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Foundations for the Virtualized Data Center

Greece Expo
21st April 2010

Data Centers Are Under Increasing Pressure



Collaboration



Empowered User



SLA Metrics

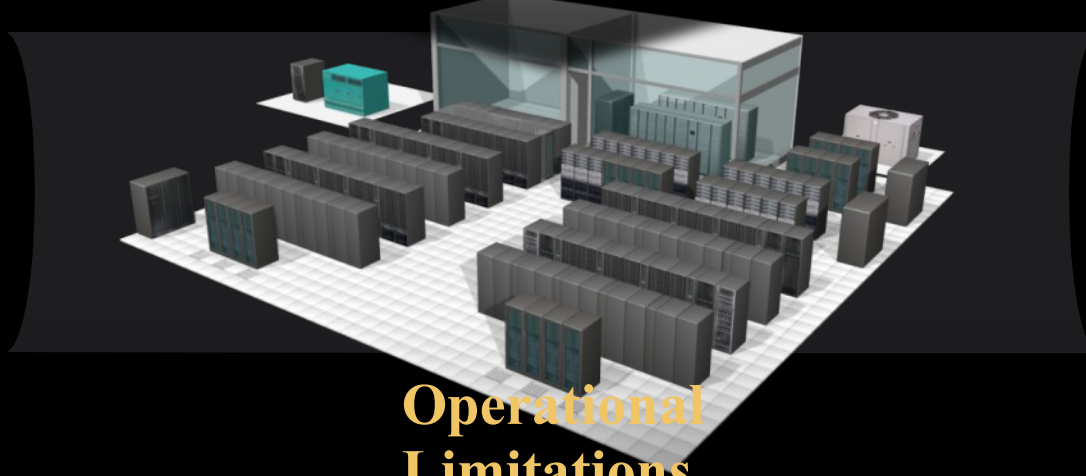


Global Availability



Reg. Compliance

New Business Pressures



Operational Limitations

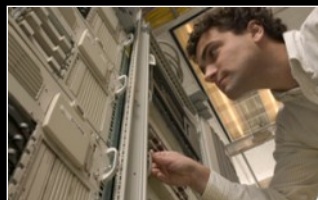
Power & Cooling



Asset Utilization



Provisioning



Security Threats



Bus. Continuanace



Market Transition from 1GE to 10GE

10 GE Port Shipment Forecast



6M+ 10GBase-T by 2013

2 – 3 years timeframe for new server migration to 10GBase-T

Greenfield DC's must support high density 10GE capacity

Key Technology Drivers for 1GE to 10GE Migration

Server / NIC Technology

10GBase-T Interface LOM standard by 2010 – 2011

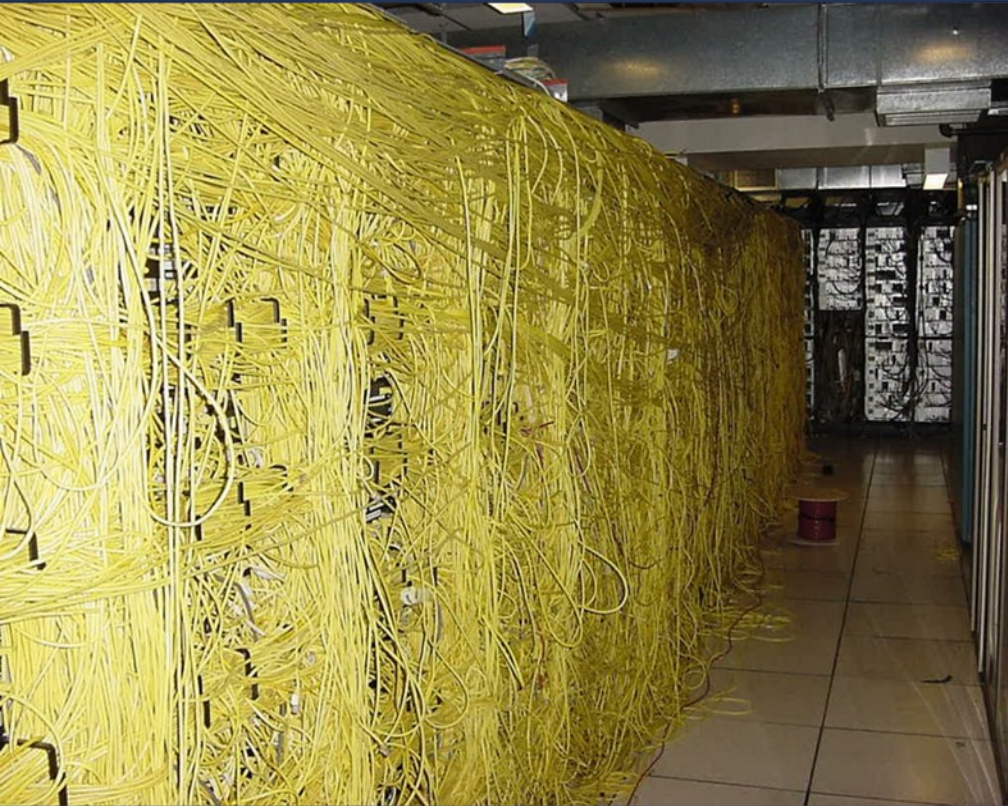
Reduction in price points and power usage of 10GE Interfaces in servers

1/10GBase-T Switches in 2010

Minimize price gap between 1 GE and 10 GE

Unifying the Data Center Fabric

Many Networks, One Infrastructure



Complexity,
Cost, Power



Increased Efficiency,
Simpler Operations

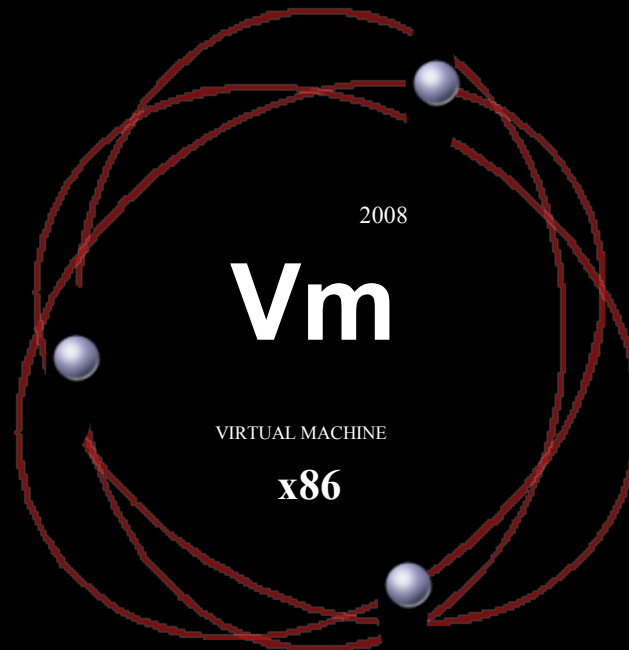
FCoE

- Need the healthcare cost savings example

FCoE

- Need a slide on T11

Server Consolidation, Virtualization and the New “Atomic Unit”



