Data Center Network Architecture

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Data Centers Are Under Increasing Pressure

Collaboration

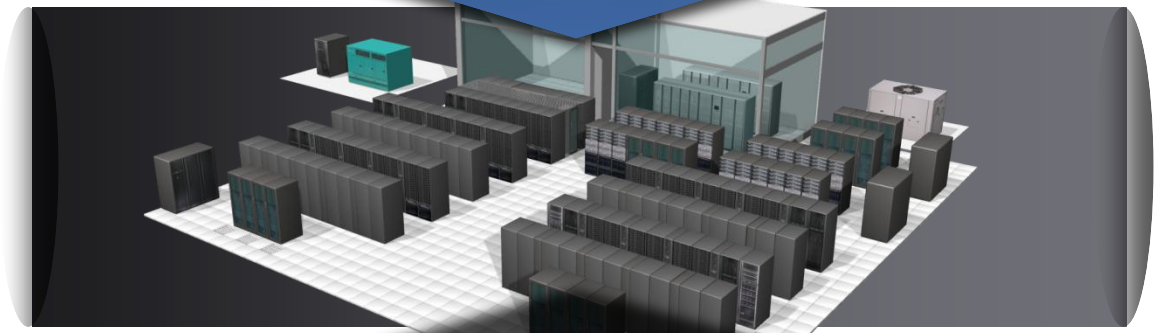
Empowered User

SLA Metrics

Global Availability

Reg. Compliance

New Business Pressures



Operational Limitations

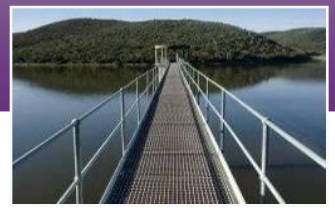
Power & Cooling

Asset Utilization

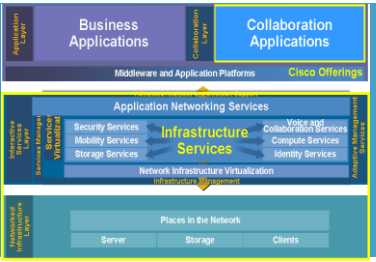
Provisioning

Security Threats

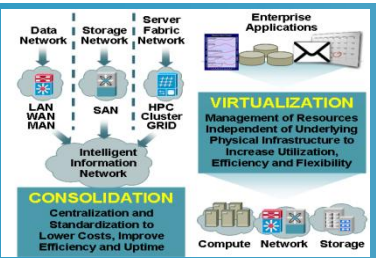
Bus. Continuance



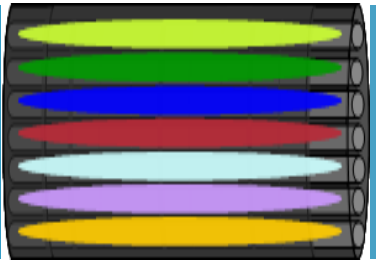
Key Benefits of Cisco SONA-DCNA



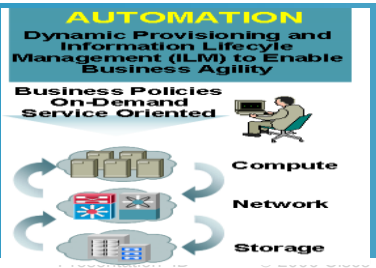
Reduce overall complexity in existing environment in order to adapt to changing businesses need with a framework approach.



Improve productivity and reduce expenses via consolidation and virtualization of expensive resources across current environment without impacting existing businesses.



Offers the ability to differentiate existing services and maintain SLAs for a mixture of disparate applications & user groups.



Enhanced business agility by offering the ability to turn on new apps and services in minutes instead of weeks or months in existing environment.

Critical Infrastructure for Data Center 3.0

Unified Fabric and I/O Interfaces

- Simplify infrastructure (reduce capex) and operational complexity (lower opex)
- Lowers overall data center power draw

Cisco® Nexus Switching Platforms

- Forward Investment Protection
- Engineered the most stringent availability requirements

NX-OS Operating System

- Designed with features that improve operational continuity
- Delivers virtualized network services

Data Center Network Manager

- Provides holistic view of the network to simplify management and facilitate troubleshooting

