Use Cases for iSCSI and FCoE: Where Each Makes Sense

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SNIA™
Ethernet Storage Forum

Today's Presenters

David Fair, SNIA –ESF
Business Development Chair - Intel

Jeff Asher, SNIA-ESF Member,
Principal Architect - NetApp

Sameh Boujelbene - Director, Server and Controller & Adapter Market Research

Casey Quillin – Director, Data Center Appliance and SAN Market Research

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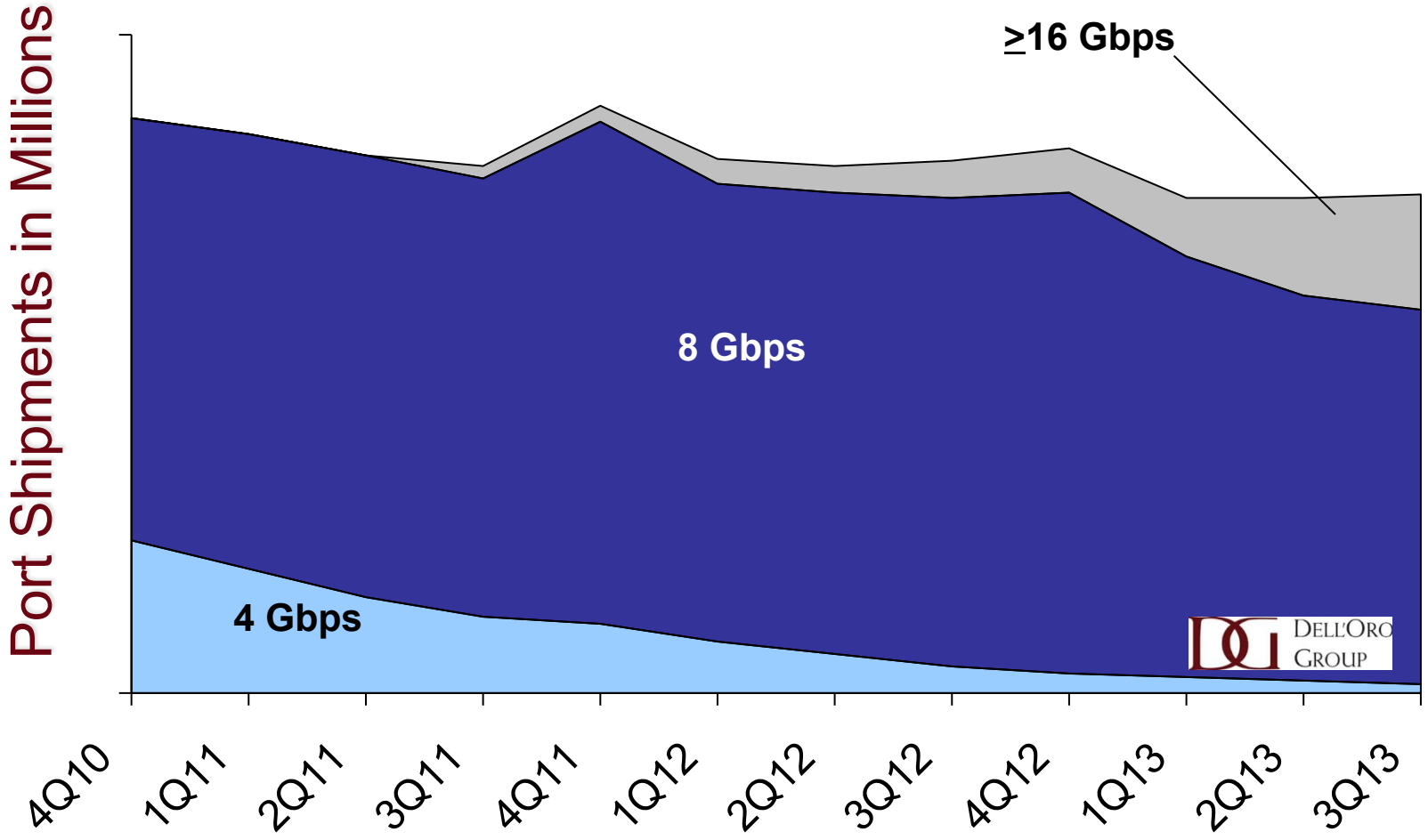
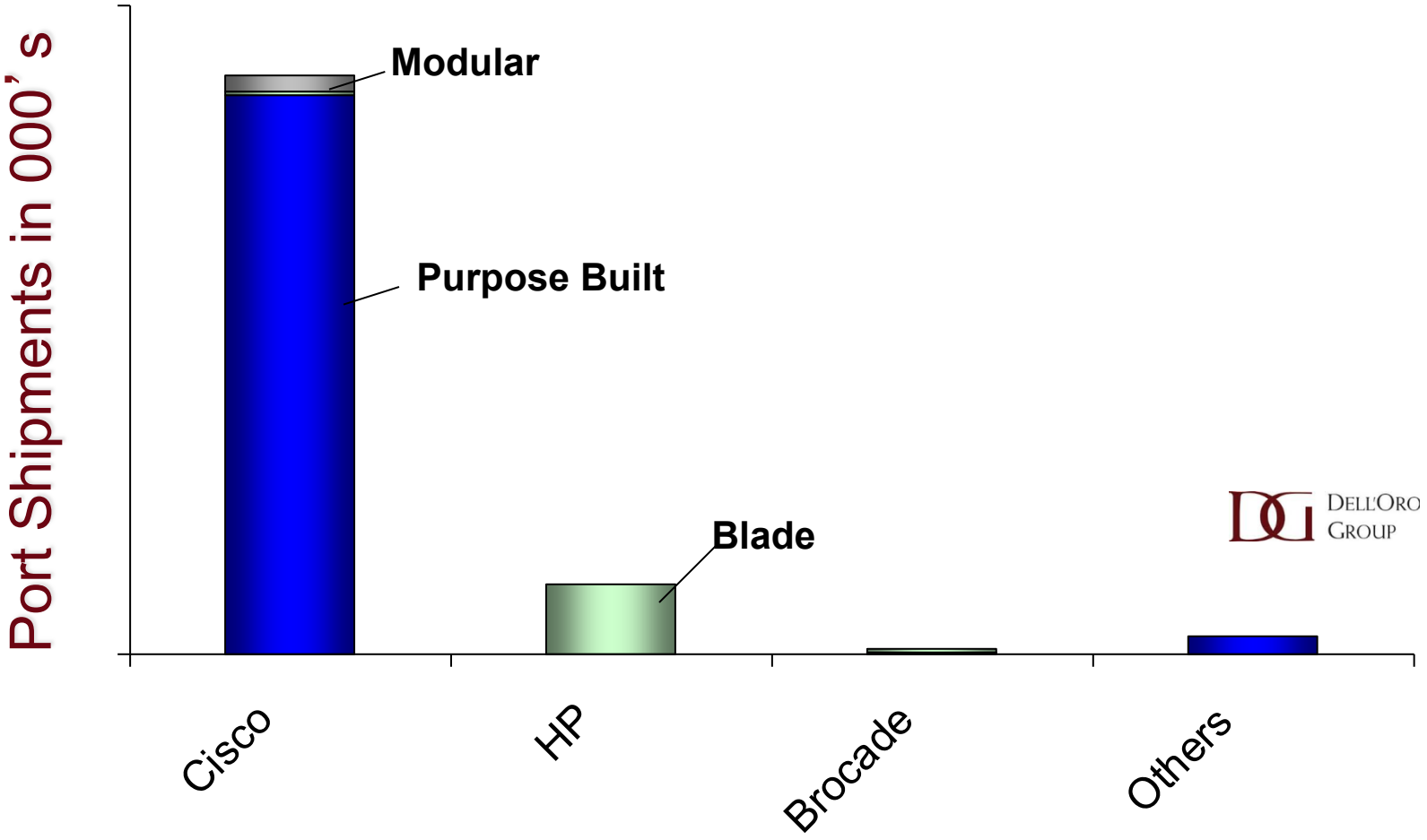
SAN Market—Use Cases for iSCSI and FCoE: Where Each Makes Sense