Data Center Systems Portfolio



DC Interconnect Systems



DC Edge
Routing

WAN
Optimization

Optical
Family

Nexus and Catalyst Switching Systems



Catalyst Family



Nexus
Family

DC Services Systems



ASA and ACE
Families

DC Storage Systems



MDS 9000
Family

Unified Computing System

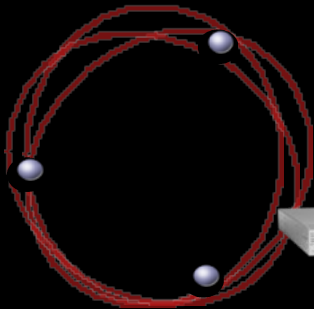


UCS
Family

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
5010/20**



Nexus 7010



Nexus 7018



NX-OS Data Center Operating System

Data Center Network Manager

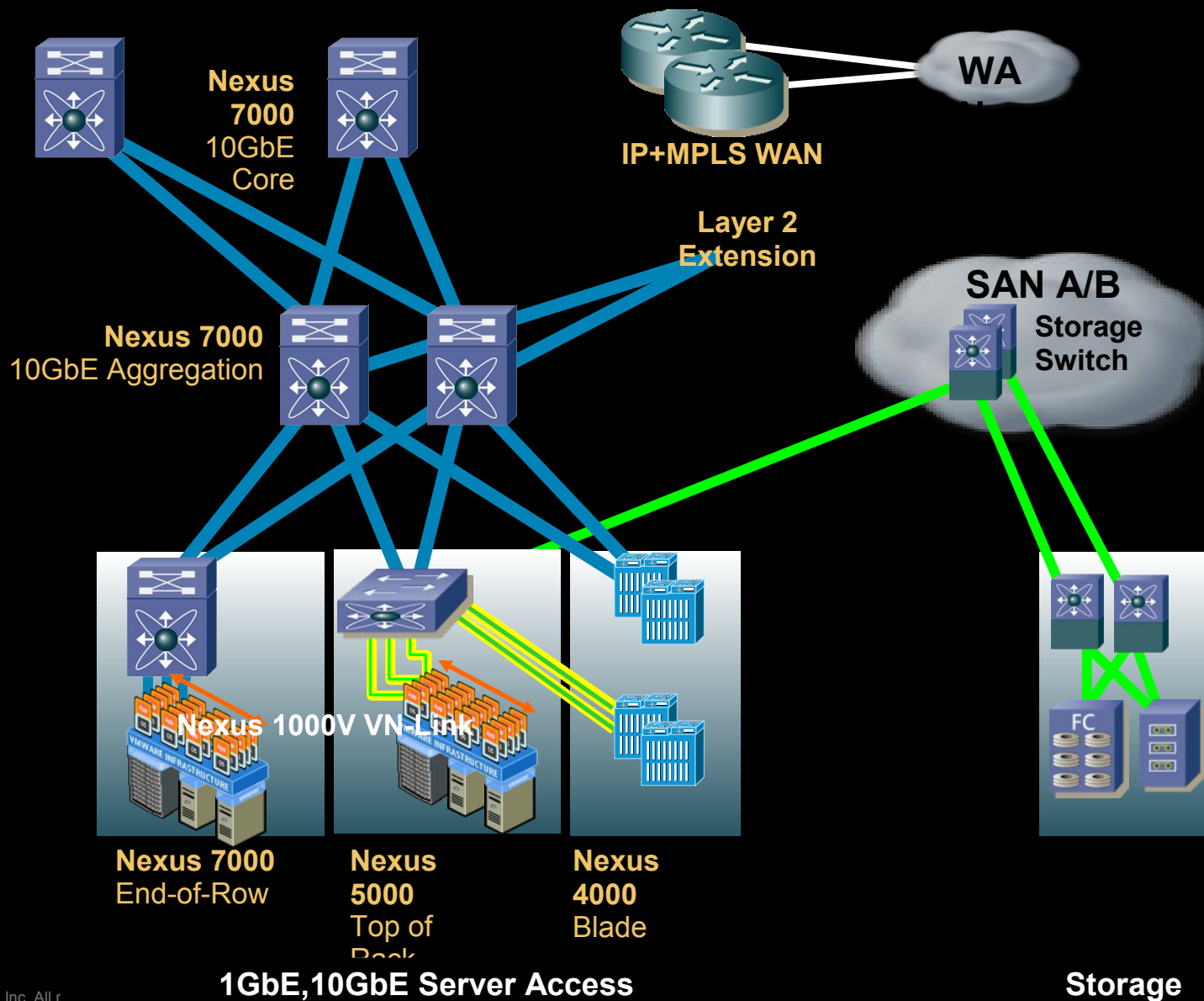
Nexus Deployment: 3-Tier or 2-Tier

DC Core

DC Aggregation

DC Access

- Gigabit Ethernet
- 10 Gigabit Ethernet
- 10 Gigabit FCoE/DCE
- 4, 8Gb Fibre Channel



