



Data Center Market Trends

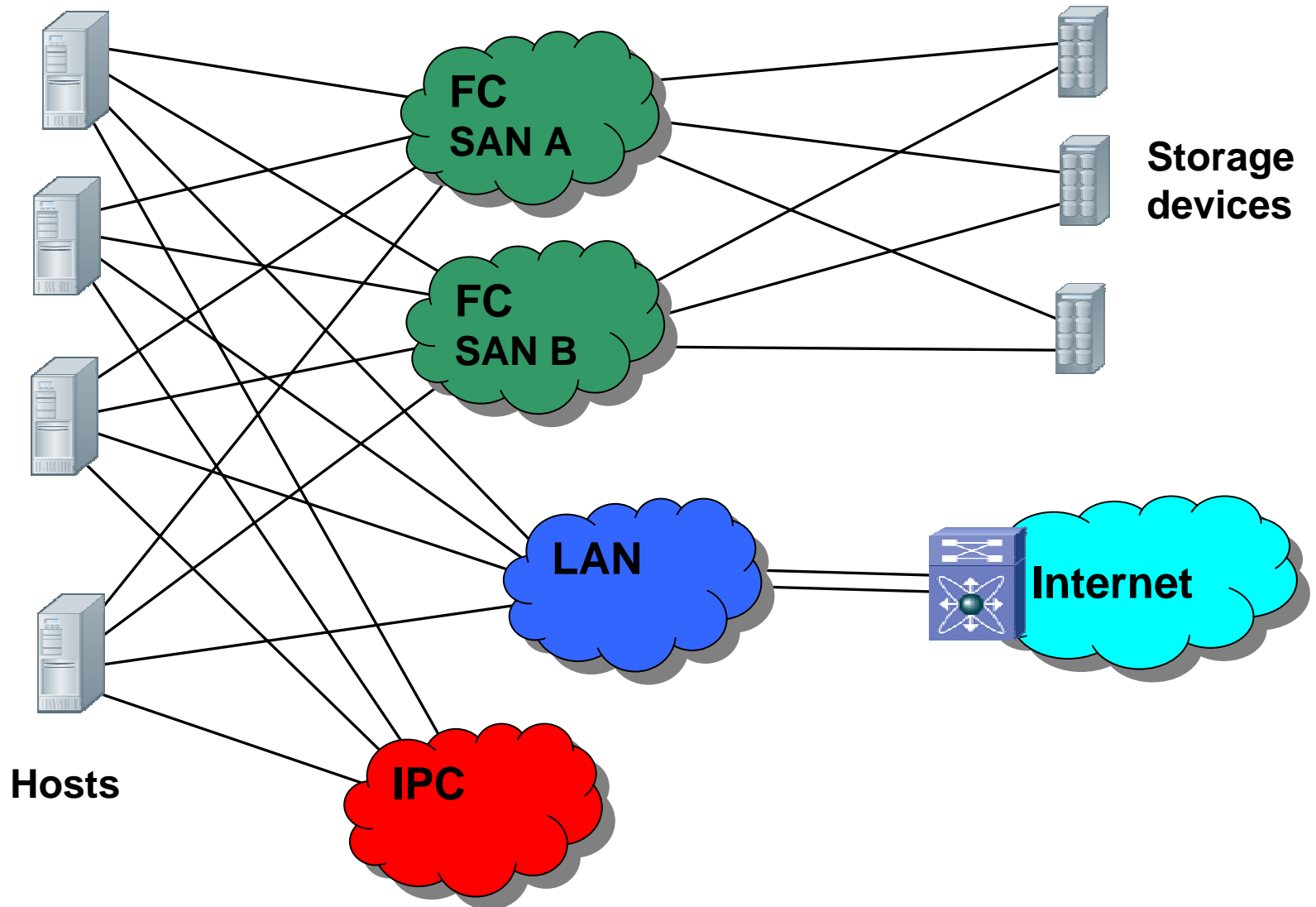
Joy Jiang

Product Manager of JDSU

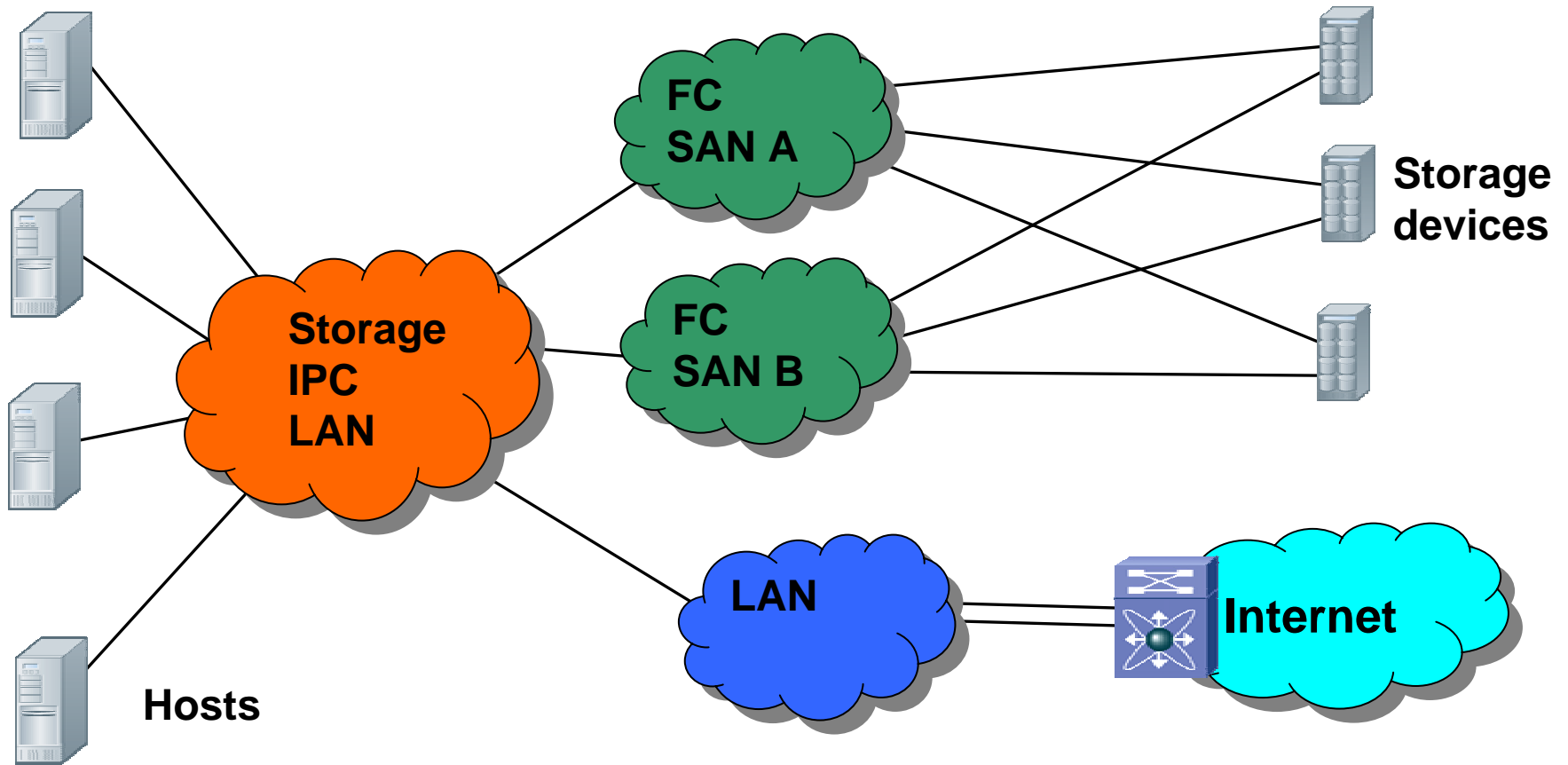
Data Center Trends

- Speed goes up
 - 10GE network migration from 1GE thanks to the low cost 10GE interfaces
- Network convergence
 - maximizes the utilization of available bandwidth and improve the network efficiency
- Server virtualization and cloud computing
 - Enables highly flexible, scalable and virtualized computing resource services over internet
- Green data centers
 - Blade servers to reduce the use of footprint, save the cooling space and minimize the power consumption

