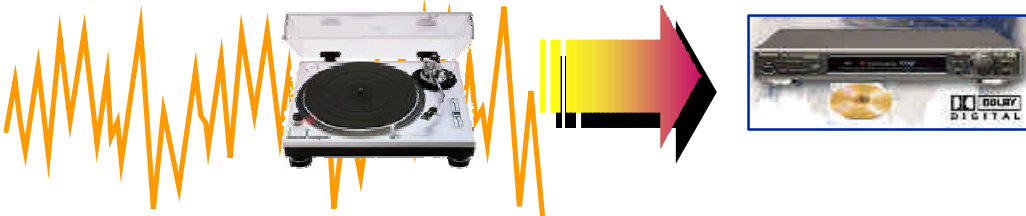
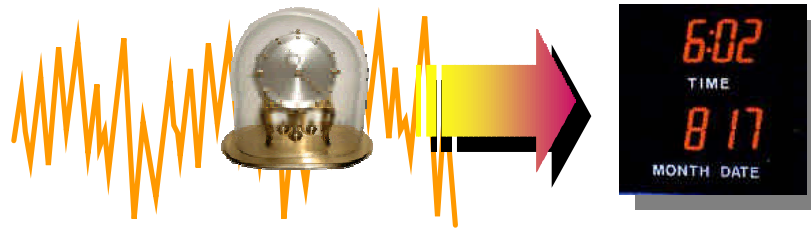




# Introduction

State of the Market

# The Digital Age of Consumer Electronics



**esp**  
EMERGING STANDARDS  
& PROTOCOLS

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Slide: 2

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**Digital technology brings**  
**Higher accuracy**  
**Higher reliability**  
**Faster speed**  
**Lower power**  
**Lower cost**

# Digital Logic Spawns New Consumer Products

## *Replay TV*

*Revolutionizing the way we watch television*



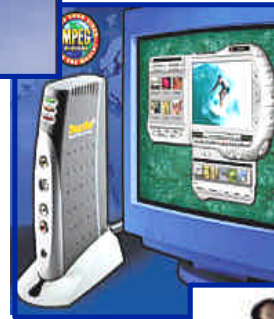
## *Consumer Satellite Modems*

*Revolutionizing high speed home Internet access*



## *Desktop Video Editing*

*Delivering video editing to the home*



## *Smart Card*

*Revolutionizing the way we purchase products*

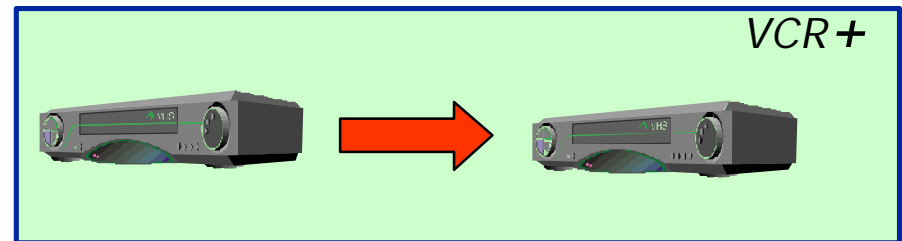
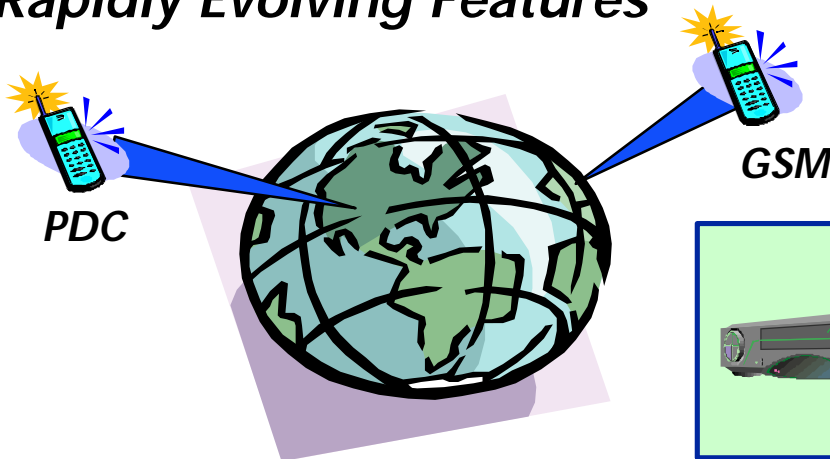
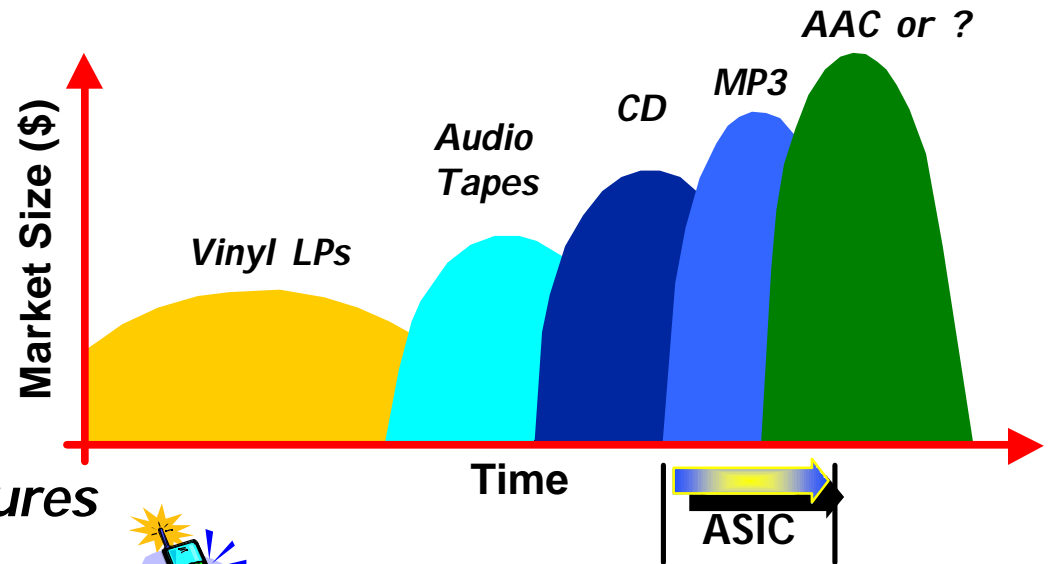


## *MP3 Players*

*The new revolution in portable digital music*

# ASICs Cannot Meet Consumer Market Requirements

- *Short Product Life Cycles*
- *Changing Standards*
- *Multiple Standards*
- *Rapidly Evolving Features*



# New Dimensions to Home Internet Access

- ◆ Internet revolution
  - New ways to communicate, entertain & educate
  - Millions of users rushing to Gain Internet access
- ◆ Applications & services are fueling demand for high-speed Internet access
  - E-mail, instant messaging, shopping, games, research
- ◆ Home users are embracing a variety of new services
  - Broadband access will evolve to bring new dimensions to the Internet experience



# Device Networking in a New Age

*Networking Solution for Controlling & Managing Smart Devices*

- ◆ The “new age of information” or “new age of communication” - Whatever you want to call it!
  - Ubiquitous computing
  - Post-PC age
  - e-Business
  - e-Commerce
  - e-Services

# Convergence Is Happening!

- ◆ Invisible computing embedded within everyday devices
  - Increasing intelligence of everyday appliances
- ◆ Digital revolution
  - Infrastructure: Circuit-switched to IP-based networks
  - Analog TV to Digital TV
- ◆ Internet is ubiquitous
  - Being deployed within commercial channels
    - Business-to-Business commerce, secure transaction processing, banking
- ◆ Deregulation of global infrastructure
  - Multiple industries such as telecom, cable and utilities

Response	Percentage
Yes	65%
No	30%
Don't know	5%





# What is Home Networking?

- ◆ The distribution of information (Audio, Video, & Data) around the home and their interface with attached devices and external services
- ◆ The interconnection and interoperation of
  - Home appliances
  - Entertainment devices
  - PC hardware
  - Telecommunication devices
  - Security, lighting and environmental control systems

Its All About Convergence

# The Push for Home Networking

- ◆ Rapid growth in multiple-PC household penetration (by Dataquest)
  - PC penetration exceeds 50% in US households
  - Multi-PC households growth: 15M (in 1998) to 26M (in 2003)
- ◆ Increasing Internet usage (by Yankee Group)
  - Nearly 90% of PC households will be online by 2001
  - Online households growth: 20% (in 1997) to 47% (in 2001)
- ◆ Broadband Internet access (by Forrester Research)
  - Broadband penetration growth: less than 1M (in 1998) to more than 15M (in 2002)
  - % Penetration of online households: increases from 2% (in 1998) to 26% (in 2002)