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The Nexus Portfolio

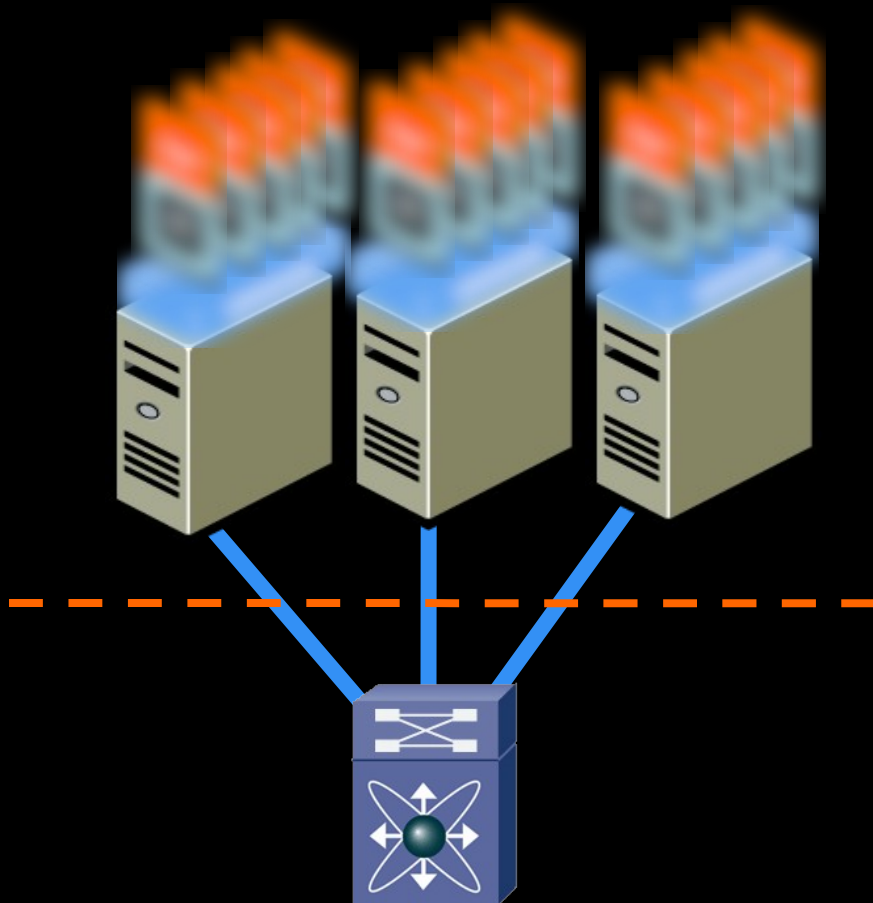
Impact of VM on Server Access



Servers and infrastructure eliminated,
but mechanism needed to connect all virtual
machines

No VM Visibility from the Access Layer

Boundary of network visibility

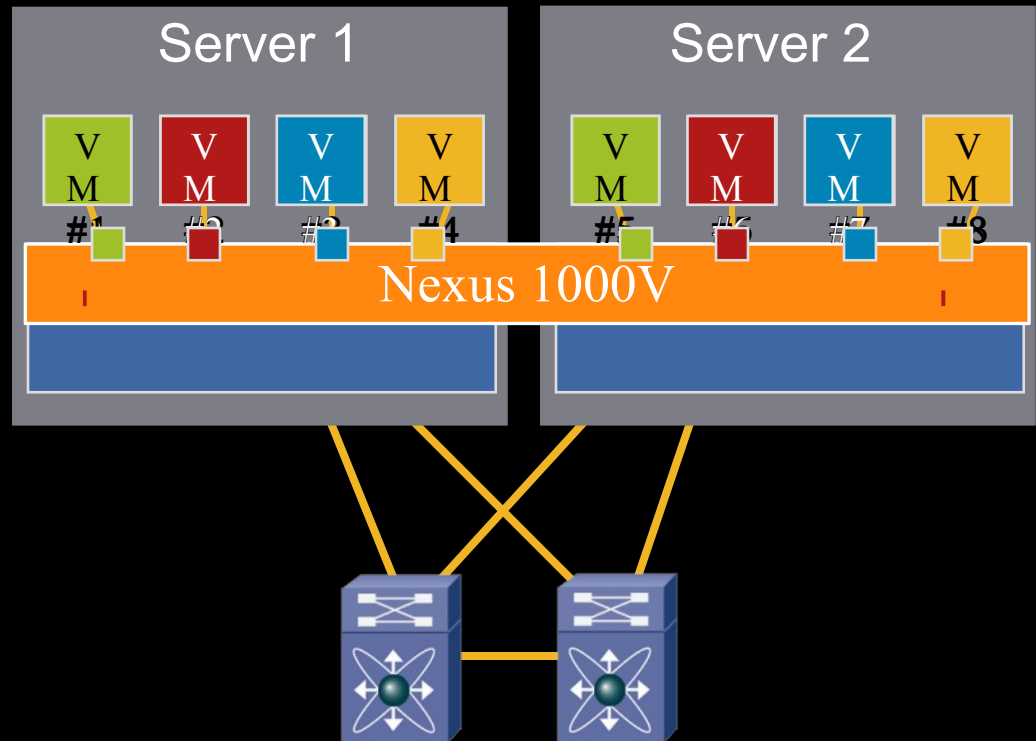


- No visibility to individual traffic from each VM
- Unable to apply policy, troubleshoot, nor address performance issues
- Confused ownership
- Inability to audit compliance