Dell'Oro Group Research

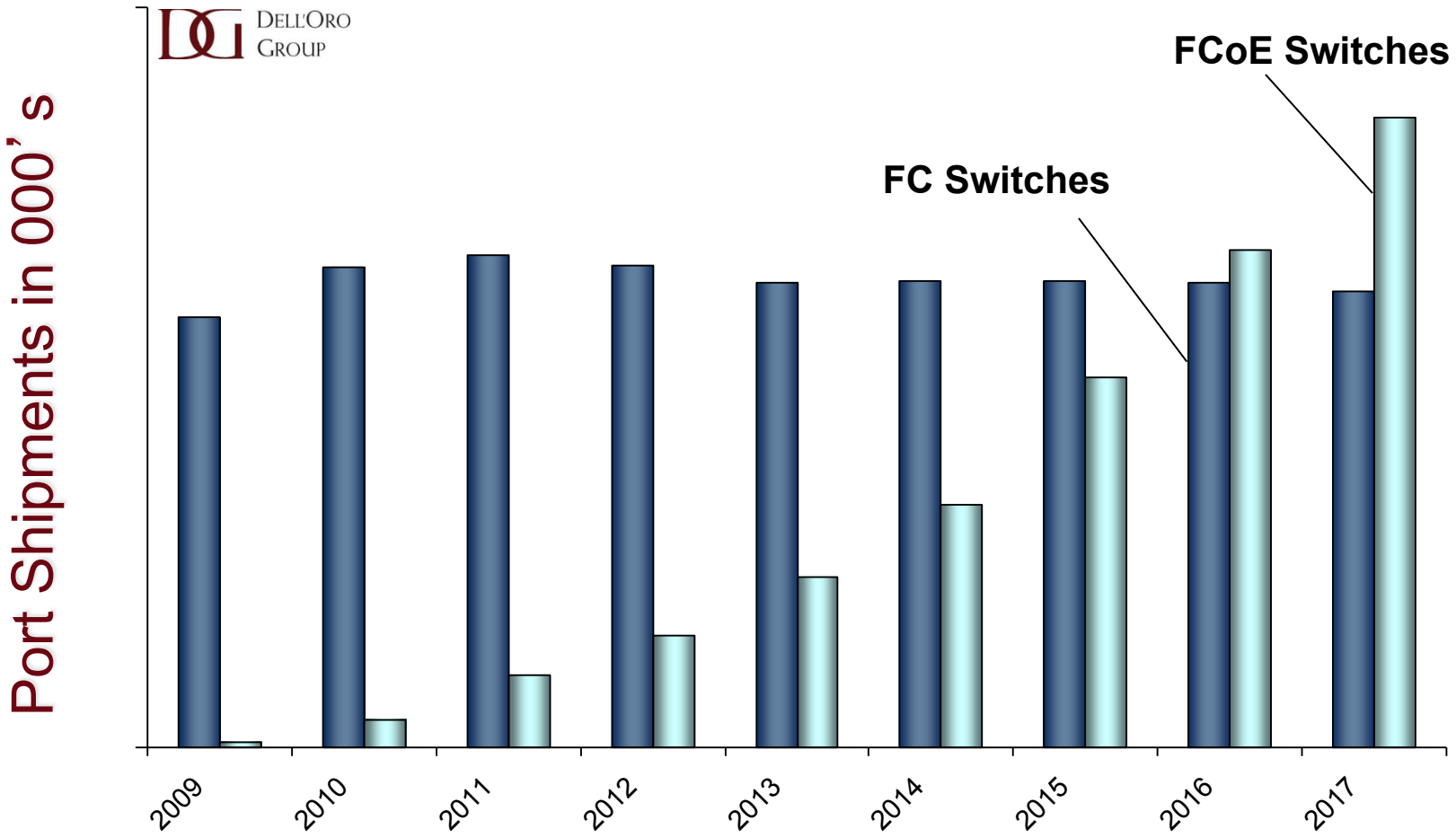
FC Switch and Adapter Port Shipments



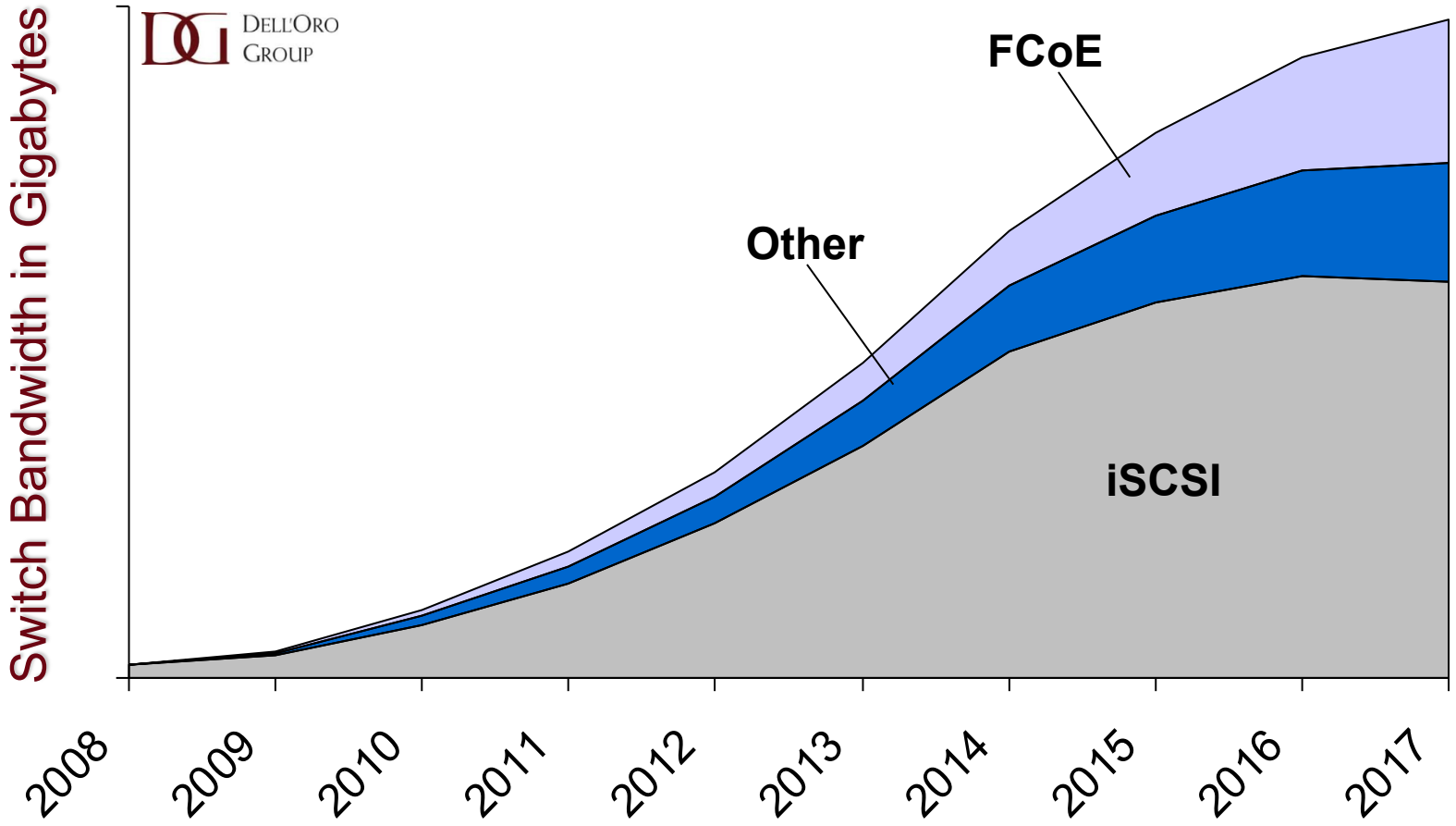
FCoE Enabled Switches 3Q13



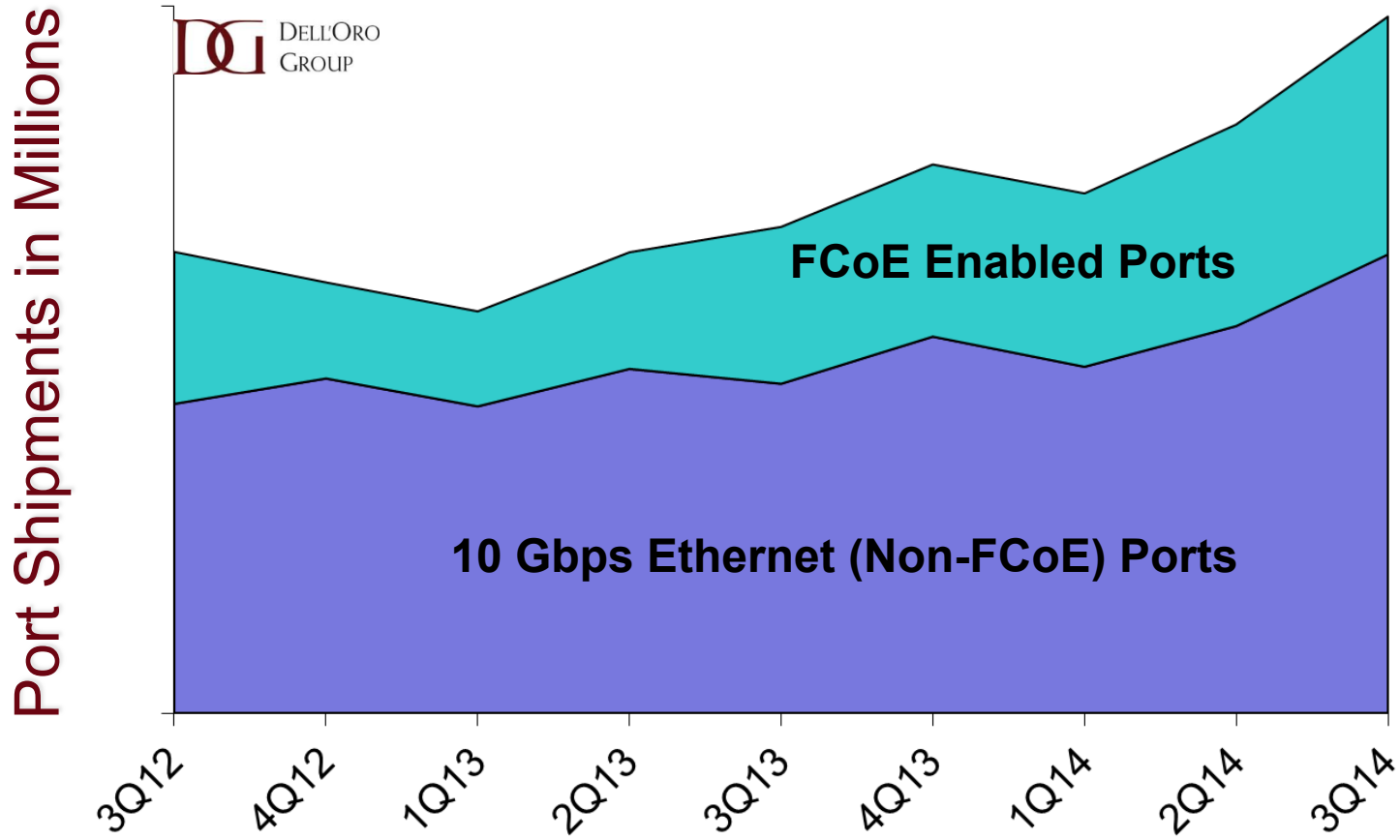