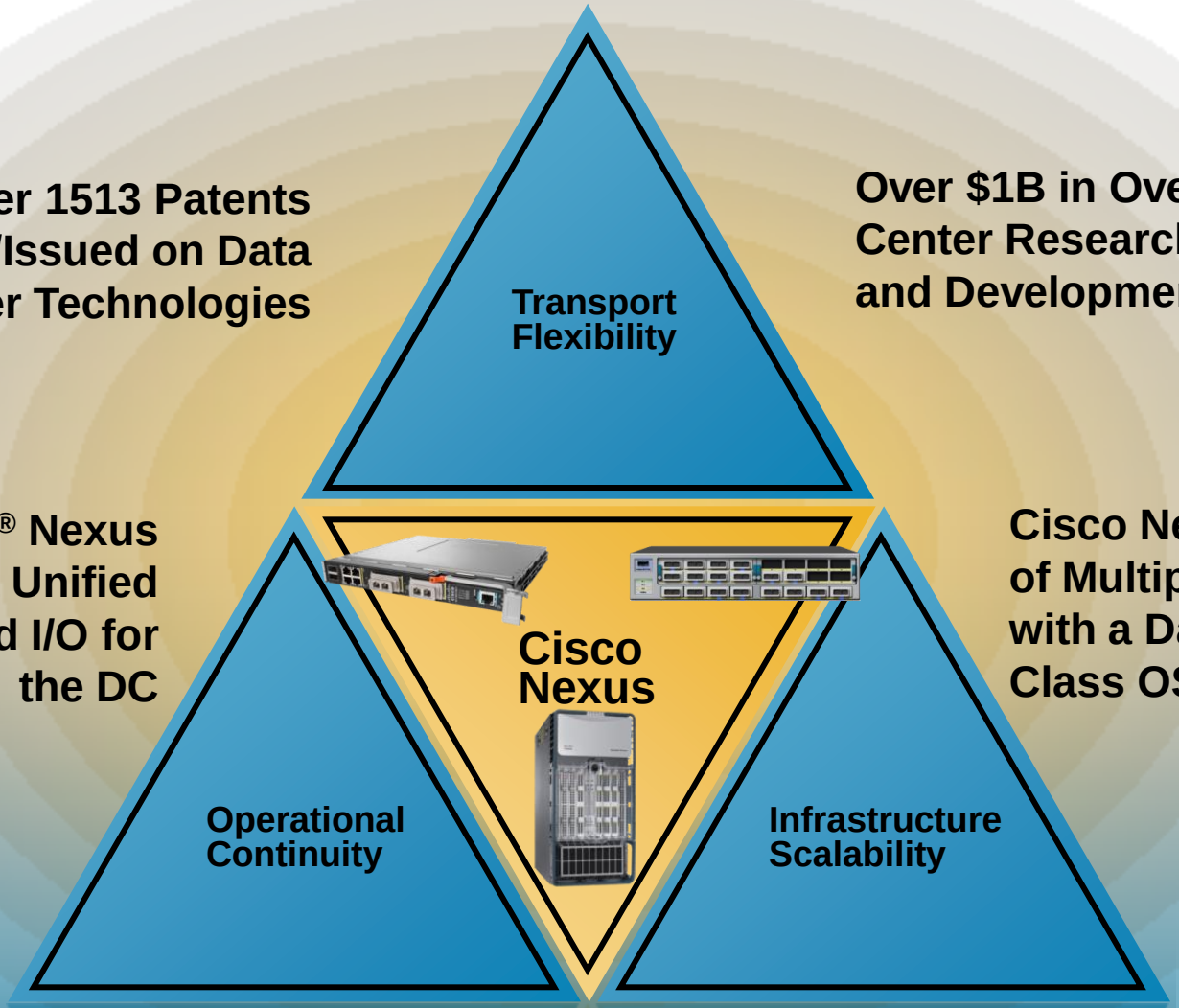
Introducing Cisco Nexus Family:
The Network Platform for Data Center 3.0

Over 1513 Patents Pending/Issued on Data Center Technologies

Over $1B in Overall Data Center Research and Development

Cisco® Nexus Delivers a Unified Fabric and I/O for the DC

Cisco Nexus Consists of Multiple Products with a Data Center Class OS



Cisco Nexus 7000 Series
Data Center Class Switches

Operational Continuity

- Zero Service Disruption design
- Graceful systems operations
- Integrated lights-out management

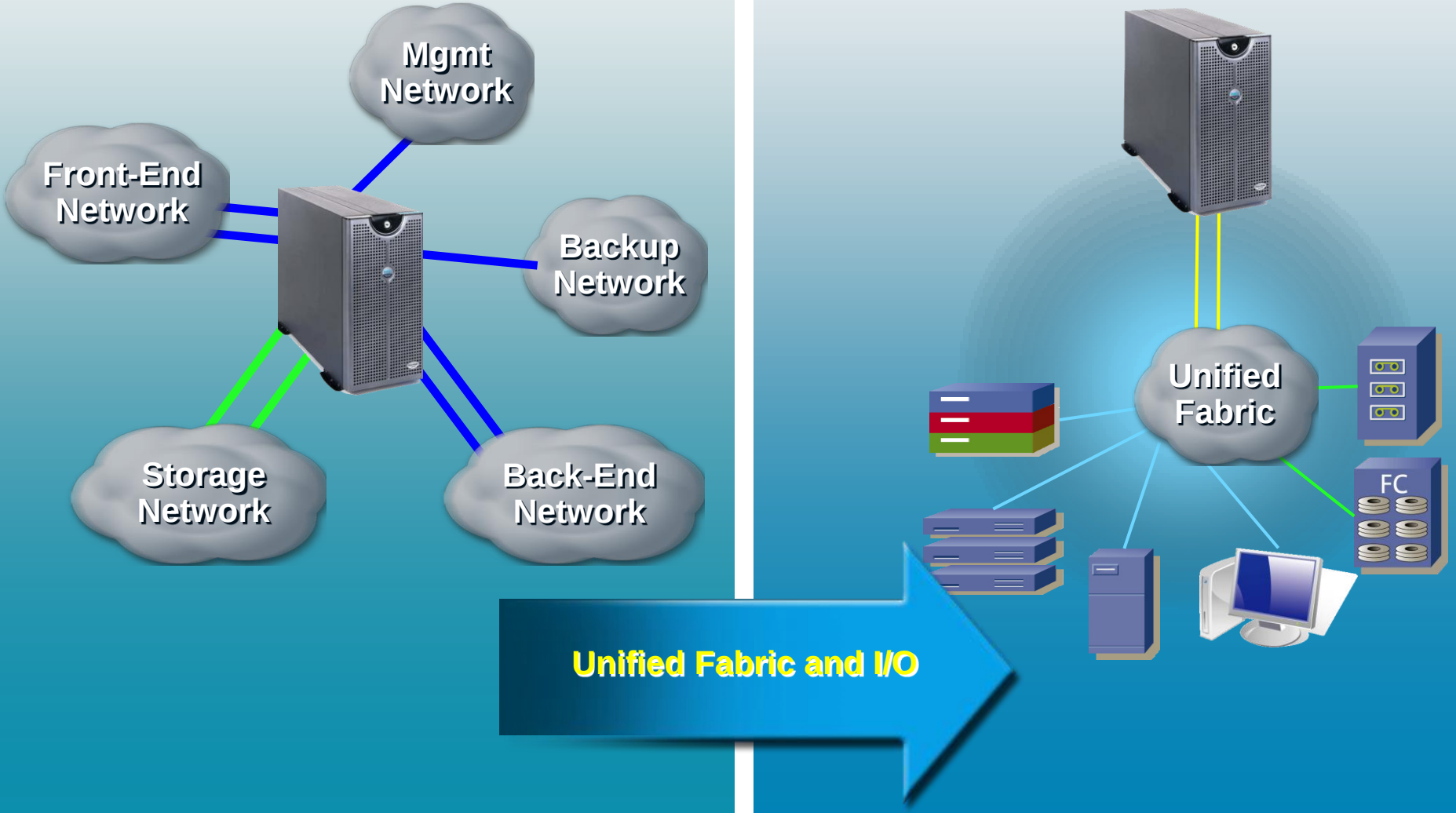
Transport Flexibility

- Lossless fabric architecture
- Dense 40GbE/100GbE ready
- Unified fabric

Infrastructure Scalability

- Virtualized control and data plane
- 15Tb+ switching capacity
- Efficient physical and power design

