

State-of-the-Industry Reports 2009
Next Generation DataCenter Series



FCoE: Storage & Network Convergence

Industry Report 2009

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NextGen DataCenter

FCoE: Storage & Network Convergence

Industry Report 2010

1. Executive Summary

Fibre Channel over Ethernet (FCoE) - Path to I/O Consolidation

- Introduction
- I/O Consolidation and Unification
- Encapsulation Fibre Channel into Ethernet
- Path to End-to-End Convergence
- FCoE Benefits
- Recommendations

2. Market Drives & Industry Dynamics

Fabric Requirements in a Virtualized Data Center

FCoE: Enabling Fibre Channel over Lossless Ethernet Fabrics

Data Center Ethernet Opens the Door to FCoE

The Unified Fabric Payoff

iSCSI: Game over

- So what do you need iSCSI for, then?
- Bad timing

Fibre Channel in Double-Time

Enabling today's dynamic data center

- A Simpler Approach to Unified Storage
- Unified Storage Architecture
- Performance Analysis
- Cost Advantages FCoE vs. FC vs. iSCSI

iSCSI: Is the Game over

- So why do you need iSCSI, then?
- iSCSI dodges FCoE noose

Fibre Channel vs. IP vs. InfiniBand vs. FCoE

Converged Networks and the Standards Bodies

- Meeting the Challenge with FCoE and CEE
- CEE: Advancing Ethernet

Key Elements of Converged Ethernet

- Putting It All Together: Converged Ethernet and FCoE
- FCoE Benefits

- Unified fabric in the data center
- Cost and Power savings

Is FCoE our Savior or Another Empty Promise?

3. Market Segments & Product Requirements

Goodbye to physical Fibre Channel

Internal array Fibre Channel
FC Fabric
SAS and Ethernet

iSCSI dodges Fibre Channel over Ethernet noose

VMotion and FCoE: A match made in admin heaven

Blade dishes loss-less Ethernet wonder

Goodbye to physical Fibre Channel

Internal array Fibre Channel
FC Fabric
SAS and Ethernet

FCoE vs iSCSI

VMotion and FCoE: A match made in admin heaven

Ethernet Storage to Morph Again with FCoE vs.iSCSI

FCoE vs. iSCSI

FCoE, iSCSI, and FCIP

FCoE Or iSCSI, Where does It Really Matter?

FCoE standards efforts

Case for iSCSI

Case for FCoE

Converged Enhanced Ethernet– Good for iSCSI SANs

EXECUTIVE SUMMARY

1 INTRODUCTION

2 INTRODUCING LOSSLESS ETHERNET

3 CONCLUSION

Blade Platforms & Network Convergence

The Blade Advantage

The need for network convergence

Benefits of Network Convergence

Ethernet as the medium for network convergence

Technology options for carrying storage traffic over Ethernet

FCoE

Network Convergence in High-Performance Computing

Conclusion

iSCSI

VIRTUALIZED iSCSI SANs

SERVER VIRTUALIZATION

STORAGE VIRTUALIZATION

Networked Enterprise Storage in VM Infrastructure

ESX SERVER AND iSCSI

HOW iSCSI ENABLES VIRTUALIZED SANs

EQUALLOGIC VIRTUALIZED iSCSI SANs

AUTOMATIC LOAD BALANCING

NON-DISRUPTIVE SCALABILITY

FUTURE DIRECTIONS

- QUICK, INTELLIGENT PROVISIONING

- AUTOMATED MANAGEMENT

4. Market Demand Forecast & Shares

Brocade FCoE Server Connectivity Solutions

A NEW ARCHITECTURE OPTION

ENABLING DYNAMIC DATA CENTER INFRASTRUCTURES

Extending Fabric Intelligence Throughout the Data Center
Benefits of Utilizing CEE
FCoE Migration Strategy Relies on Existing FC Infrastructure, Built-In Fabric Intelligence.....
Predicting FCoE Adoption: Taking into Account the Human Factor
The promise of FCoE, the reality of adoption

5 Technology

What is Fibre Channel over Ethernet FCoE?

The Converged Ethernet Fabric

Converged Enhanced Ethernet (CEE)

FCoE Protocol Stack

FCoE Objectives

FC over IP (FCIP) Example

Ethernet Frame with FC Packet (Concept)

Relative Framing Overhead

FCoE Frame Considerations

FCoE to FC Gateways

FCoE to FC Gateway

Lossless and Reliable Delivery

Bit Error Rate Considerations

Ethernet "Pause" Flow Control

Why Use Ethernet?