FC and FCoE Switch Forecast



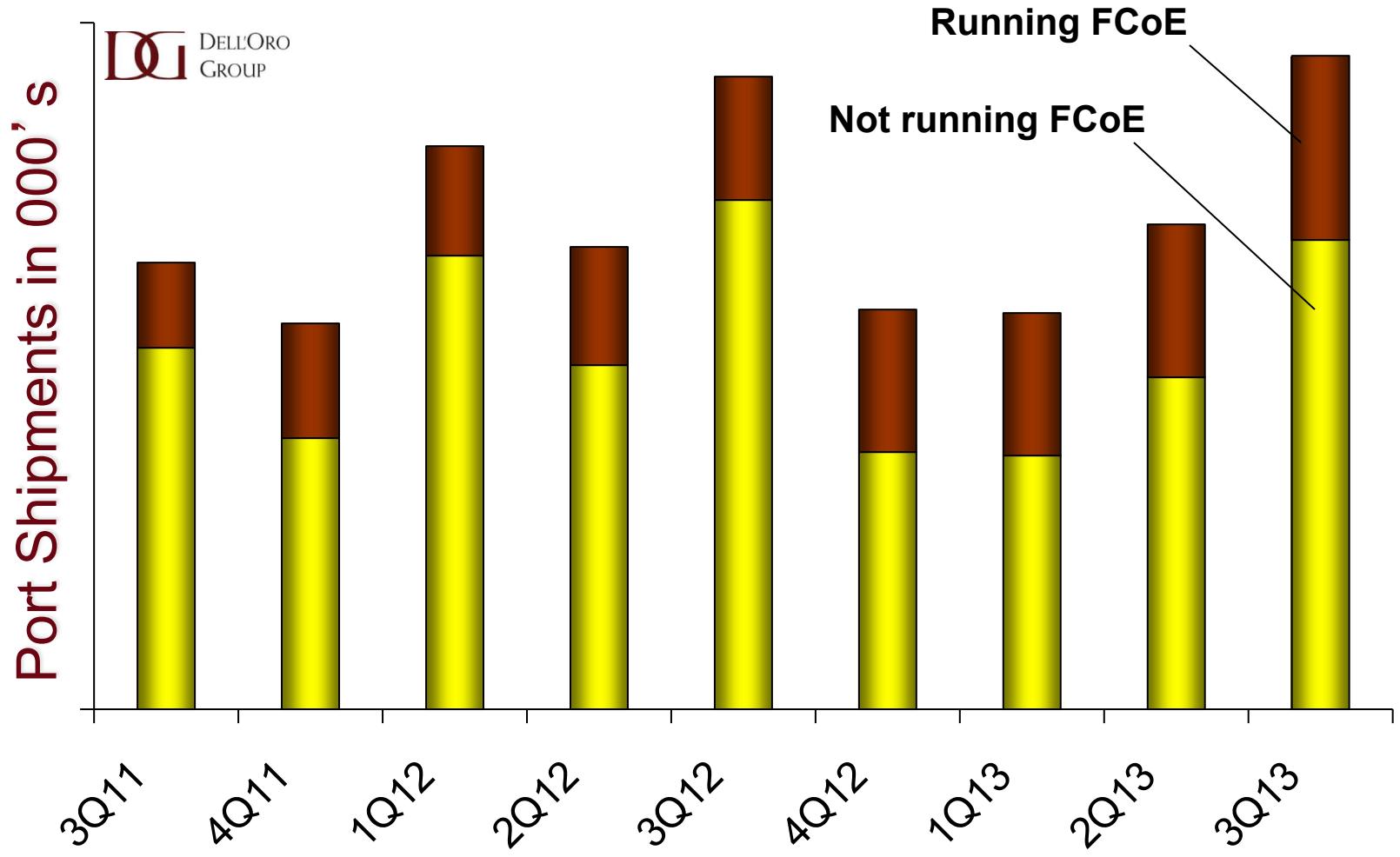
L2+L3 10 Gbps Ethernet Switch Bandwidth – Data Center