Cisco Nexus 1000V

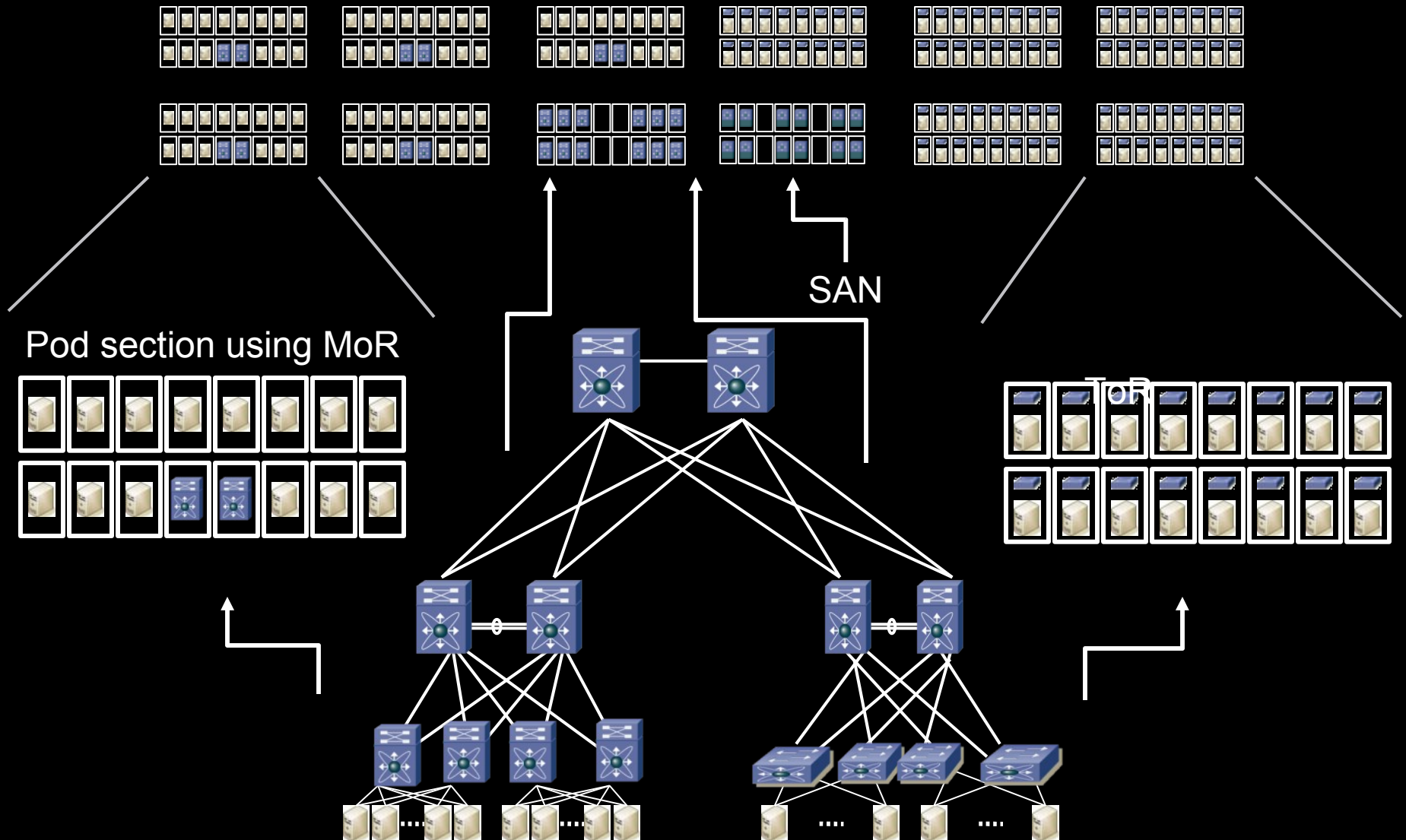
Industry First 3rd Party Virtual Distributed Switch

- Network Policies defined by the Network Admin
- Policy is applied by the Server Admin to the appropriate VM via vCenter
- Installed by Server Admin
- Jointly developed with VMware
- Supplements vSwitch functionality with enhanced switch features
- Implements NX-OS