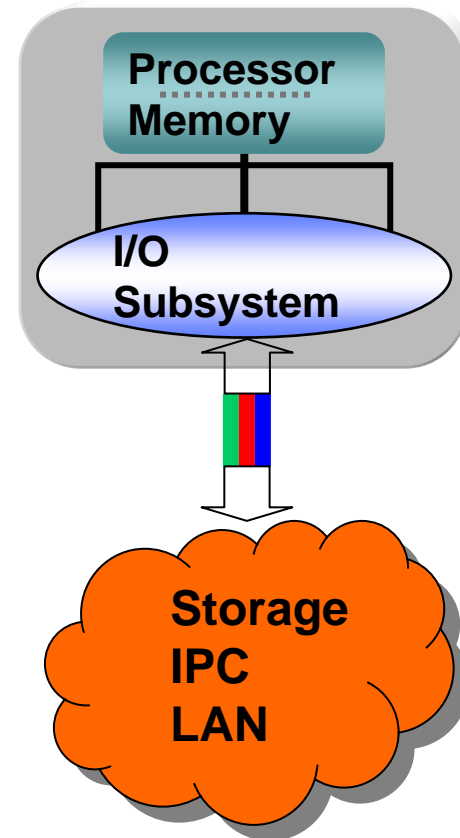
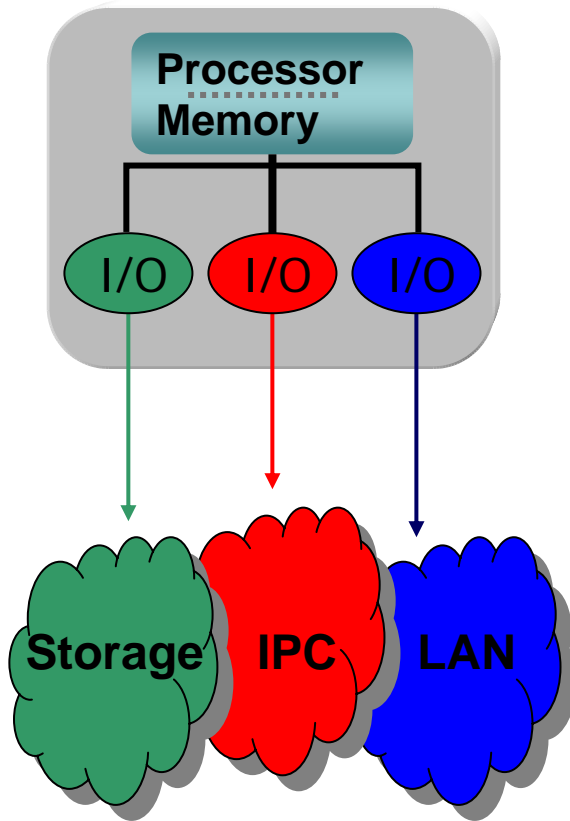
Isolated Data Center Structure - Current



