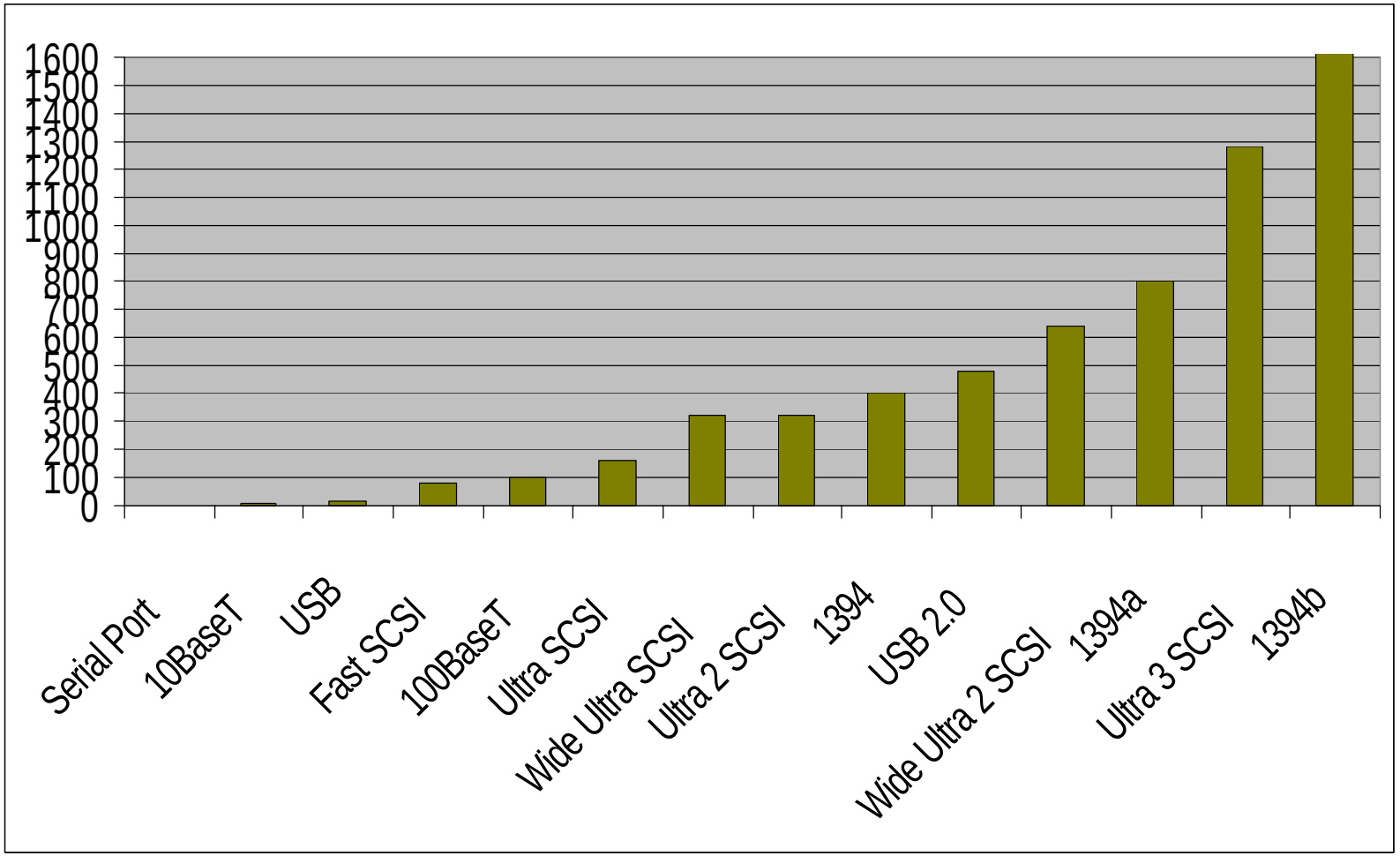
Agenda

- Introduction
  - Market trend and application
    - 1394 Market Analysis Data
    - 1394 and industry
    - Applications
- Technology
  - What is 1394?
  - Why 1394?
  - Applications
  - 1394 Protocol
  - PHY
  - Link Layer
  - Transaction Layer
  - 1394 Operation
  - Bus Management
  - Cable and Connection
  - Architecture
  - Topology
- Other Technologies
  - USB
  - DVI
- 1394 In Home Networking
- Xilinx Value
- Alliances
- Summary