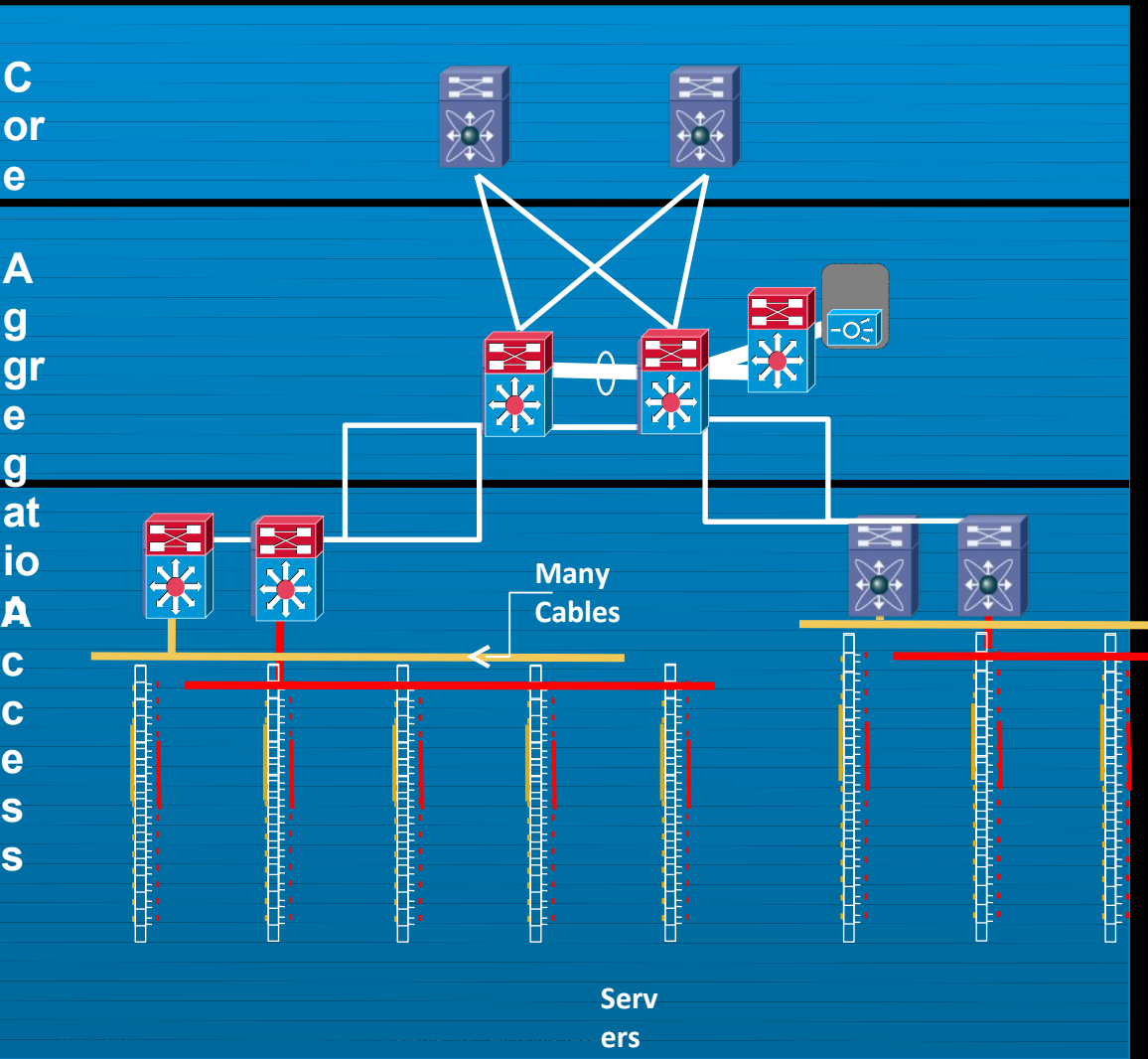


Enabling Acceleration of Server Virtualization Benefits

Topologies in the Data Center



End or Middle of Row



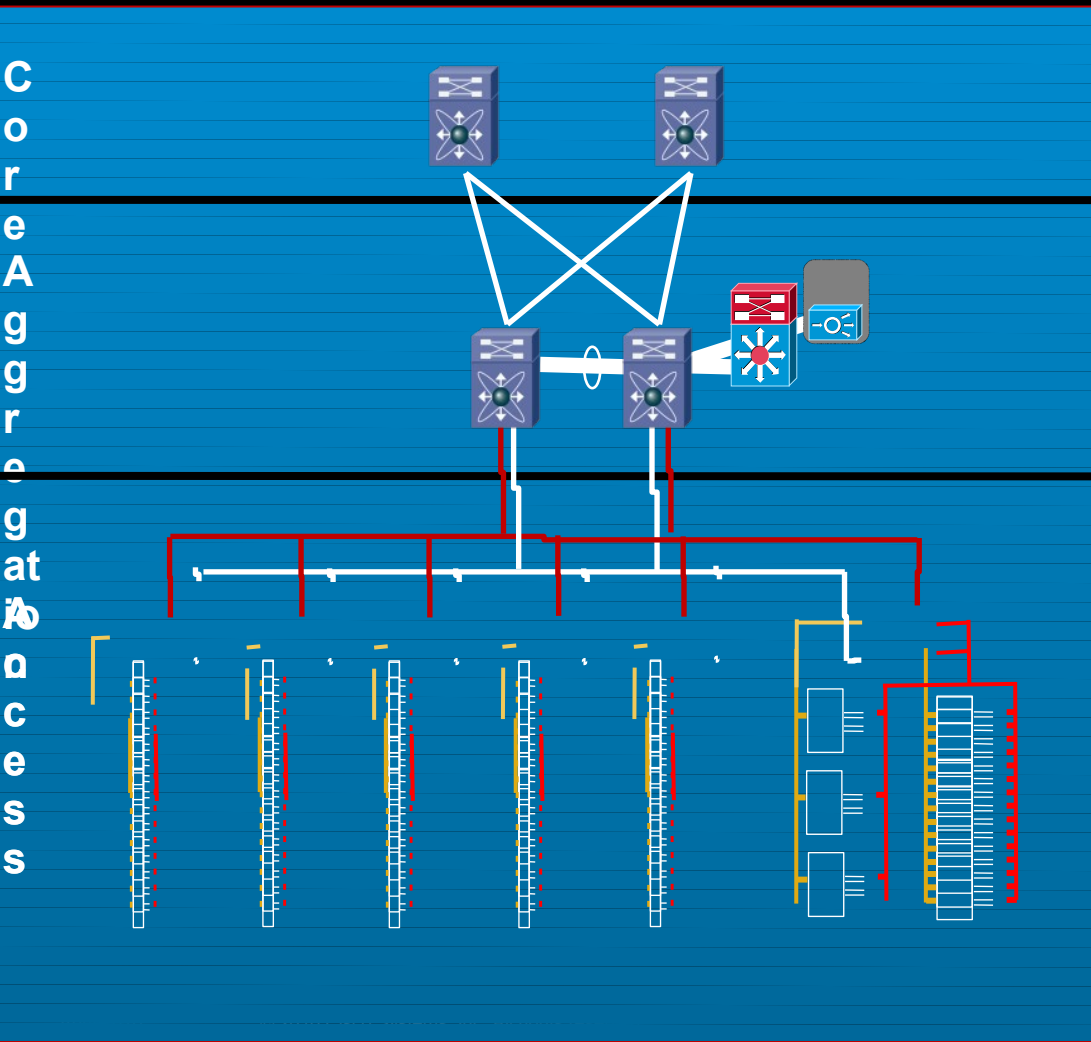
Benefits

- Fewer configuration and management points in the network
- Ease of rolling out services and software upgrades
- Maintain feature consistency (Security, QoS, Multicast etc.)

Challenges

- Many across-rack cables

Top of Rack



Benefits

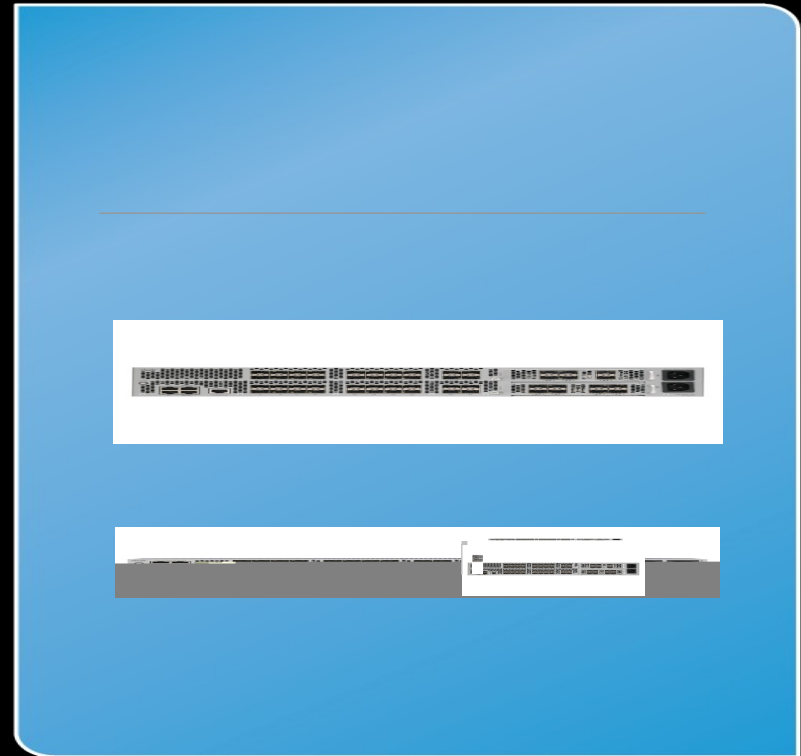
- Flexible and scalable design
- Ease in replication of racks
- Shorter server-to-access switch cabling
- Fewer across-rack cables
- Lower cabling costs

Challenges

- Many managed devices

Nexus 5000: Data Center Class System

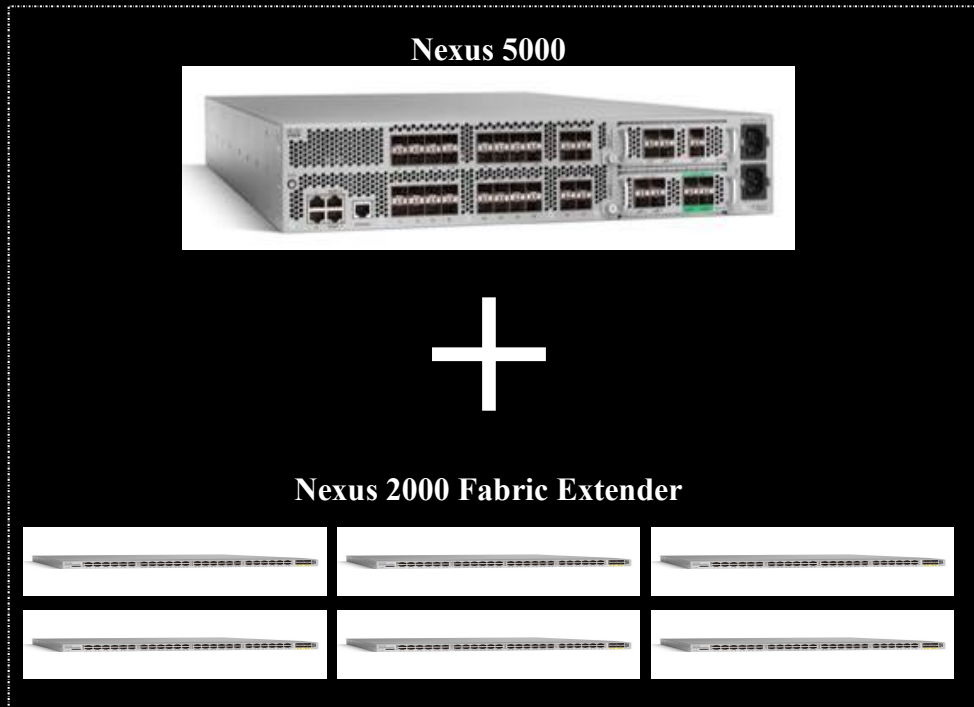
- **High performance, high availability**
 - 20 or 40 L2 10GbE ports (+ modules)
 - Terabit bandwidth
 - Non-blocking, non-oversubscribed
 - Very low latency & jitter
 - Hitless In-Service Software Upgrade**
- **Flexible compatibility and connectivity**
 - Supports iSCSI
 - Supports FCoE and native FC today
 - Pick the right size with plug-in modules
- **Server access oriented**
 - ToR/Pod Access switch for LAN
 - Airflow and port connection alignment with servers**



Cisco Nexus 5020 and 5010
Purpose-built as 1/10GbE Switch

Nexus 2000 Fabric Extender

Virtualized Access Switch



Nexus 5000
Virtualized chassis

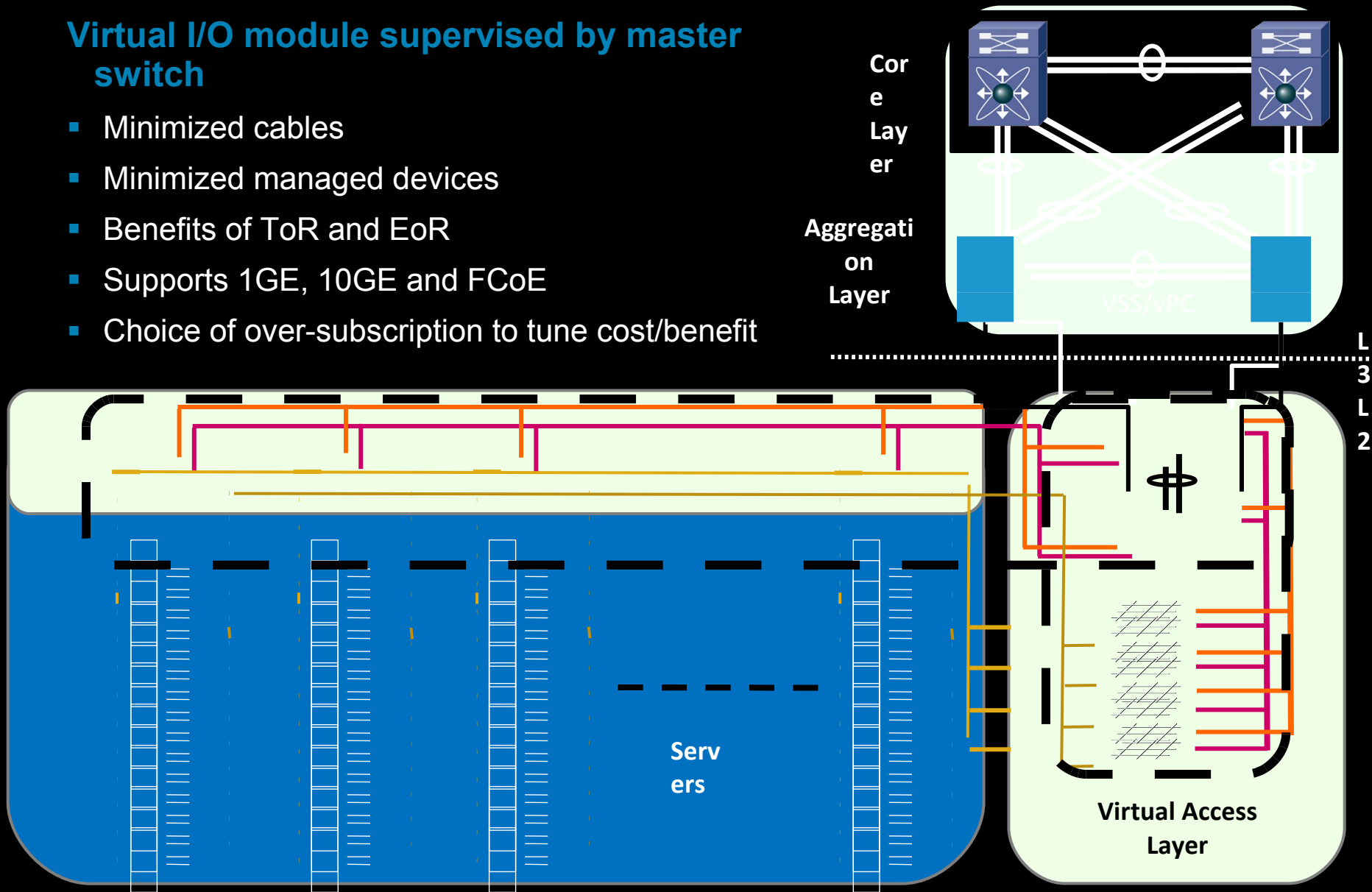


The Nexus 2000 Fabric Extender (FEX) acts as a remote linecard for the Nexus 5000, retaining all centralized management and configuration on the Nexus 5000, transforming it into a Virtualized Chassis

