IEEE 1394 In the Home

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What We're Going to Say

NORTEL NETWORKS

Home Networks

1394 In Home Networks

Ethernet On 1394 In Homes

Conclusions

Why Home Networks?

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- Telephone Service - POTS/ISDN/ADSL/Cable/Ethernet/IP
- Television Service-Cable/Antenna/DBS/ADSL/Ethernet/IP
- Data Service - POTS/ISDN/ADSL/Cable/Ethernet/IP
- Picture Phone Service
- Home Theater System
- Audio Distribution System
- Electronic Piano and Other Instruments
- Home Computer Systems
- Control Systems for Lights/Theater/Environment/Lawn
- Door Bell System
- Intercom and Baby Monitoring System
- Alarm System

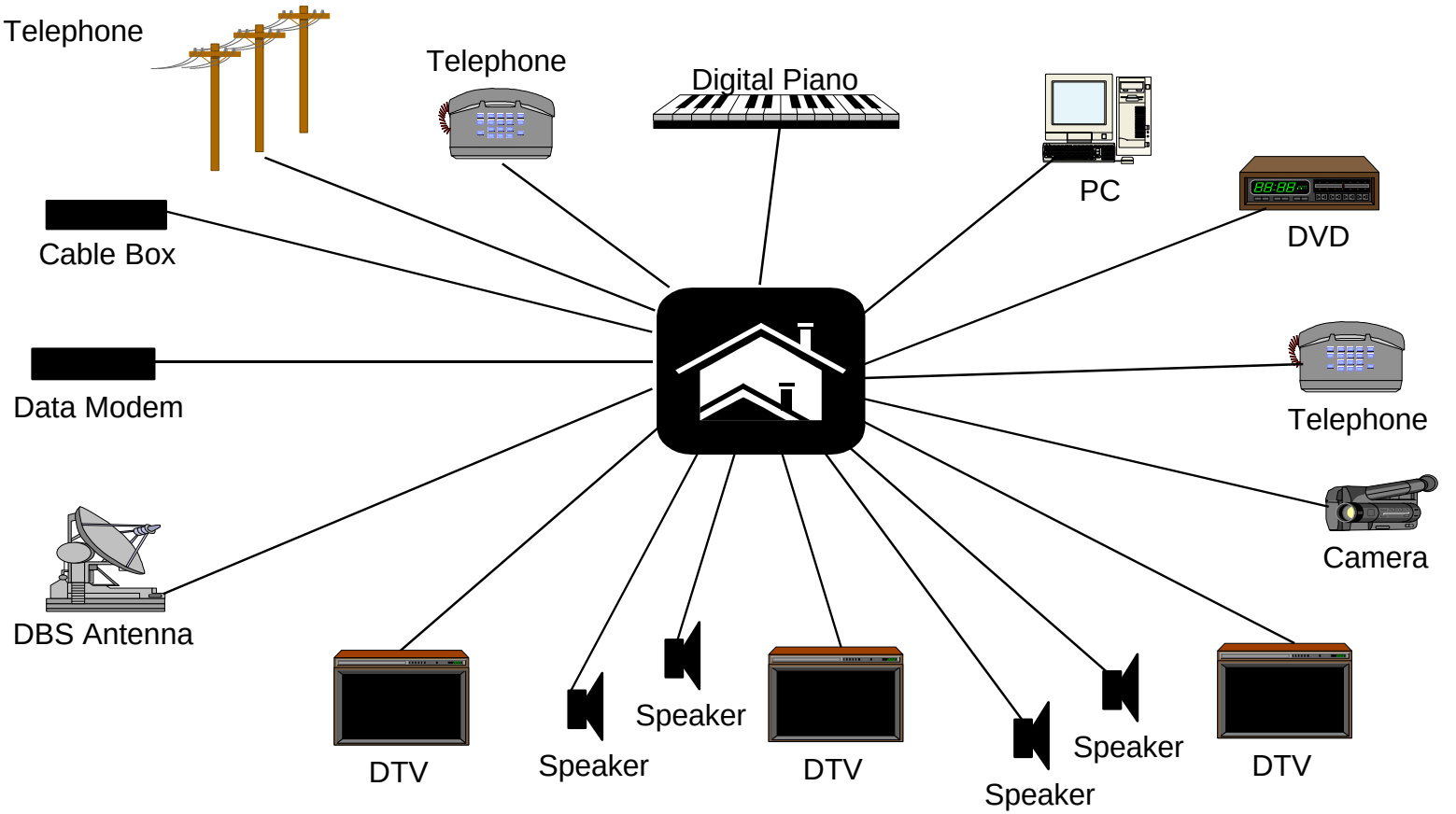
A Unified Home Network

NORTEL NETWORKS

- **All outside services carried over a single network**
  - **Phone Service**
  - **Cable TV Service**
  - **Digital Satellite Service**
  - **Internet Service**
- **All inside services multiplexed on same network**
  - **Allows component interaction**
- **Greatly simplifies installation**
  - **Rather than 12 different disconnected systems**
- **Future proof home**
  - **Home wiring lasts 30-100 years**
  - **Retrofitting is difficult and costly**
- **Provides many features which are impractical today**

Typical Application

- **Connect any audio/video source to any display/speaker**