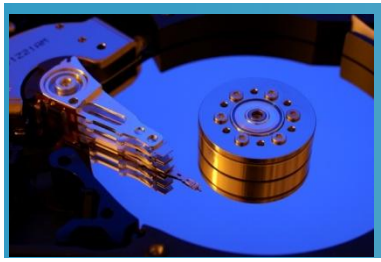
Increased Efficiency, Simpler Operations



Key Benefits of Unified Fabric

Reduce overall DC power consumption by up to 8%. Extend the lifecycle of current data center.

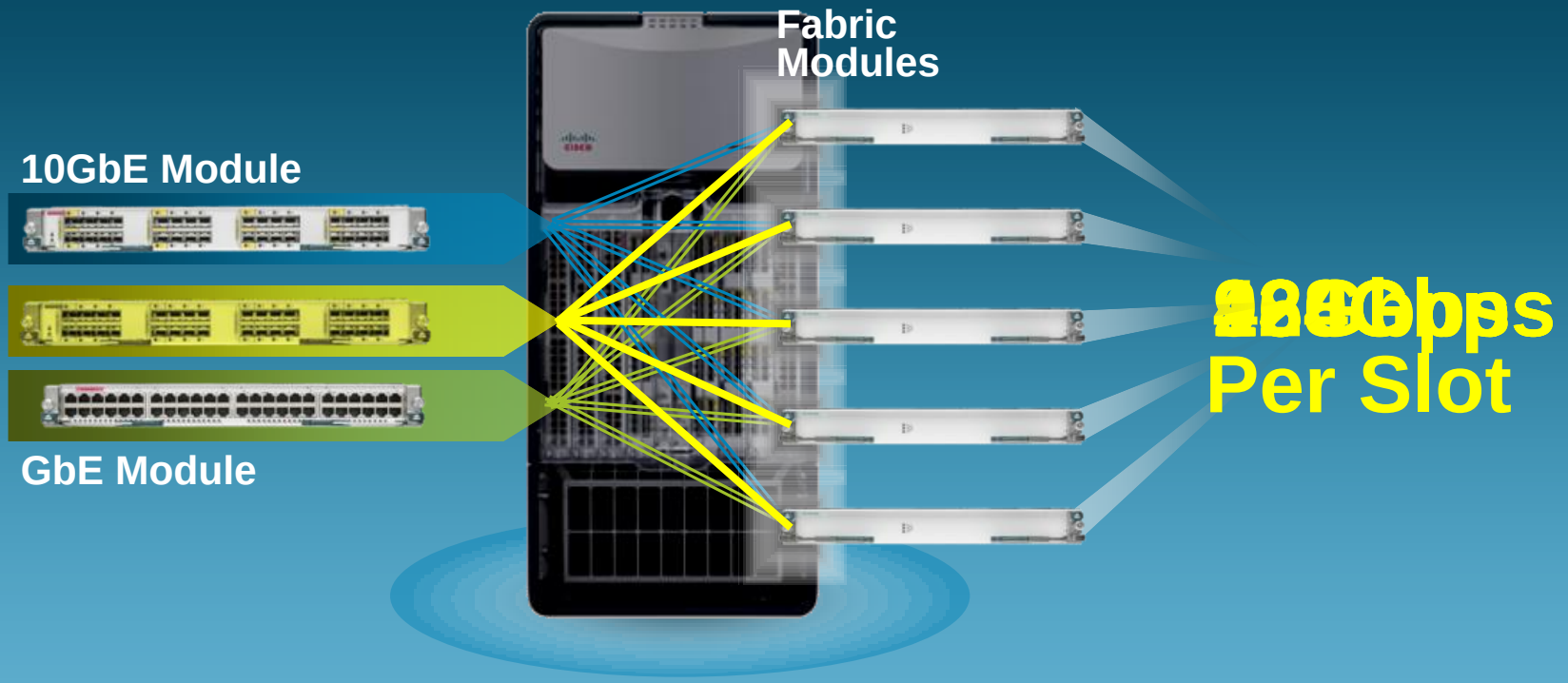
Wire hosts once to connect to any network - SAN, LAN, HPC. Faster rollout of new apps and services.



Every host will be able to mount any storage target. Drive storage consolidation and improve utilization.

Rack, Row, and X-Data Center VM portability become possible.