Why Maintain Fibre Channel Content?

Why not use iSCSI?

What About ATA over Ethernet (ATAoE)?

FCoE Timeline and Roadmap

Fibre Channel Standards Activity

Ethernet Standards

Product Development

Fibre Channel vs. InfiniBand vs. Ethernet

Technologies Defined

Managing Multiple Technologies

FCoE vs. iSCSI

Fibre Channel over Ethernet (FCoE)

Success of FC

FCoE Standards Initiative

One Big Network?

Maintaining the Channel

FCoE Switches

Avoiding Packet Loss

Mapping Fibre Channel to Ethernet

Redundant Pathing and Failover

Fibre Channel vs. InfiniBand vs. Ethernet

Technologies Defined

Managing Multiple Technologies

Unified Storage Architecture

IP-based storage protocols

MFCP
IFCP
ISNS
iSCSI

6 Competitive Positioning

Hardware vendors primed for FCoE Interoperability

FCoE enjoys major buzz at SNW 2010
Cisco, Dell Blogs Feud over FCoE vs. iSCSI

Hardware vendors primed for FCoE love-in

iSCSI for SAN virgins
FCoE driver code licensing
Fibre Channel in Double-Time

FCoE vs. iSCSI – Pulls & Pushes

FCoE a Diabolical Plot?;
iSCSI Crowd Feeling Threatened?
FCoE “and” iSCSI - Who cares? It's all about Data Center Ethernet
iSCSI vendor EqualLogic takes on Fibre Channel over Ethernet (FCoE)
iSCSI, FCoE or InfiniBand for storage networking?
FAQs: iSCSI vs. Fibre Channel
Players

Emulex and Qlogic support emerging FCoE technology

Emulex releases new product line CNAs
Converged Network Adapters from Emulex and Qlogic
QLogic hypes 'network consolidation' with FCoE

EMC Introduces its First Switch for FCoE

EMC Connectrix Family of Switches and Directors
Converged Network Adapters from Emulex and QLogic

Brocade unfurls FCoE roadmap,CNA and FCoE switch next year

Brocade Buys Foundry: A Boost for FCoE?

BLADE Network Teams w Emulex, NetApp for FCoE on Blade Servers

Network Blade Network's loss-less Ethernet for FCoE

NetApp First to Announce Support for Native FCoE Storage

EMC's support for FCoE - Connectrix Family of Switches and Directors

Cisco Target Data Center Needs at SNW

7 Suppliers & Strategies

Industry Ecosystem – Storage, Servers, Networking, Blades, System Software

FCoE Suppliers

Components: Brocade, Fujitsu Limited, Intel, LSI, PMC-Sierra, Mellanox, Vitesse

Software: Neoscale Systems, VMWare

Testers: Finisar

Storage Subsystems: Blade Network Technology, EMC, Emulex, Hitachi Data Systems, NetApp, Qlogic

Systems: Cisco, Fujitsu-Siemens, Hewlett Packard, IBM, Sun Microsystems

Strategic Product Positioning

Go-to-Market Plans

Financials

8 Channels

FIVE TESTS FOR DETERMINING IF YOU'RE BUYING UNIFIED STORAGE

General considerations before deploying 10G Ethernet for Convergence

Choosing a Fibre Channel array or iSCSI SAN storage for SMBs

IP SAN services fertile ground for SMBs

What iSCSI weaknesses should you consider when developing iSCSI services offerings?

9 Recommendations

FCoE: Extending FC Into the Future

Industry Status & Recommendations for

- Channel Players

- System Integrators,VARs

- Users - CIOs & DataCenter Managers

- Financial Investors – VCs, Wall Street

10 Appendix

A Primer on FCoE

Lossless Ethernet

Ethernet Standards Activities

FCoE and CEE: A technical perspective

FCoE Framing

FCoE Switch

FCoE in the Brocade Data Center Fabric Architecture

Brocade Working with IEEE to Develop FCoE Standards

Ethernet Congestion Management (ECM)

Priority-based Flow Control (PFC)

Enhanced Transmission Selection (ETS)

Summary

Connecting Microsoft Windows machine to Storage Area Network (SAN).

Key Benefits:

Key Features: