Introduction

- New industry standard being formulated by ANSI X3T9.3
- Wide industry participation - IBM (Rochester MN; Austin TX; Kingston, Poughkeepsie, Endicott and Yorktown Heights, NY), Amdahl, DEC, Sun Micro, Livermore and Los Alamos National Labs, etc.

Fiber Channel Requirements

- Small footprint (for ruggedness means serial)
- 2 to 10 kilometer operating distance
- Up to 100 megabytes/s payload
- Support for interconnection fabric

Fiber Channel Requirements (Cont.)

- New low-level protocol for efficiency over distance (not extender)
- Multiple cost/performance levels
- Carry existing interface command sets with few modifications (SCSI, IPI, etc.)

Fiber Channel Architecture

- Workstation
- Mainframe
- Disk Subsystem
- Interconnection Fabric
- Tape Subsystem
- Supercomputer
- Other

Fiber Channel Hierarchy

- Sat. Conn
- Exchange
- Other

Fiber Channel Structure

- FC-4: IPI-3, SCSI, HIPPI, Block Mux, Other
- FC-3: Common Services
- FC-2: Framing Protocol
- FC-1: 8B/10B Encode/Decode
- FC-0: Low-End, Mid-Range, High-End
Fiber Channel Frame Structure

Fiber Channel Compared to FDDI

<table>
<thead>
<tr>
<th>Fiber Channel</th>
<th>FDDI</th>
</tr>
</thead>
<tbody>
<tr>
<td>No topology considerations</td>
<td>Topology dependent</td>
</tr>
<tr>
<td>Premise of self-managing fabric</td>
<td>Station/Configuration mgmt. protocols</td>
</tr>
<tr>
<td>Frame size insensitive</td>
<td>Frame size sensitive</td>
</tr>
<tr>
<td>Hardware disassembly/reassembly</td>
<td>Protocol disassembly/reassembly</td>
</tr>
<tr>
<td>Speed relates to existing ifs</td>
<td>Speed relates to PSNs</td>
</tr>
</tbody>
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Fiber Channel Compared To FDDI (Cont.)

- Fiber Channel and FDDI cannot be one standard/implementation:
  - Different applications require different philosophies
  - Protocols have very different philosophies
- To Fiber Channel, FDDI is a fabric or a part of a fabric
- To FDDI, Fiber Channel is an interface inside a connected equipment

FDDI "Hidden" Within Fabric

Possible useful commonalities:
- Transceivers (requires same baud rates to be defined)
- Encode/decode hardware

Potential Fiber Channel Market

- Multi-million SCSI peripherals in 1990
- SCSI to be $7 billion market in 1992
- IPI growing to 1 million units/year by 1993
- High-performance units at beginning of growth

Summary

- Fiber Channel could become "universal pipe" - mixing channel, comms traffic, etc. on single interface
  - All "computer outputs" at common speed
- Mix n’ Match requests:
  - Channel requests for i/o
  - LAN requests for service
- Support functions in h/w for channel traffic which typically in s/w for comms i/f/s
- Connect to PSNs via bridges/gateways
A LOW-COST DISTRIBUTED FABRIC

Roger Cummings
Senior Engineer
Tape, Library and SSD Systems
December 4, 1990

FABRIC SERVICES

- Three classes of connection:
  - Class 1 Dedicated Connection and Ports
    Guaranteed delivery
    Frames received in transmitted order
  - Class 2 Frame Switched
    Buffer-to-Buffer flow control
    Guaranteed delivery
    Receipt order not guaranteed
  - Class 3 Datagrams
    Delivery and receipt order not guaranteed

- Mechanisms for defining frame sizes, legal number of outstanding frames (credit) etc.
- No definition of topology or implementation

TODAY'S SCSI ARCHITECTURE

TERMINATOR

SCSI DEVICE

Up to 8 Devices Max., 8 meters length max.

SCSI DEVICE

SCSI DEVICE

TERMINATOR
LOW-COST DISTRIBUTED FIBER CHANNEL FABRIC

WHAT'S IN A TAP?
NOT VERY MUCH!!

- A minimum of three 2148 byte FIFOs
- Two transceivers and sets of serial-parallel and parallel-serial conversion
- Some multiplexing and frame handling logic
- All logic should fit in medium-sized gate array
- Expect Tap to be packaged like an Ethernet transceiver

TAP DETAILS

CHARACTERISTICS AND ADVANTAGES

Fully functional Fiber Channel fabric:

- Supports Class 1, 2, 3 (Class 1 delimiters "freeze" Mux and Demux)
- Supports flow control mechanisms
- Fabric credit count of 1
- "To Stub" FIFO sized by Port Credit Count.
- Supports Login
- Only "Stub Interface" defined by Fiber Channel
- Stub and Line interface speeds may be different

Advantages:

- Allows SCSI devices to be removed or powered-off without halting channel traffic.
- High reliability due to simplicity of Tap and dual power-sources
- Removes limiting restrictions on:
  - Number of connected devices
  - Total operating distance of channel
- Line interface not defined - opportunity for multiple cost/performance levels and added value
- Painless migration to higher performance systems