# The Push for Home Networking

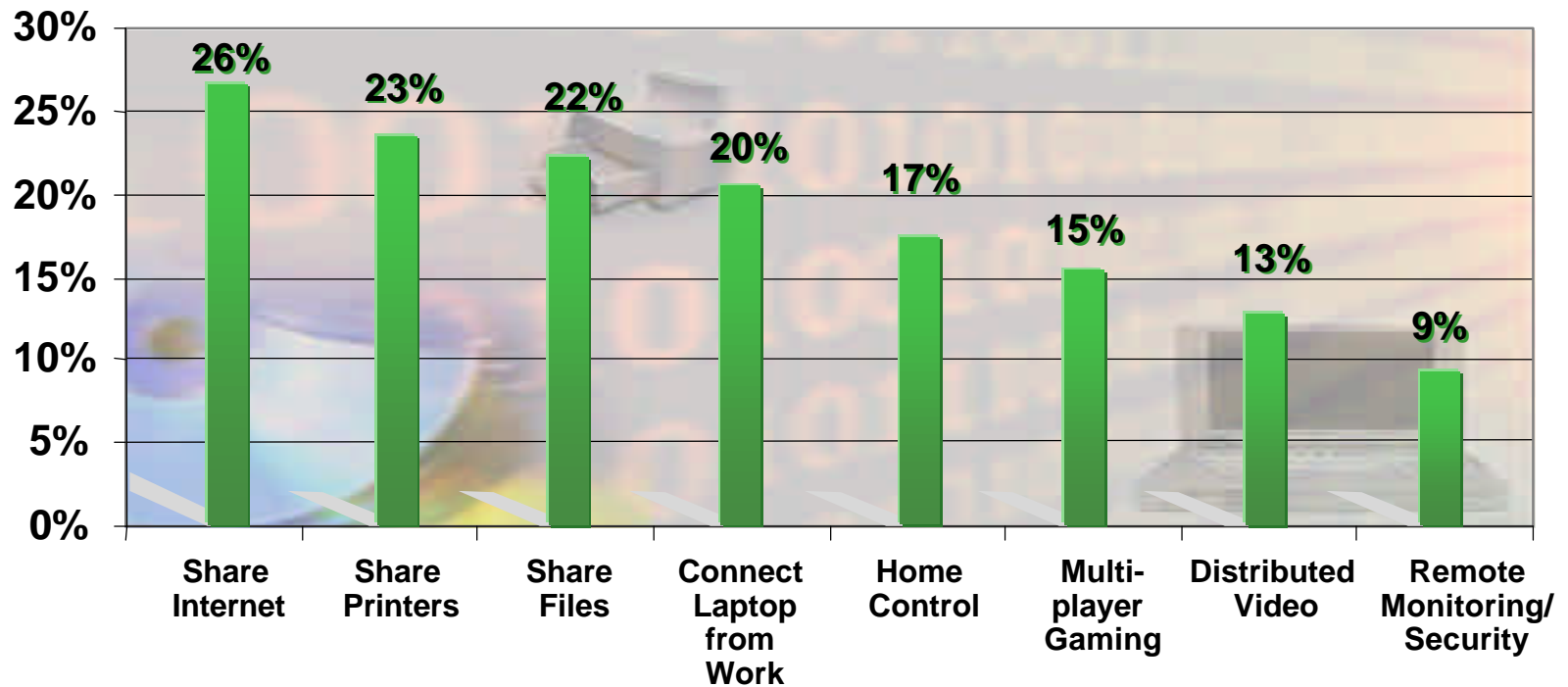
- ◆ More digital appliances are coming into the home (by IDC)
  - DSS, DVD, Digital TV
  - Web-Top boxes, set-top boxes
  - PDAs, mobile (cellular) phones
  - Digital cameras
  - Installed base of internet appliances will exceed 50M by 2001
- ◆ More digital content entering the home
  - Published Content
    - CD-ROMs, DVDs, DVRs, digital photography
  - Networked Content
    - DTV, DBS, VoIP, MP3, movies-on-demand, streaming media

# History Repeats Itself Again...

## ◆ Television

- There was a time when one television set per home was considered a luxury
- Today 76% of US households have two or more television sets
- Three factors contributed to multiple TV ownership
  - Purchase of newer/bigger/ better television
  - Additional television to reduce conflicts over TV use
  - Television in bedroom / kitchen
- Replace the word "TV" with "PC" and history repeats itself again!