Consolidated Data Center Structure

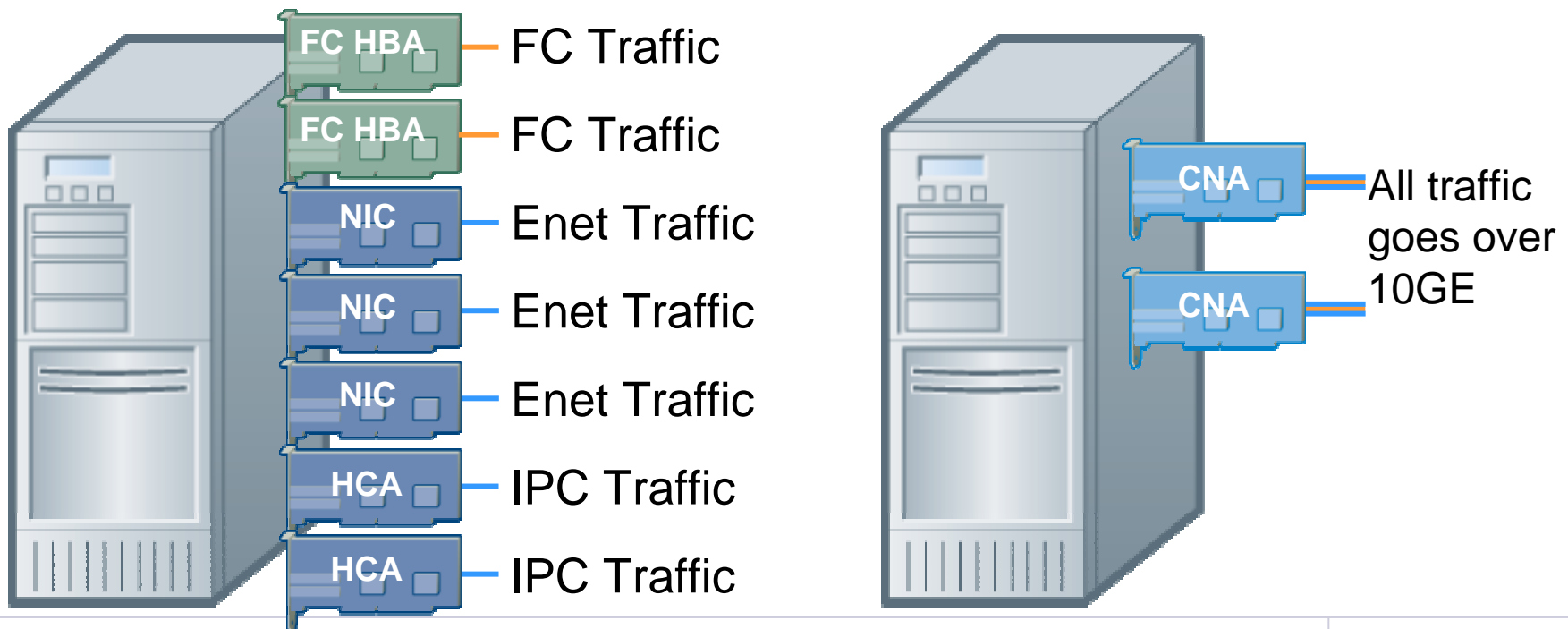


I/O Consolidation



I/O Consolidation in the Host

- Fewer CNAs (Converged Network Adapters) instead of NICs, HBAs and HCAs
- Help saving real estate for blade servers
- Less power consumption



I/O Consolidation Physical Interface Consideration

- Ethernet based
 - Lots of investment in data centers
- More bandwidth
 - Sharing bandwidth among different traffics
 - PCI Express solves the bandwidth bottleneck in server buses to support 10G interfaces
- 10GE enables I/O consolidation
 - High bandwidth
 - Full duplex links
 - Competitive cost
 - Optical interface cost dramatically reduced by SFP+ modules
 - Twinax and active optical cable in alternative to Cat5e/6/6a cables as low cost short distance electric interface

Evolution of Ethernet Physical Media

Mid 1980s

Mid 1990s

Early 2000s

Late 2000s

10Mb

100Mb

1Gb

10Gb

SFP+ Cu



AOC



Technology	Cable	Distance	Power (each side)	Transceiver Latency (link)
10GBase-CR	Twinax	5m	0.1W	0.1μs
AOC Active optical cable	MM OM3	50m	0.5W	0
SFP+ USR ultra short reach	MM OM2 MM OM3	10m 100m	1W	0
SFP+ SR short reach	MM 62.5μm MM 50μm	82m 300m	1W	0
10GBASE-T	Cat6	55m	8W	2.5μs
	Cat6a/7	100m	8W	2.5μs
	Cat6a/7	30m	4W	1.5μs