15Tb+ System Performance
Bandwidth Scales with Each Fabric Module



Investment Protection and Unified Fabric

NX-OS: Purpose Built for the Data Center

Data Center Class Requirements Demand Focused Software Development

Zero Service Disruption Design

Enables Nexus to unify the data center fabric

Virtual Device Contexts

Overcomes administrative barriers to consolidation

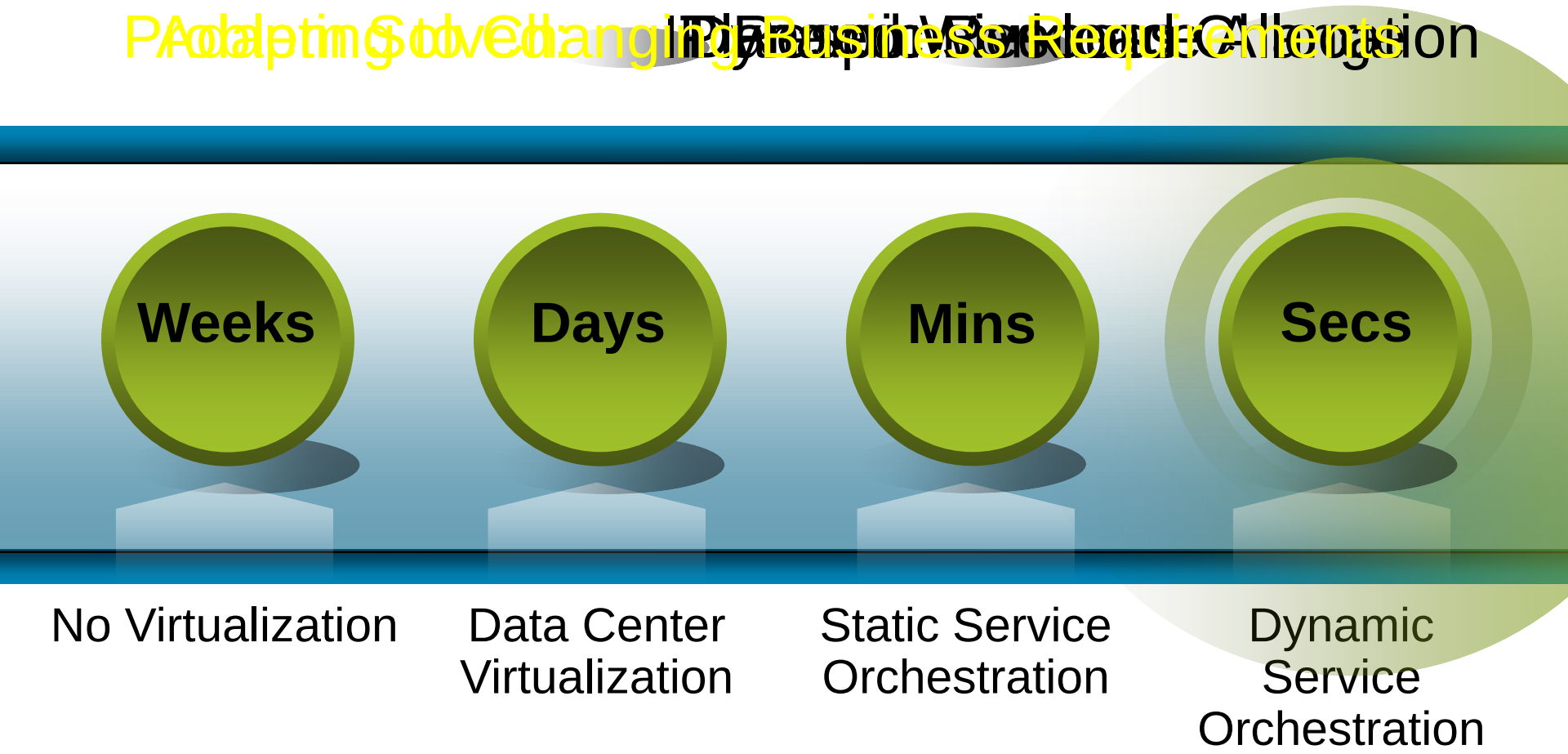
Stateful Process Restart

Self heals faster than networks can converge

Graceful System Operations

Enables simplified operations and links all protocol layers

Improving IT Responsiveness



No Virtualization

Data Center Virtualization

Static Service Orchestration

Dynamic Service Orchestration

Catalyst and Nexus:
Complementary Focus for Broad Deployments

Cisco® Nexus 7000

15 Terabit Scalability
Unified Fabric

100GbE

40GbE

Transport Flexibility

Operational Continuity

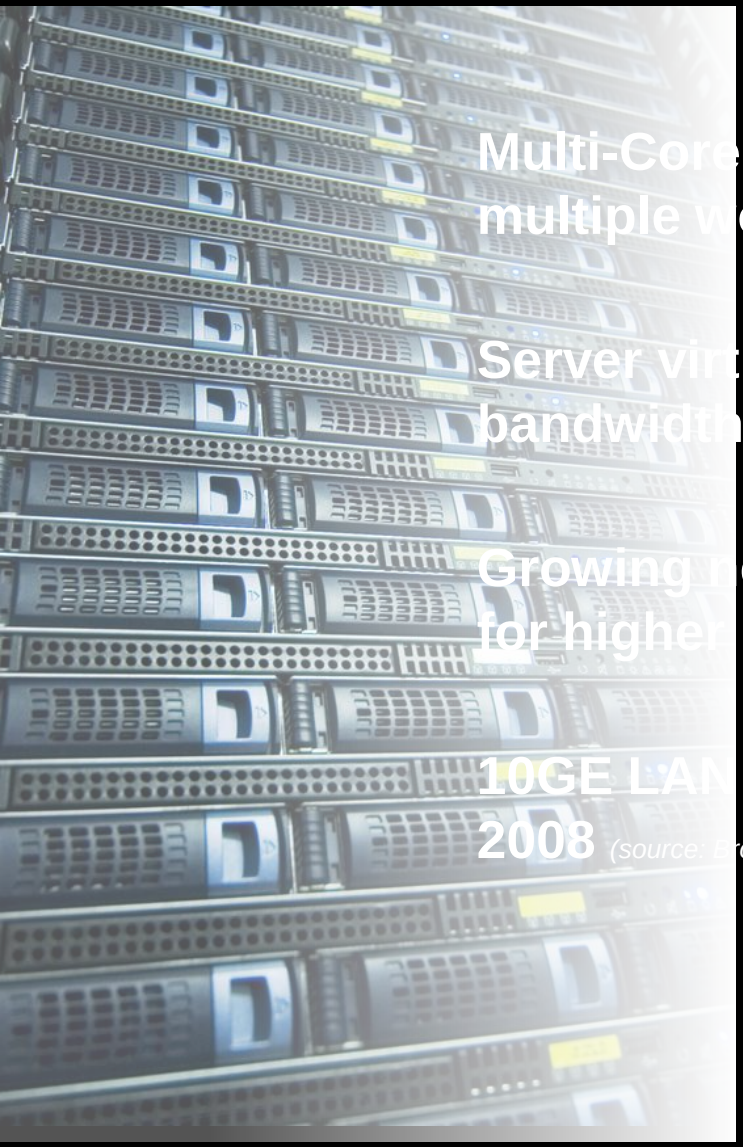
10GbE

1GbE

Cisco Catalyst® 6500

2 Terabit Scalability
Unified Network Access

The Case for 10GbE to the Server



- Multi-Core CPU architectures allowing bigger and multiple workloads on the same machine
- Server virtualization driving the need for more I/O bandwidth per server
- Growing need for network storage driving the demand for higher network bandwidth to the server
- 10GE LAN on server Motherboards (LoM) beginning mid-2008 *(source: Broadcom)*