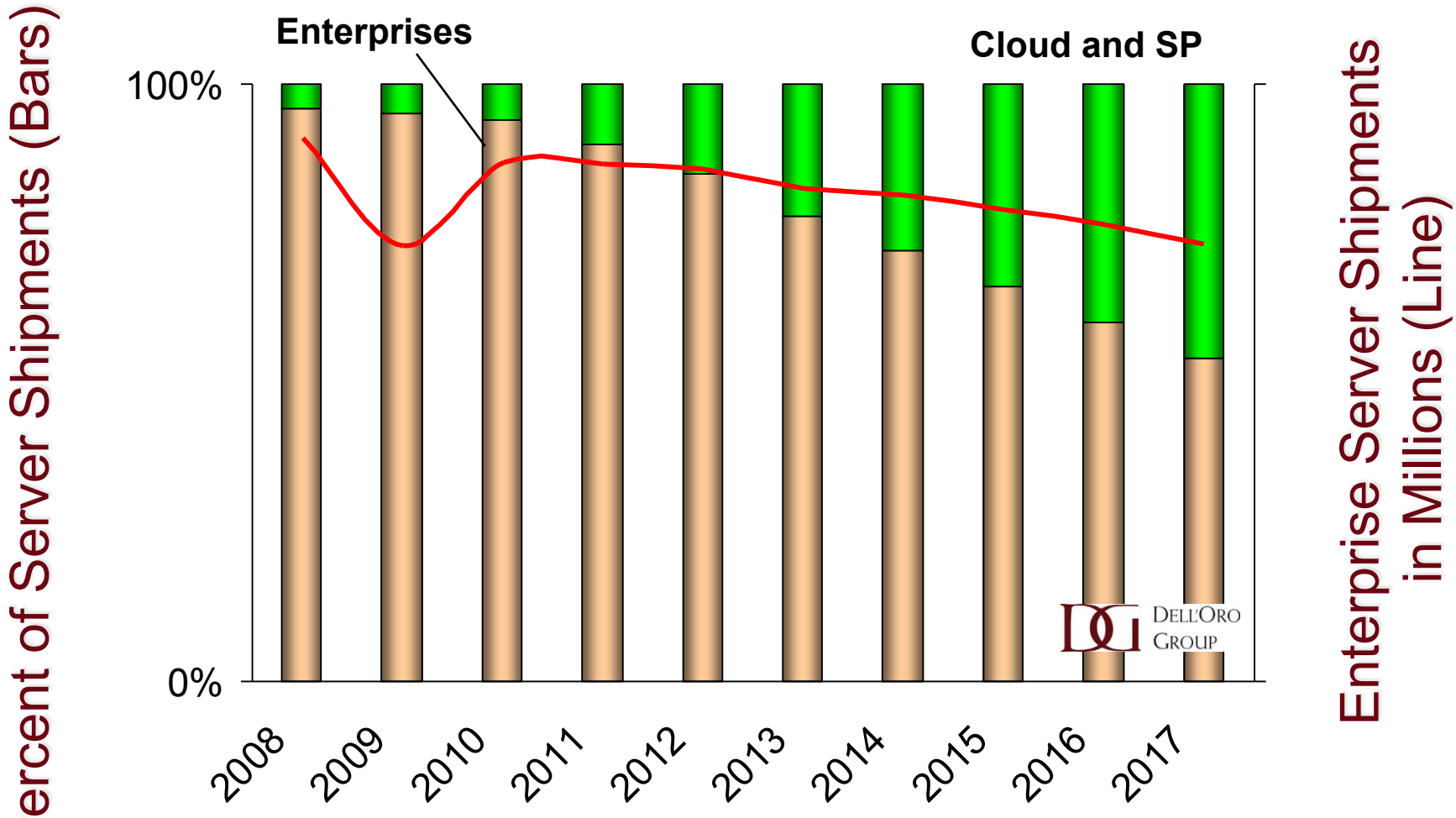
10 Gbps Ethernet Controller and Adapter Port Shipments



FCoE Enabled Controller and Adapter Port Shipments



Server Market Adoption



Jeff Asher, SNIA-ESF Member,
Principal Architect - NetApp

Market Perceptions

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- FCoE = Enterprise Grade
- iSCSI = Non-critical apps
- No real evidence to suggest differences in reliability given identical hardware (discussed more later)

FCoE/iSCSI Hardware

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- FCoE hardware all supports iSCSI
  - FCoE requires CNA
  - iSCSI runs on any NIC
- Easy to run both simultaneously on same links and ports
- DCB is required for FCoE but benefits iSCSI
  - 10GbE gives iSCSI same bandwidth as FCoE
  - Jumbo frames reduce overhead
  - Lossless ethernet
- Storage system support
  - iSCSI targets are much more common
  - Most FCoE target systems also support iSCSI

