



Market Opportunity for Ethernet in Storage and IPC Applications

Presentation for Congestion Management Study Group
July 2004



Contributors

- Gopal Hegde, Intel Corp
- David Koenen, HP

Storage Components Market

Exhibit 1

Fibre Channel SAN Component Market Forecast

Source: The Yankee Group Global Storage Networking Forecast, First Quarter 2004

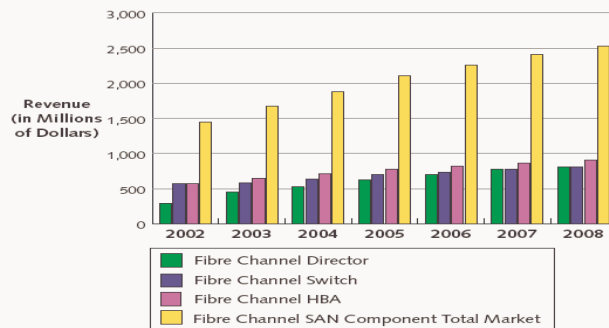
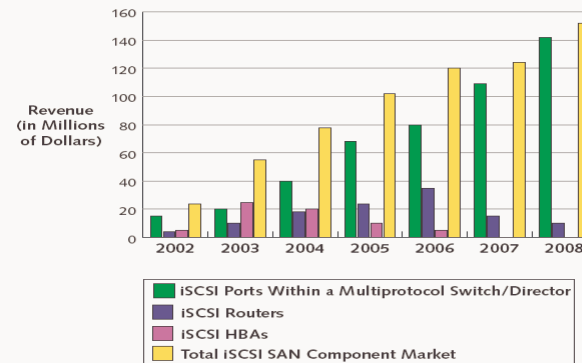


Exhibit 8

iSCSI SAN Component Market Forecast

Source: The Yankee Group Global Storage Networking Forecast, First Quarter 2004



- FC continues to be the dominant SAN technology
 - ~ 70+% SAN connections in '06 & beyond
 - Primary storage fabric for Blade Servers today ~ 15-20% attach rate by '07**
 - 15X size of iSCSI in 2008
- iSCSI adoption has been slow despite being more cost effective compared to FC
 - Cost & availability of adapters
 - Packet loss in Ethernet is an issue

July 2004

** Intel Market Models

Opportunity for Ethernet in Storage



- Small enterprises expected to deploy iSCSI SANs first
 - No installed base of SANs
 - Use existing, under-utilized network
- Fortune 500 IT concerns regarding iSCSI – part perception, part reality
 - Performance – Ethernet and IP
 - Availability
 - Security
- Opportunities for increasing iSCSI penetration in data centers
 - iSCSI as storage fabric for blades
 - iSCSI SANs for mid size enterprises
- Doubling the penetration rate of iSCSI in the data center adds >\$200M in additional revenues
- iSCSI will also accelerate adoption of 10 GbE in the data centers

Improving Ethernet congestion management in IEEE would enable faster adoption of iSCSI -- address IT “perception” & “reality”

Opportunity for Ethernet in Storage



- Small enterprises expected to deploy iSCSI SANs first
 - No installed base of SANs & therefore use existing, under-utilized network
- Opportunities for increasing iSCSI penetration in data centers
 - iSCSI as storage fabric for blades
 - iSCSI SANs for mid size enterprises
- Doubling the penetration rate of iSCSI in the data center adds >\$200M in additional revenues
- iSCSI will also accelerate adoption of 10 GbE in the data centers
- However Fortune 500 IT concerns regarding iSCSI are as follows – part perception, part reality
 - Security
 - Performance
 - Ethernet behaves poorly in congested environments, packet drops significant
 - Storage traffic is very sensitive to dropped packets
- Improving congestion management capabilities of Ethernet will address end user concerns and help accelerate iSCSI adoption

Improving Ethernet congestion management can accelerates iSCSI adoption – addresses IT perception & reality



Clustering & IPC Fabric Market

- Clustering:

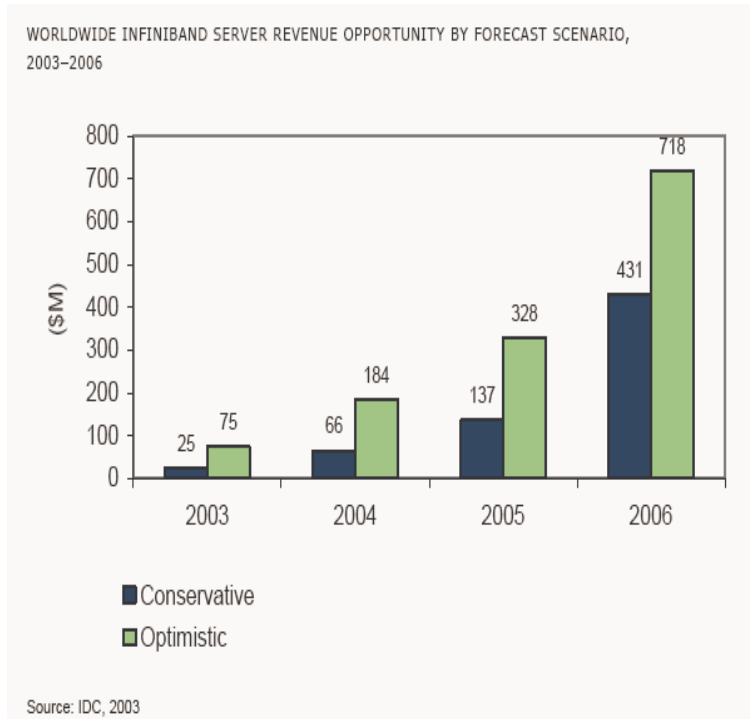
- Highest growth in the “Technical Capacity” Servers ~ 20% of High Performance Computing (HPC) market by 2007
 - Clusters built using low cost servers connected by a high performance, low latency fabric

- Inter-processor Communication (IPC) Fabrics:

- Blades are increasingly being deployed as Application and Database servers
 - IPC traffic significant → Next generation Blades are supporting an “IPC” fabric

- Requirements: Low Latency, Better Congestion Handling capabilities

Ethernet Opportunity for Clustering and IPC



- Users like the cost structure and availability of Ethernet
 - However latency and congestion management are key issues
- Myrinet and Quadrics based fabrics are being deployed to address this need
- Infiniband® emerging as fabric of choice for clustering and IPC applications
 - Major server OEMs considering IB in server platforms

Addressing latency and packet loss opens up the cluster market for Ethernet



Summary

- Storage, IPC and clustering offer significant revenue opportunity for Ethernet
 - Will also drive adoption of 10 GbE in the enterprise
- Other opportunities include – Ethernet as a converged fabric for blade servers
 - iSCSI/Ethernet storage fabric, Ethernet as IPC fabric
- Ethernet is making some inroads
 - Technical issues affecting broad deployment
 - Improved Congestion Management would enable Ethernet to better address these issues
- Ethernet only has to be “good enough” for it gain a sizeable portion of storage & IPC market segments

802.3 can improve Ethernet's capabilities