Data Rates Of Various Ports



Interconnect Technologies

Technology	Throughput Data Rate	Applications
Apple Desktop Bus	0.01 Mbps	Input Devices like Mouse, Keyboards, Joysticks, etc
Serial Port	0.23 Mbps	Printers, Telephony Devices, Modems, etc
USB at low data rate	1.5 Mbps	Most Devices
10Base-T	10 Mbps	Laser Printers, Network Connections, etc
USB at high transfer rates	12 Mbps	Most Devices
SCSI	40 Mbps	Hard Drives, Removable Storage, Scanners, etc
Fast SCSI	80 Mbps	High Performance Drives
100Base-T	100 Mbps	Laser Printers, Network Connections, etc
Ultra SCSI	160 Mbps	High Performance Drives
Wide Ultra SCSI	320 Mbps	High Performance Drives
Ultra2 SCSI	320 Mbps	High Performance Drives
1394	400 Mbps	Hard drives, Scanners, Digital Video
USB 2.0 (Intel)	480 Mbps	Most Devices
Wide Ultra2 SCSI	640 Mbps	High Performance Drives
1394a	800 Mbps	Hard Drives, Scanners, Digital Video
Ultra3 SCSI	1280 Mbps	High Performance Drives
1394b	1600 Mbps	Hard Drives, Scanners, Digital Video

USB 2.0 & 1394

- USB and 1394 are complementary buses, differing in their application focus
- USB 2.0 is the preferred connection for most PC peripherals
- 1394's primary target is audio/visual consumer electronic devices such as digital camcorders, digital VCRs, DVD players, and digital televisions
- Both USB 2.0 and 1394 are expected to co-exist on many consumer systems in the future

USB 2.0 & 1394

- USB requires a CPU to perform the bus master functions while 1394 is peer-to-peer
  - A D-VCR must be able to talk directly to a D-TV without going through a PC first
- USB throughput is not nearly as fast as advertised
  - When shipping data directly from a peripheral to the host, throughput is OK
  - When shipping data from a peripheral to another peripheral, real bandwidth drops in half
  - All data must be be moved from the peripheral to the host and then from the host to the target peripheral

USB 2.0 & 1394

- The USB 2.0 hubs are more complicated
  - They require an entire USB 1.1 HOST controller and a new USB 2.0 hub controller
  - They require a high-speed signal repeater, routing logic, dual-function ports, etc
- 1394 is for devices where high performance is a priority and price is not
- USB is for devices where price is a priority and high performance is not

1394 & DVI

- IEEE 1394, is a two-way high-speed interface capable of sending command and control protocols
  - It enables devices to both broadcast and record data
- DVI is a point-to-point digital interface designed to send uncompressed streams
  - It is a one-way interface with a display
- IEEE 1394 is inherently suited for recording and networking applications within the home

1394 & DVI

- DVI is pitched as an interface between a graphics chip and various kinds of monitors
  - including plasma display panels, LCDs and even CRTs
- 1394 is suitable for distribution of compressed data (MPEG-2)
  - Most digital content received at home from DVD, satellite or cable is based on MPEG-2 streams
- DVI is suitable for distribution of uncompressed data
  - Designed to carry sustained HDTV data rate without interruption

1394 & DVI

- 1394 distribute video data at 100, 200, or 400 Mbps, Scalable
- 1394b is being designed to deliver data at 800 Mbps to 3.2 Gbps, Scalable
- DVI's single link can distribute video data at 4.9 Gbps
- DVI's double link can distribute video data at 9.9 Gbps
  - Does not support audio/video commands

1394 & DVI

	Stream	Bit Rate	Architecture	Command & Control	Applications
IEEE 1394	Compressed MPEG-2 Transport	1394: 100, 200, or 400 Mbps, Scalable 1394b: 800 Mbps to 3.2 Gbps, Scalable	Peer-to-peer	Support for AV command & control	Storage, networking
DVI	Uncompressed baseband	Single link DVI: 4.9 Gbps Double link DVI: 9.9 Gbps	Point-to-point	No support for AV command & control	Digital interface between a graphics chip and a monitor