- **TV centric not PC centric**



Example Problems Solved

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- Copy a video tape
- Display video tape on all TV sets
- Edit home video on PC
- Display digital pictures from PC to TVs
- Record piano on PC
- Play piano from PC
- Play music on any speakers from any source
- Select between cable/DBS/IP video program sources
- Control all entertainment equipment from any room

Home Dominated By Video

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- **Television sets are the most common appliance in home**
  - **Over 250,000,000 TV sets in America**
  - **Only 60,000,000 PCs in America**
- **VCRs, Games, etc. common video peripherals**
- **Telephones are the second most common appliance**
- **Stereo is common**
- **PCs in the home becoming increasing video capable**

Audio/Video Characteristics

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- **High Bandwidth Streams**
- **Delay and Jitter Sensitive**
- **Loss Sensitive**
- **Multicast Isochronous Channels**

Data Rate Mbits	Standard	Application
50		Digitized VCR Quality
143	SMPTE 259M Level A	Digitized Composite NTSC
177	ITU-R BT.601 or SMPTE 259B Level B	Digitized Composite PAL
270	SMPTE 259M Level C	525/625 Component Video
360	SMPTE 259M Level D	525/625 Component Widescreen Video
540	SMPTE 259M	Component Video
1500	SMPTE 259M	HDTV