Extending the Cisco Nexus Family
Data Center Class Switches

- Simpler More Stable Layer 2 Network
- Highly Available Platform
- Preserves operational best practices

Operational Continuity

- FCoE based Unified Fabric
- Virtualization Optimized Networking
- Support for GE, FCoE, DCE, and FC

Transport Flexibility

- Reduces power, cooling, cabling
- Up to 52 non-blocking 10GbE
- Up to 1.2 Tbps capacity

Infrastructure Scalability

Cisco Nexus 5000 Series

56-Port L2 Switch
- 40 Ports 10GE/FCoE/DCE, fixed
- 2 Expansion module slots

Fibre Channel
- 8 Ports 1/2/4G FC

FC + Ethernet
- 4 Ports 10GE/FCoE/DCE
- 4 Ports 1/2/4G FC

Ethernet
- 6 Ports 10GE/FCoE/DCE

NX-OS

DC-NM and Fabric Manager

SFP+ Transmission Media

- Low power consumption
- Low cable cost
- Low transceivers latency
- Low error rate (10 exp-17)

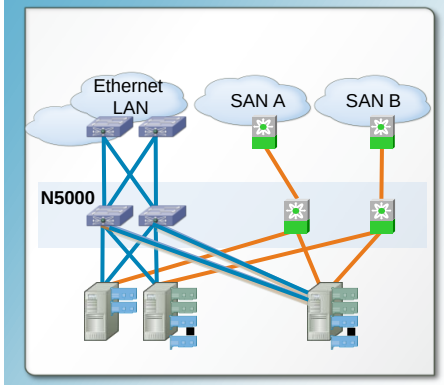
Technology	Cable	Distance	Power (each side)	Transceiver Latency (link)
SFP+ CU Copper	Twinax	10m	~0.1W	~0.25 µs
SFP+ USR ultra short reach	MM OM2 MM OM3	10m 100m	1W	~0.1 µs
SFP+ SR short reach	MM OM2 MM OM3	82m 300m	1W	~0.1 µs
10GBASE-T	Cat6 Cat6a/7 Cat6a/7	55m 100m 30m	~8W ~8W ~4W	2.5µs 2.5µs 1.5µs