# Applications Driving Home Networking



Source: Cahners In-Stat Group





# State of the Internet Connectivity Market

- ◆ Most homes access the Internet via dialup modems at 28.8kbps or 56kbps
  - Not an “always on” connection
    - Requires modem synchronization
    - Users hope that connection is established right away
  - Phones & faxes cannot be accessed while on the Internet
- ◆ Broadband connectivity
  - Simpler & significantly faster Internet access
  - Always on connection
    - No dialing & synchronization required
  - No worry about the phoneline
    - Data & telephone can share the same line at the same time

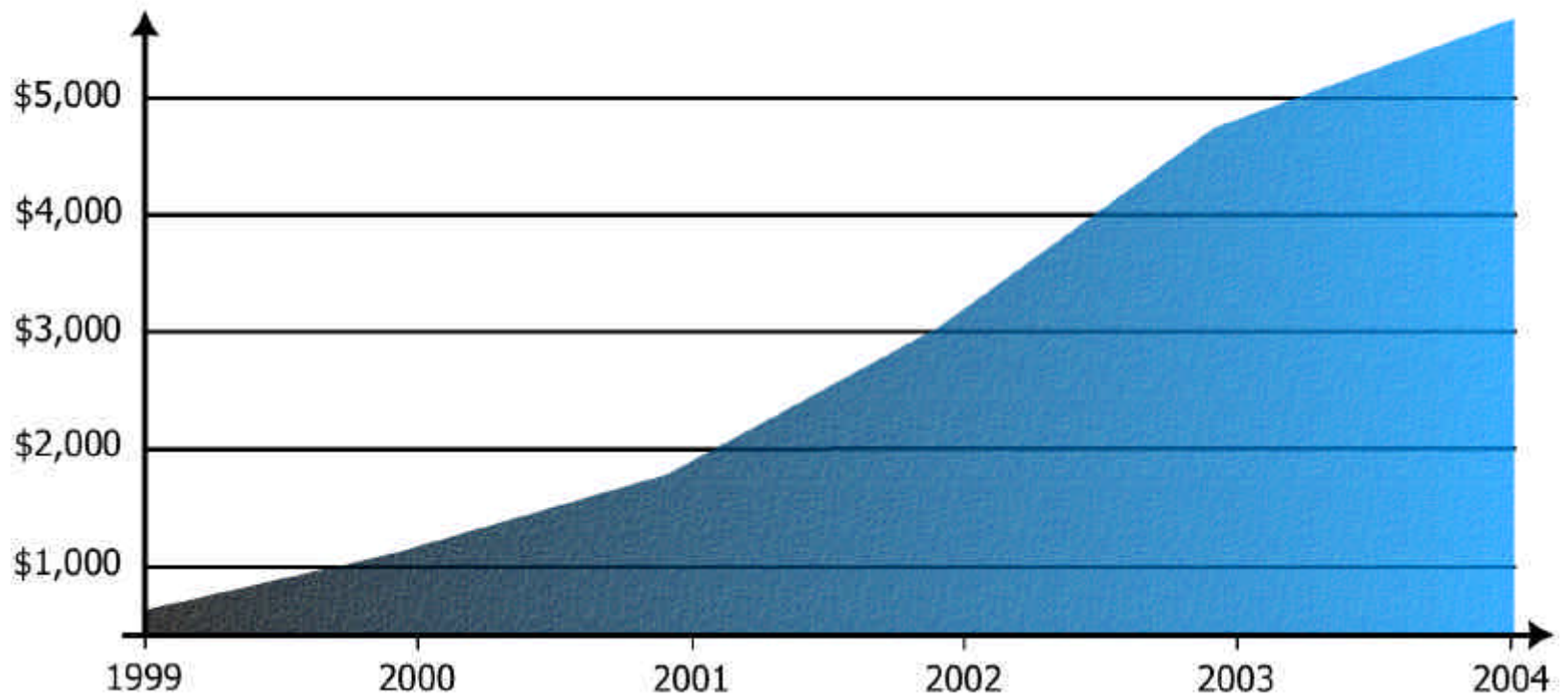
# Residential Gateway

## *The Key Ingredient For Home Networking*

- ◆ RGs provide integration of different broadband access types & different home networking solutions
  - Broadband access: xDSL & cable modems
    - Each modem offers an Ethernet port for connecting one computer
    - Increasing number of households have multiple computers
      - Tech-savvy users may install Ethernet hub and pull Cat5 cabling to each computer
      - Most users will not find this a viable option due to installation obstacles or cost
  - Home networking solutions: HomePNA, HomePlug, HomeRF, Wireless LANs, IEEE 1394

# Worldwide Home Network & Residential Gateway Forecast

Worldwide Home Network and Residential Gateway Forecast (US \$M)



Source: Cahners In-Stat Group