1394 - The Household Interface

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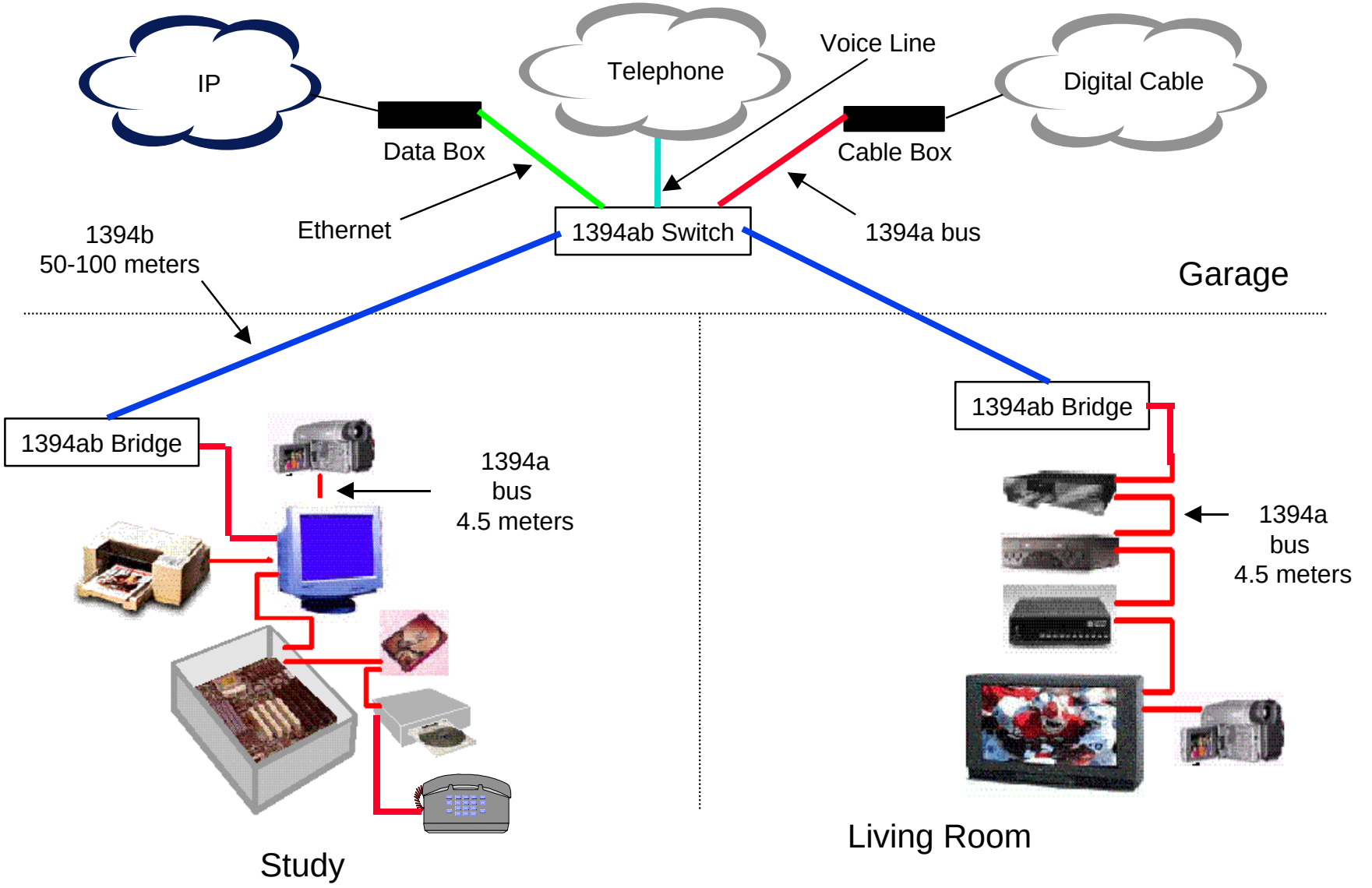
- **Many Digital Camcorders already shipping**
- **DTV, DVD, DVCR, Digital Cable, and DBS on the way**
- **PC 99 Specifies 1394 for consumer electronics interface**
- **First US digital broadcast of John Glenn's launch**

World Wide 1394 Consumer Electronics Units (in K units)