The Virtualized Access Layer

Virtual I/O module supervised by master switch

- Minimized cables
- Minimized managed devices
- Benefits of ToR and EoR
- Supports 1GE, 10GE and FCoE
- Choice of over-subscription to tune cost/benefit



Nexus 7000 Platform Overview



15+ Tbps Capable Platform

Hitless ISSU Capability

Virtual Device Contexts

Ready for Unified Fabric



Nexus 7010

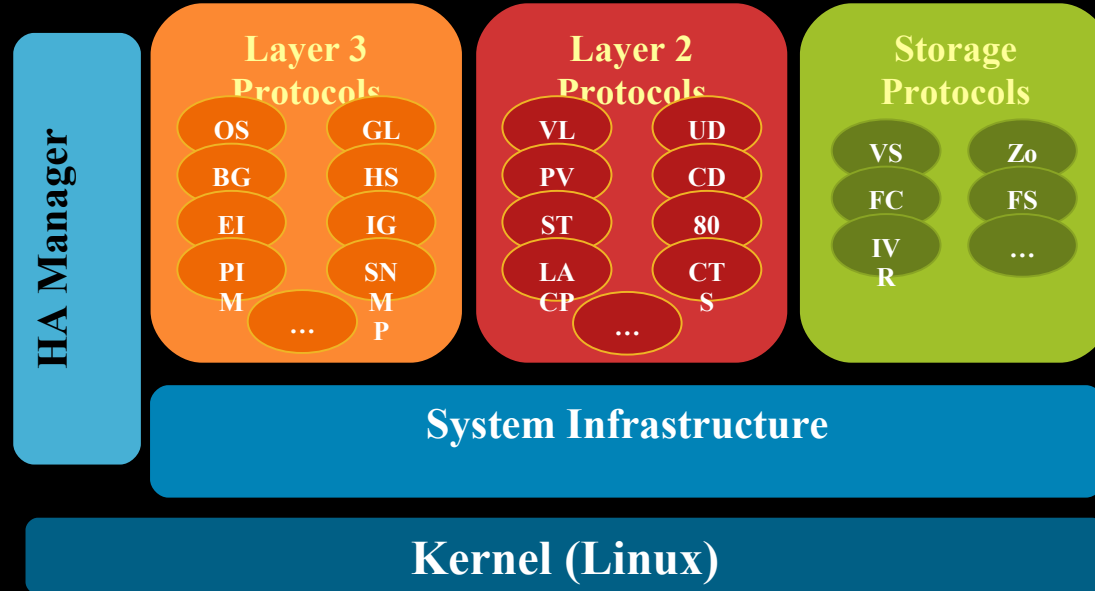
8 I/O Slots + 2 Supervisor Slots
Front to Back Airflow
256 10GbE / 64 Line-rate 10GE
384 10/100/1000 Ports

Nexus 7018

16 I/O Slots + 2 Supervisor Slots
Side to Side Airflow
512 10GbE / 128 Line-rate 10GE
768 10/100/1000 Ports

Summer 2010: Higher densities at a lower price and power consumption per port

NX-OS Modular Architecture

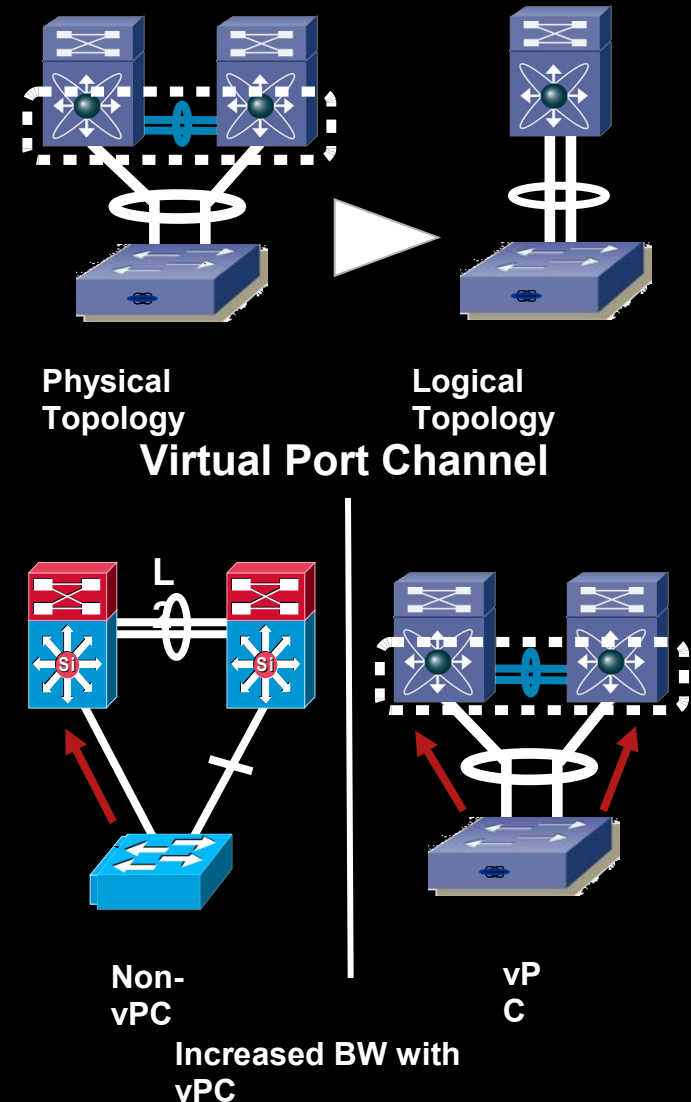


- Based on MDS-9000 Series SAN-OS 3.1
- Every process runs in protected memory for fault containment
- Automatic stateful process restart
- Modular code only runs in DRAM when invoked