Technical Details

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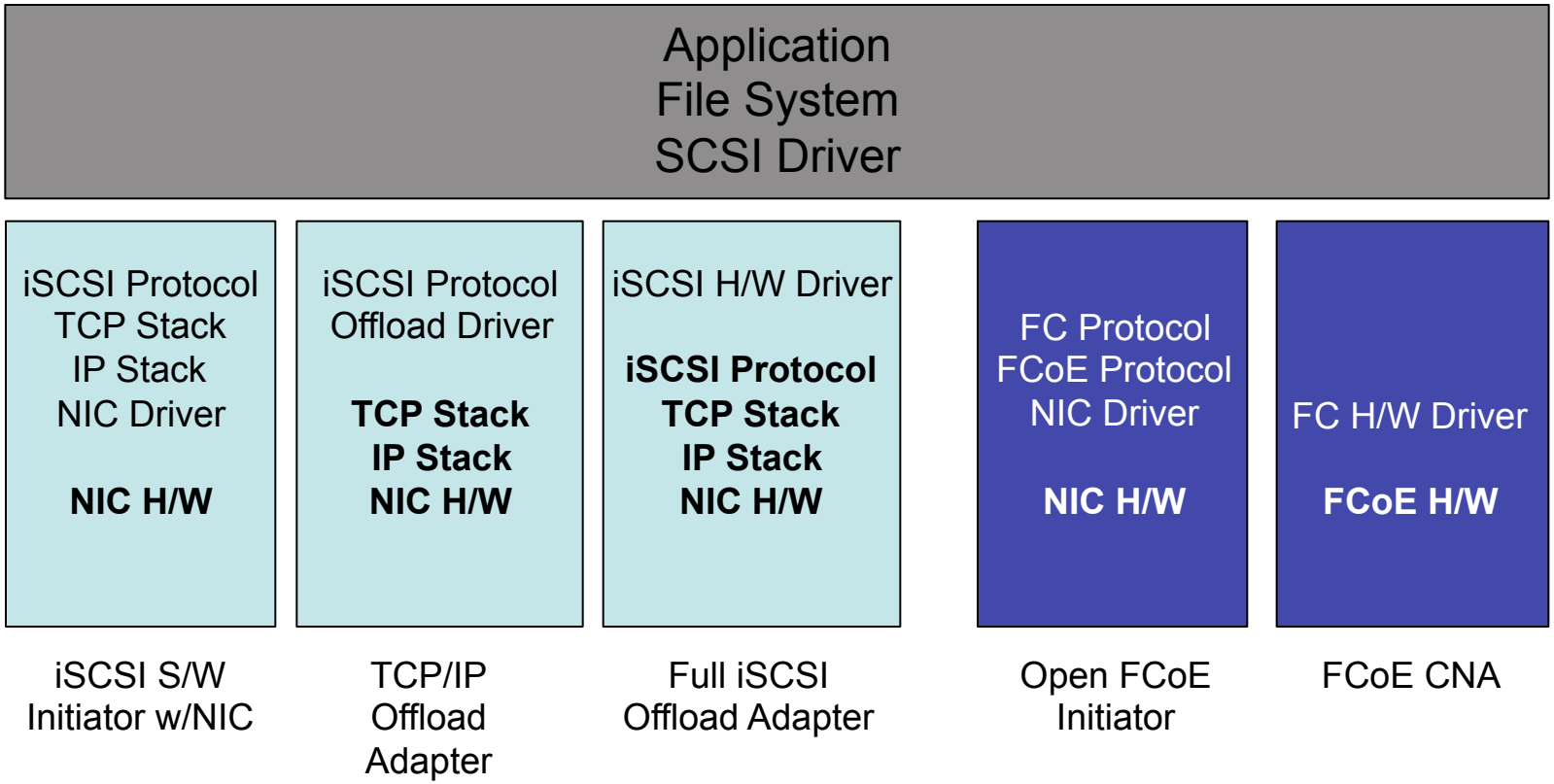
- Fibre Channel to FCoE
  - Ratified in 2009
  - Seamlessly integrates with traditional Fibre Channel
  - Encapsulates SCSI at OSI Data Link layer
  - Data Center Bridging Enhancements
  - Always implemented in hardware
- iSCSI
  - Ratified in 2003
  - 1GbE to 10GbE
  - Encapsulates SCSI in IP Packets
  - More layers of encapsulation increase latency
  - Implemented in either software or hardware

Protocol Stack Comparison



BOLD - Hardware

Decision Factors

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- Topology Requirements
- Applications Requirements
- Performance Requirements
- Resource Utilization
- Skills and Support

Topology Requirements

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- FCoE has more stringent topology requirements than iSCSI
  - DCB connectivity is required end-to-end
  - Initiator and target must be on same layer 2 segment
  - FCoE requires customer to pay more attention to interoperability
- Very few topology limitations for iSCSI
  - Initiator and target can be on different subnets
  - Non-DCB links in the path are supported
- An environment that takes advantage of iSCSI's topology flexibility may encounter reduced performance.
  - May not meet storage and application vendor best practices
  - Layer 3 hops increase latency

Application Requirements

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- In practice, an application can't distinguish between iSCSI and FCoE
  - Ability to identify the difference if important to the customer
- Application vendor may specify protocol
  - Protocol restrictions more common in healthcare and financial application environments
  - Protocol choice driven by vendor qualifications

Performance Impacts

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- FCoE outperforms iSCSI in most cases
  - Encapsulation
  - Hardware offloading
  - Frame size
- Wire performance delta is minimal
  - Software initiator vs hardware offload will impact server load, but minimally
- Most servers and storage systems are bottlenecks before protocols are a factor
- DCB offers more predictable latency over traditional IP networks, a benefit in mixed traffic environments