An Innovative Platform To Simplify Data Center Transformation

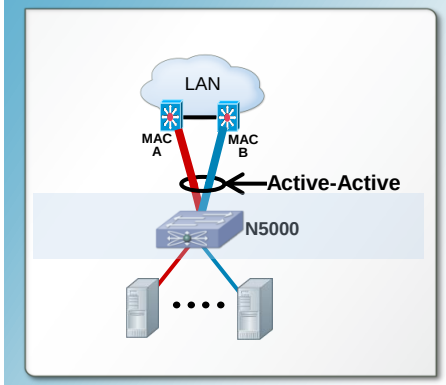
Standards

IETF IEEE ANSI

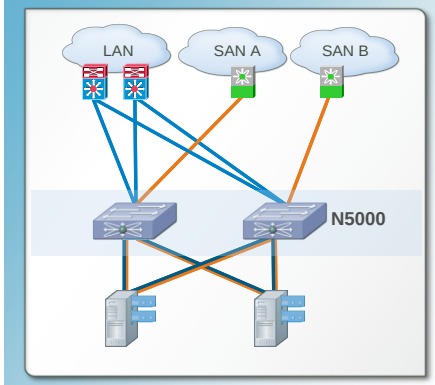
Wire Speed 10GbE Switching
Capacity



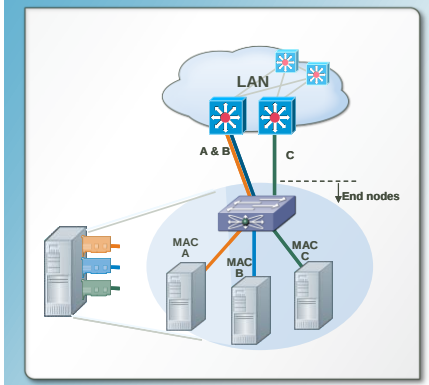
Data Center Ethernet
Scalability



Fibre Channel over Ethernet
Consolidation



VM Optimized Networking
Virtualization



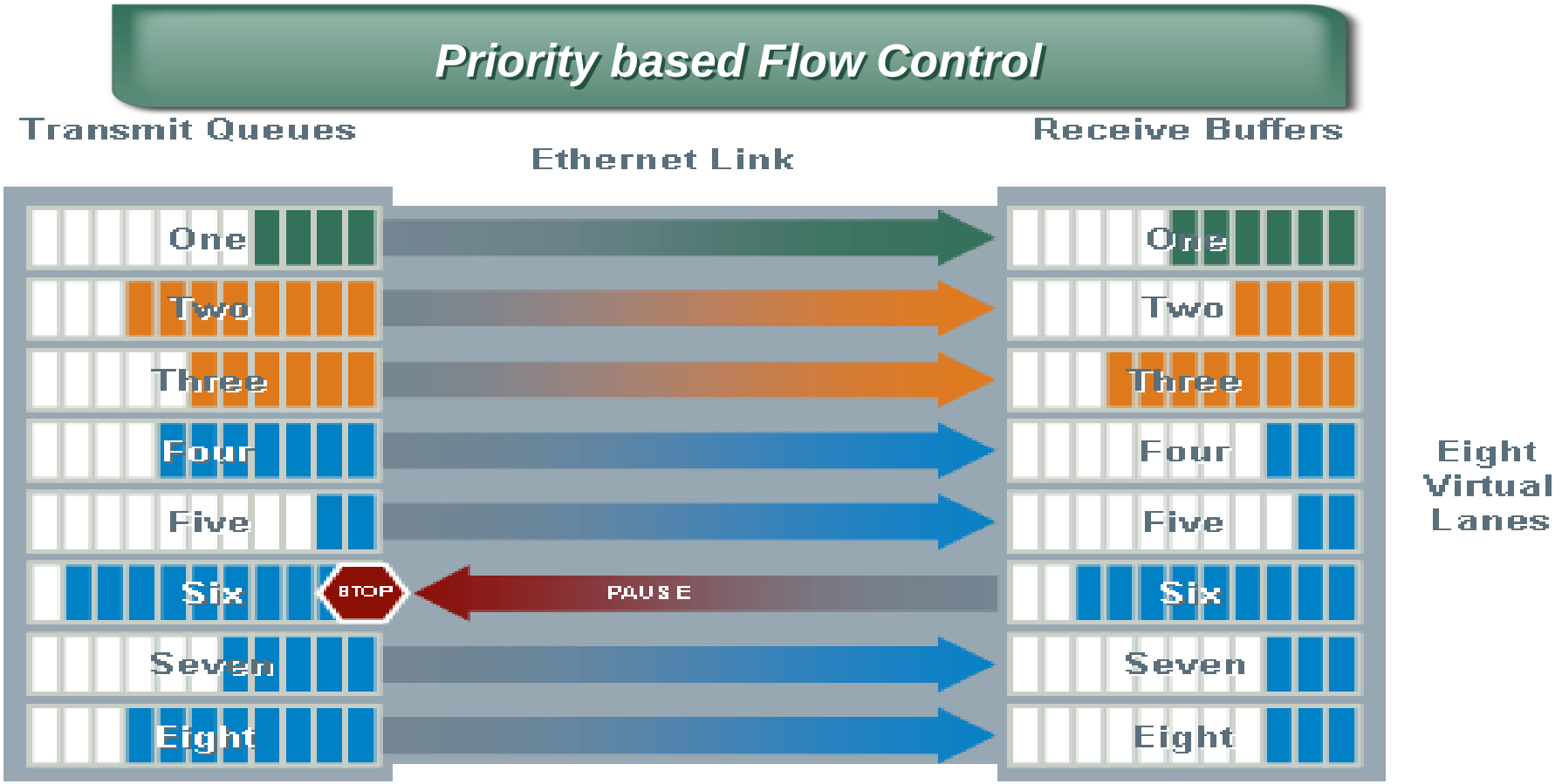
Eco-System

EMULEX NETXEN APC by Schneider Electric QLOGIC intel PANDUIT vmware

Data Center Ethernet Features
Overview

Feature	Benefit
Priority-based Flow Control (PFC)	Provides class of service flow control. Ability to support storage traffic
CoS Based BW Management	Grouping classes of traffic into “Service Lanes” IEEE 802.1Qaz, CoS based Enhanced Transmission
Congestion Notification (BCN/QCN)	End to End Congestion Management for L2 network
Data Center Bridging Capability Exchange Protocol	Auto-negotiation for Enhanced Ethernet capabilities DCBX
L2 Multi-path for Unicast & Multicast	Eliminate Spanning Tree for L2 topologies Utilize full Bi-Sectional bandwidth with ECMP
Lossless Service	Provides ability to transport various traffic types (e.g. Storage, RDMA)

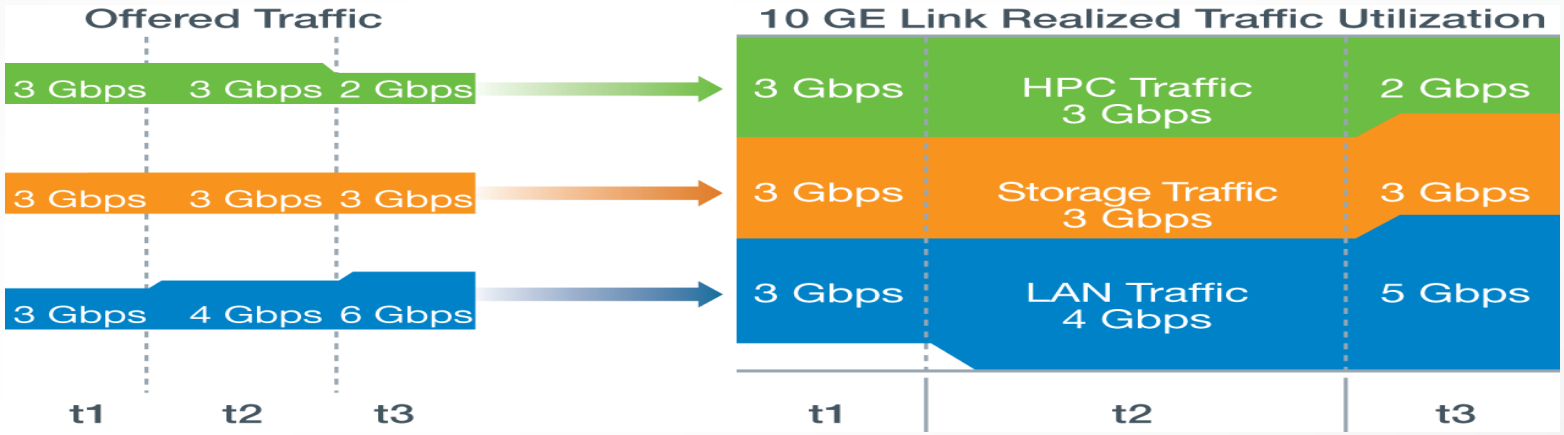
Priority Flow Control



- ***Enables lossless behavior for each class of service***
- ***PAUSE sent per priority when buffers limit exceeded***