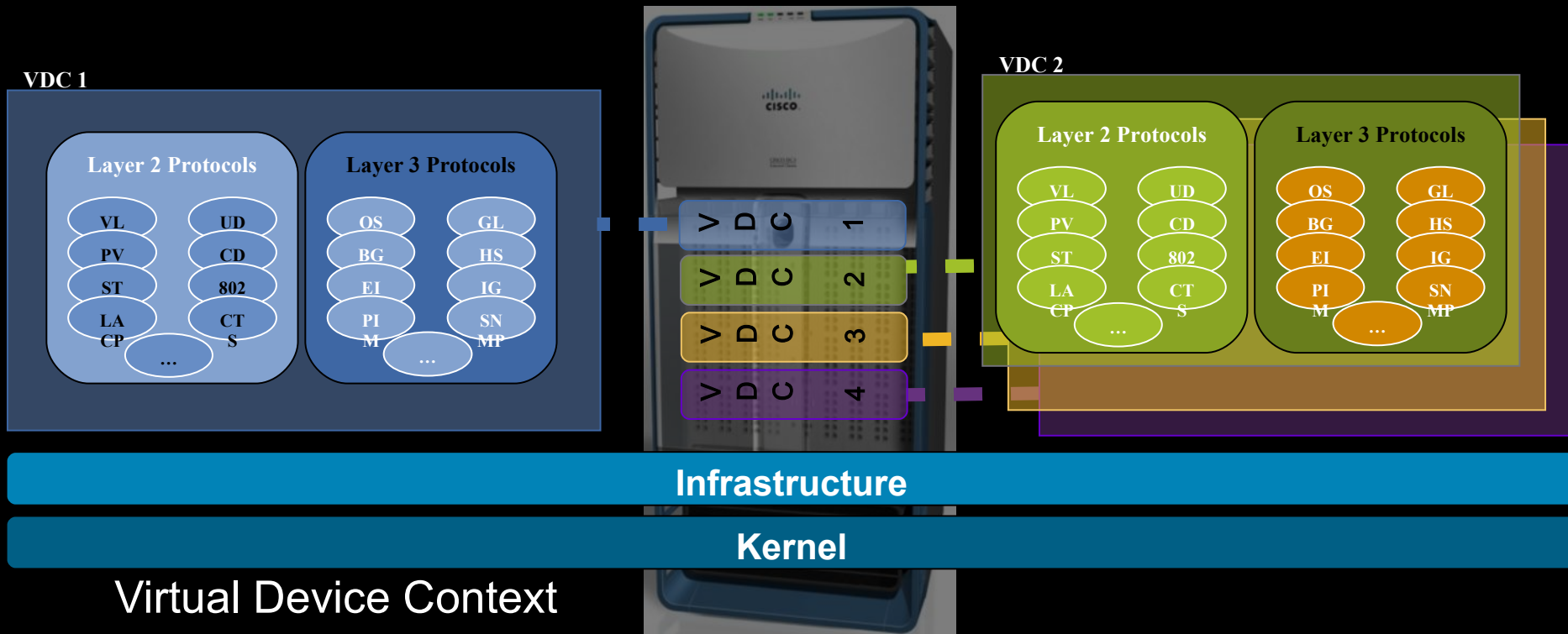
Increase Bandwidth Between Layers

Virtual Port Channel (vPC)

- vPC is a Port-channeling concept extending link aggregation to two separate physical switches
- Provides increased bandwidth
 - All links are actively forwarding
- Allows the creation of resilient L2 topologies based on Link Aggregation
 - Eliminates the STP blocked ports
- vPC maintains independent control planes



Virtualize Your Network



Virtual Device Context

- One physical switch can act as multiple virtual switches
- By reducing the number of physical switches in the network □ lowers capex, lowers power and cooling consumption
- Create isolated security domains
- Securely delineate administrative contexts
- Complete software fault isolation

OTV

In-Service Software Upgrade

```
N7K# install all kickstart bootdisk:4.2-kickstart system bootdisk:4.2-system
N7K#
```

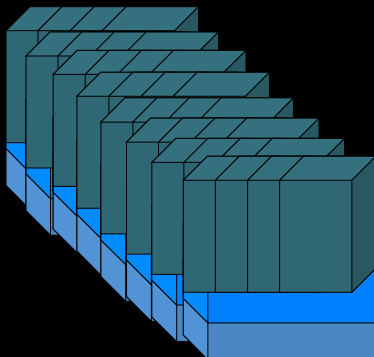
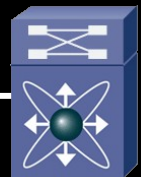
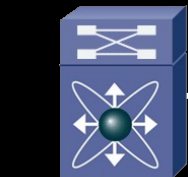
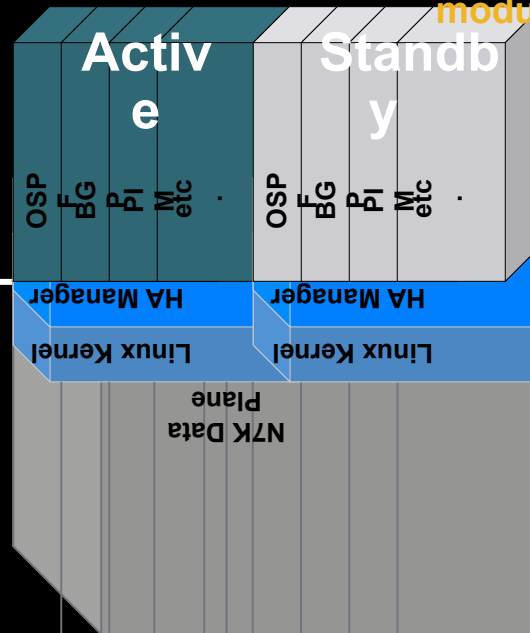
Upgrade and
reboot
Initiate Stateful
failover

Upgrade and
reboot
Upgrade and reboot I/O
modules

Release
4.2

Release
4.2

Release
4.2



I/O Module Images

Network World/Light Reading 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 .

Summary

- Use Unified Fabric and Virtualization to achieve operational efficiencies
- In the Access layer, the transition from 1GE to 10GE is underway now
- Cisco has put years' of operational experience into formulating the next-generation Data Centre
- Migrate at your own pace
- Cisco's Nexus portfolio is focused on the Data Centre
- One proven O.S. in multiple locations