Resource Utilization

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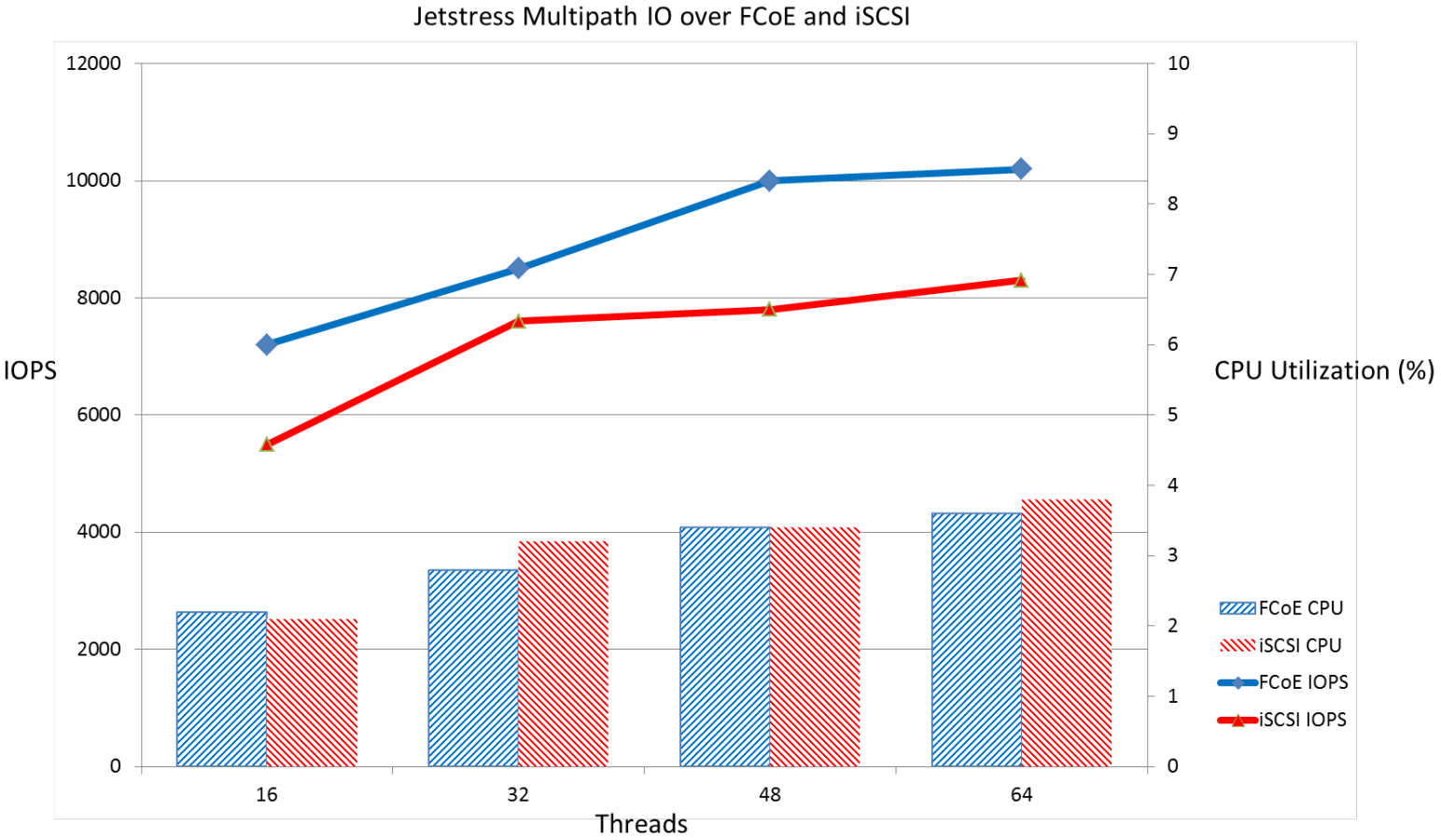
- Two approaches to protocol handling
  - Full offload – adapter handles protocol stack – lower CPU utilization
  - Host-based – selective hardware acceleration levels – higher CPU utilization
- Can make difference in acceptable application performance in edge cases on older servers
  - OLTP databases
  - Big Data applications
  - Undersized Server
- CPU utilization differences getting smaller everyday

IOPS and CPU Utilization for FCoE and iSCSI



Graph of data from Demartek Report

Intel® 10GbE Adapter Performance Evaluation for FCoE and iSCSI – September 2010

Skills and Support

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- Availability of tools
  - Most FC admin and troubleshooting tools work with FCoE
  - IP network tools can troubleshoot iSCSI the same as other protocols
  - Most iSCSI problems can be solved with “ping” command.
- Availability of admins experienced in either
  - iSCSI admins are generally easier to find
  - FC network admins are less common than IP network admins, but transition to FCoE fairly easily
  - Market forces drive salary and availability

Conclusion

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- Either protocol can satisfy most technical requirements.
  - Extreme throughput requirements push towards FCoE.
  - Extremely low latency tolerance push towards FCoE.
  - Less than 800 Mbytes/sec per port = either will work
  - Long distance requirements push towards iSCSI
- Non-technical factors often drive the decision.
  - Budget impacts
  - Personnel availability
  - Supportability in a particular environment
  - Application support
- Non Factors
  - CPU Utilization – becoming less relevant over time (Moore's law ramifications)

After This Webcast

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- This webcast will be posted to the SNIA Ethernet Storage Forum (ESF) website and available on-demand
  - http://www.snia.org/forums/esf/knowledge/webcasts
- A full Q&A from this webcast, including answers to questions we couldn't get to today, will be posted to the SNIA-ESF blog
  - http://sniaesfblog.org/
- Follow and contribute to the SNIA-ESF blog thread on many storage-over-Ethernet topics, both hardware and protocols
  - http://sniaesfblog.org/

Conclusion

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QUESTIONS?

Conclusion

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Thank You