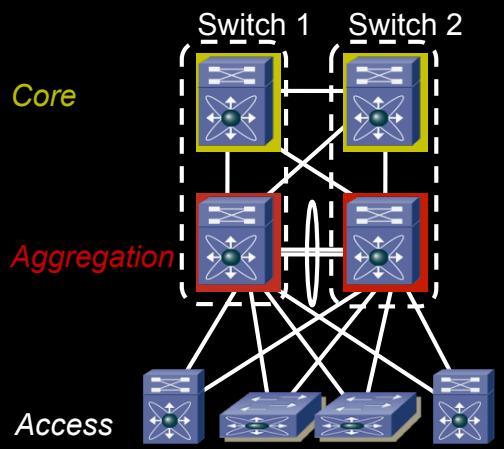
- One physical switch can act as multiple virtual switches
  - Lower CAPEX (reduce the number of physical switches in the network
  - Lower OPEX (power, service expense)
- Applications Include:



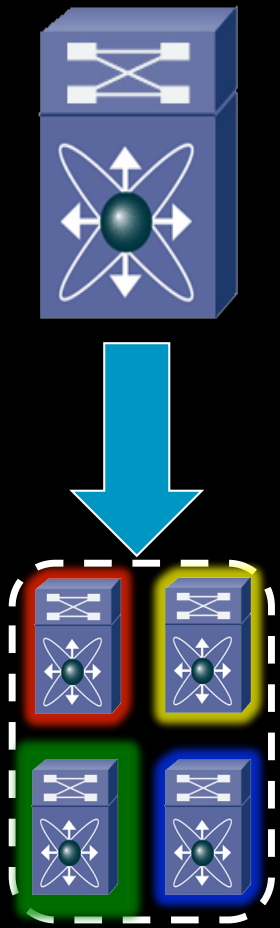
Isolating Security Domains



Separating Networks



Collapsing Architecture Layers



Operational Efficiency & Cost Optimization
ISSU Support on Nexus 7000, 5000, 2000 & 1000V

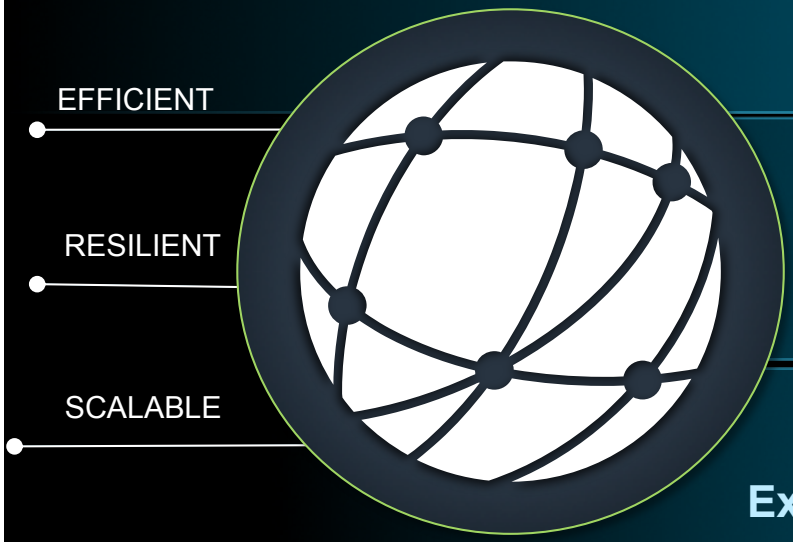
An Industry-leading Innovation for an entire portfolio

- Zero Service disruption upgrades/ downgrades
- Provides business continuity with an “always on” network
- Increases productivity by eliminating scheduled outages
- Reduces operating costs
- Extends high availability designs with vPC at the server access

Continuous Operations for Ethernet, Storage & Unified Fabric Environments

Unified Fabric & Unified Network Services

The Attributes of Next Generation Data Centers



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9:00 – 9:45	**The Data Center Journey to Virtualization and Cloud** *Cisco Data Center Business Advantage*	Business & Strategy
9:45 – 10:30	**Unified Network Services -** Consistency, Flexibility, Simplification *New Virtual Security Gateway with the Nexus 1000V & virtual WAAS solutions*	
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