Consolidated Computing Systems

Chassis with Blade Servers



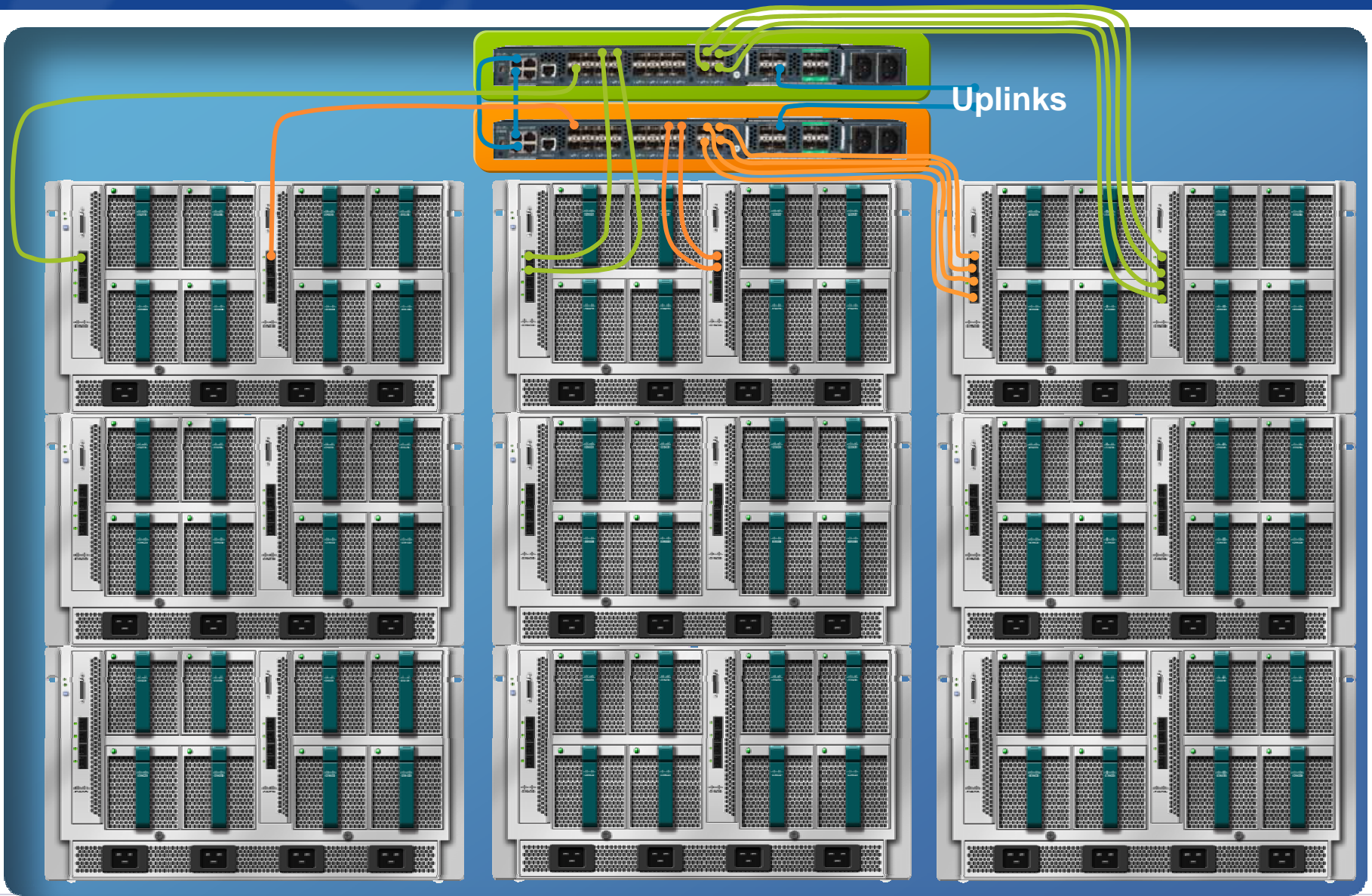
Top of Rack Interconnect



Enabling Technologies

- 10GE low cost interfaces
 - Twinax copper interface for Top of Rack (TOR) uplinks
- Consolidated networking
 - Data Center Bridging (DCB): Enhanced Ethernet
 - Fibre Channel over Ethernet (FCoE)
- Blade server technology
 - Converged Network Adapters (CNA)
 - Savings in space and power consumption
- Virtualized machines with complete scalability and flexibility
- Centralized management

I/O Consolidation in Action



THANK YOU!