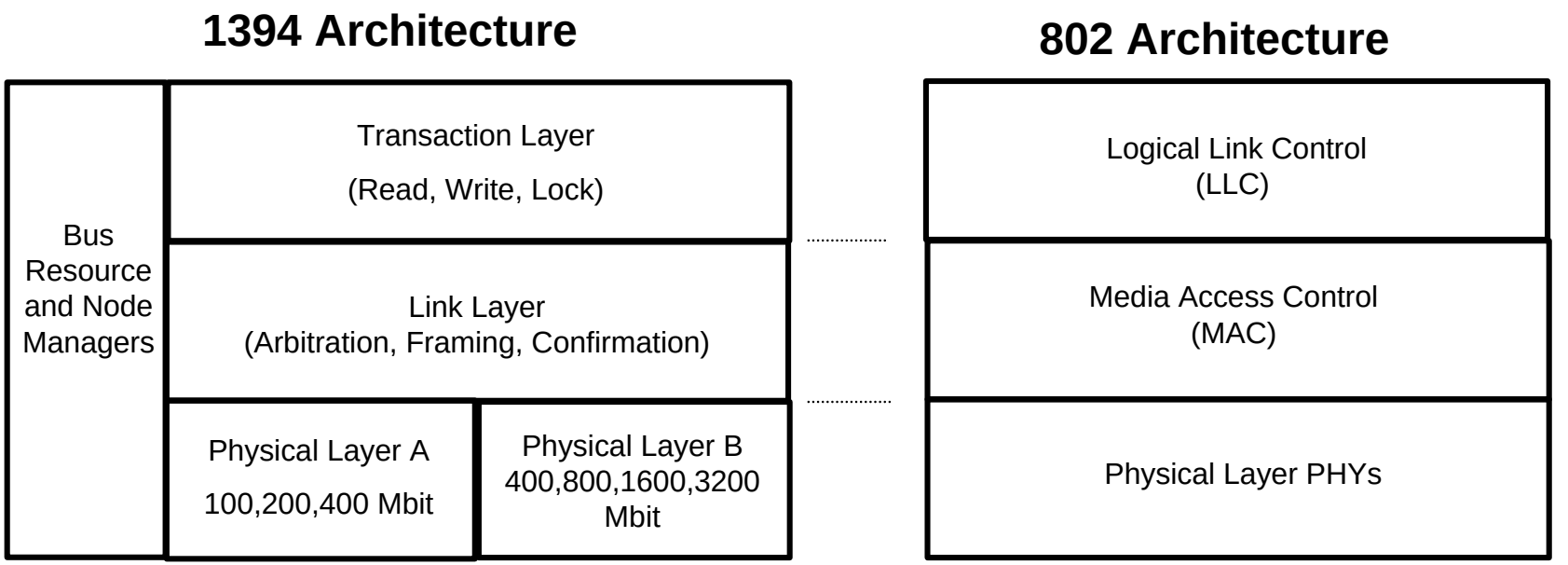
	1997	1998	1999	2000	2001	2002
Camcorders	1,500	3,300	4,697	7,651	9,430	11,425
DVCRs	64	660	1,400	2,985	6,170	6,232
DBS	-	194	3,538	10,159	14,696	18,150
DVD Players	-	-	675	4,730	13,050	21,280
Cable Set Tops	-	150	1,860	6,000	11,680	17,739
Game Consoles	-	-	980	6,177	16,349	18,393
Digital Still Cameras	-	10	207	585	2,288	4,725
Total TV Peripherals	1,564	4,314	13,357	38,287	73,662	97,943
IEEE 1394 TVs	-	50	700	3,000	7,500	10,000
Total Consumer	1,564	4,364	14,057	41,287	81,162	107,943

Source: In-Stat

Possible 1394 Home Network



1394 Compared to 802



64 Bit Global Memory Address Model

Confirmed and Unconfirmed Datagrams

Isochronous Multicast Channels

Memory Read/Write Transactions

Hierarchical Transaction Layer Bridges

48 Bit Unique Node ID

Unconfirmed Datagrams

Asynchronous Multicast

Reliable or Unreliable Streams

Transparent MAC Layer Bridges

Ethernet Over 1394

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- **Used for home data service distribution**
  - PC to PC
  - PC to Internet
  - PC to printer
- **Easy connection to existing PCs, Routers, Cable Modems, etc.**
  - PCs only require protocol changes
  - Routers and Cable Modems unchanged
- **Future proof against changes in IP networks**
  - Not affected by transition from IP4 to IP6
  - Allows lightweight inhome protocols
- **Implemented using a subset of existing 1394 protocols**
  - May run in parallel with entertainment video or POTS

Conclusions

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- **1394 bus interfaces provide an excellent foundation for providing integrated home networking**
- **1394 is suited to both high quality video and low cost control interface**
- **Ethernet data service may be provided over**