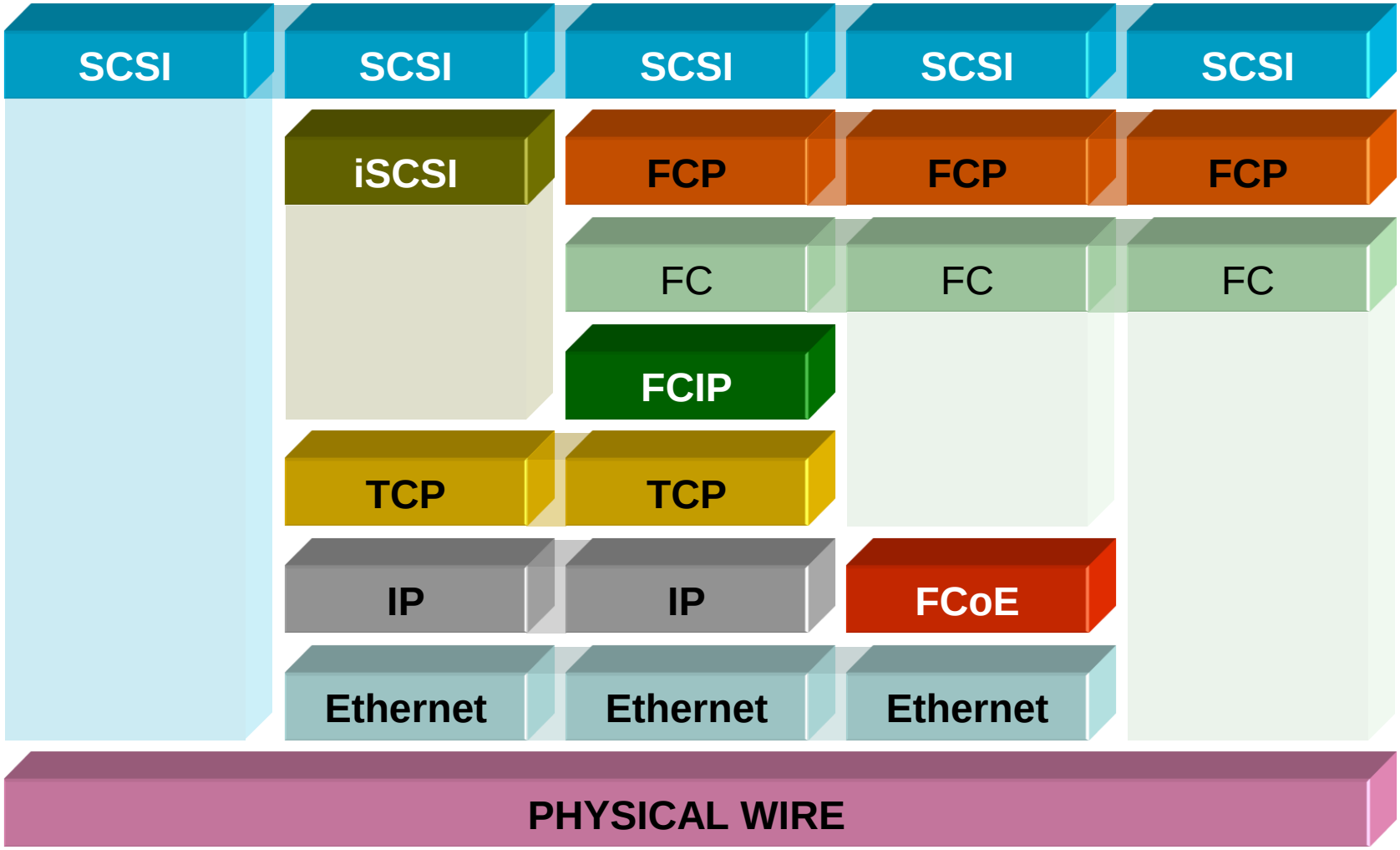
Priority based bandwidth management

Priority based Bandwidth Management

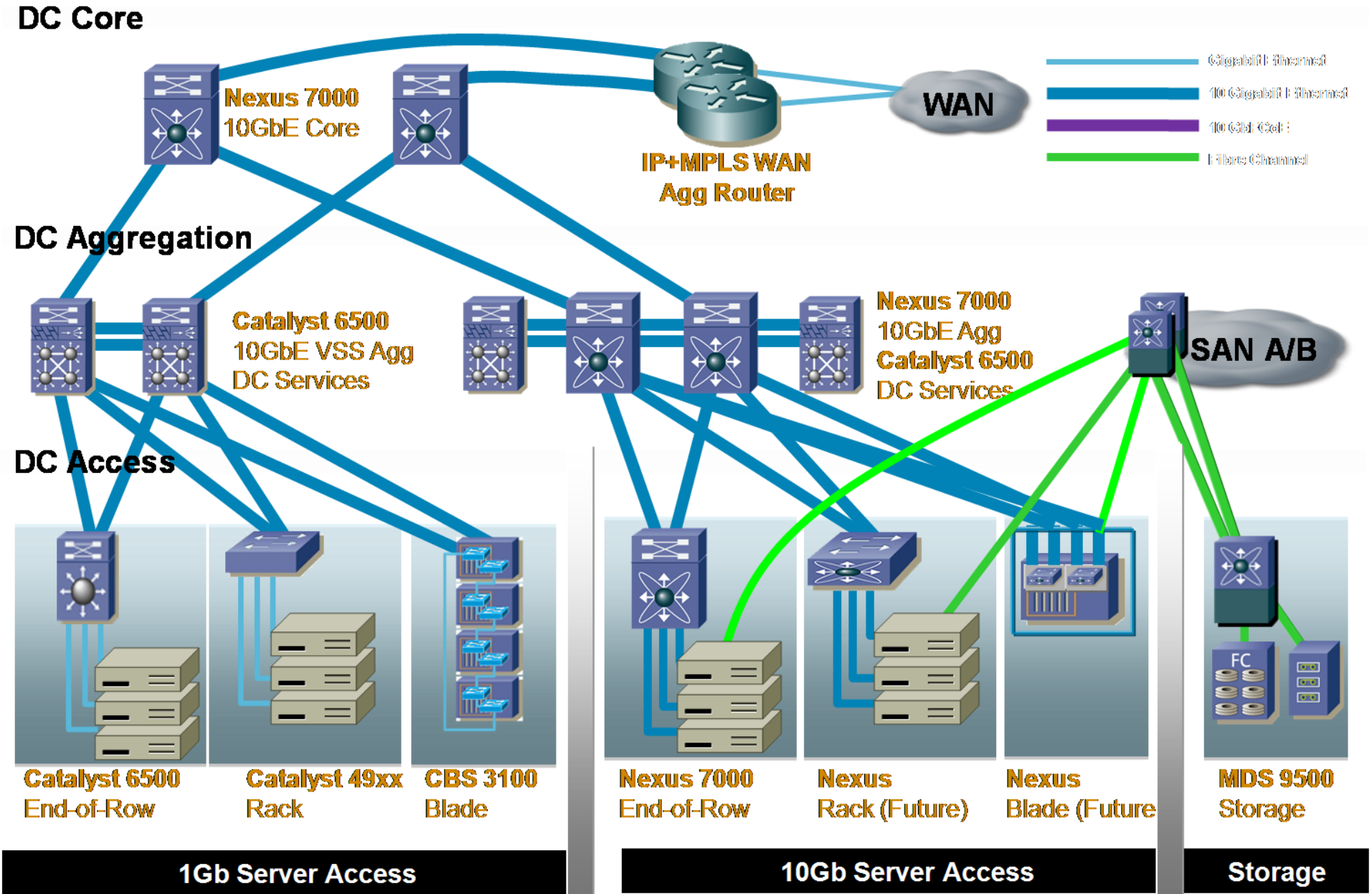


- ***Enables Intelligent sharing of bandwidth between traffic classes control of bandwidth***
- ***802.1Qaz Enhanced Transmission***

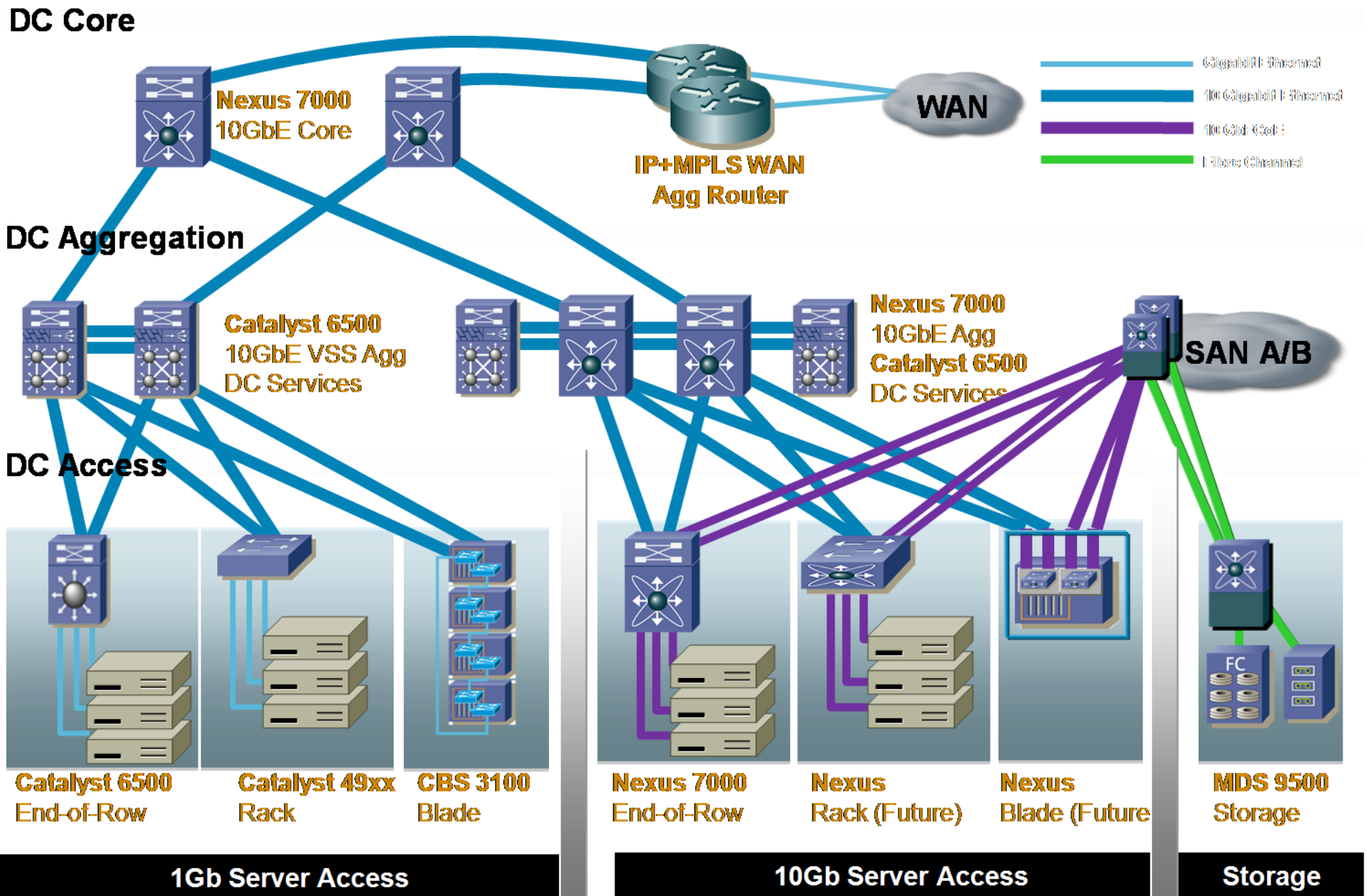
FCoE - Network stack comparison



Data Center 3.0 Infrastructure Portfolio



Data Center 3.0 Infrastructure Portfolio



A Comprehensive Portfolio for Data Center 3.0

Unified Fabric Networking

Nexus 7000 Modular Switching System

Nexus Rack Switch 5000

Nexus Blade Switch *(future)*

Ethernet Networking

Catalyst® 6500 Series

Catalyst 4900M Top-of-Rack

Catalyst Blade Server Switches

Storage Networking

MDS 9500 Storage Directors

SSM

MDS Fabric Switches

Blade Switches

Application Network Services

ACE Application Delivery – Module and Appliance

Wide-Area Application Services

ACE XML Gateway

Infiniband Clustering

SFS 7000 Infiniband Switch

SFS 3000 Infiniband Gateway

Data Center Security

Firewall Services Module

Data Center Provisioning

VFrame Server/Service Provisioning System

Data Center Management

Data Center Network Manager– Topology Visualization and Provisioning

ANM– Advanced L4-7 Services Module Management