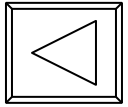


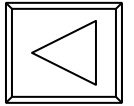
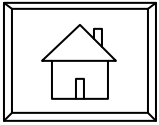
# PBS Digital Videotape Plus





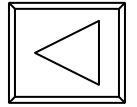
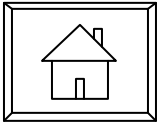
# Early Adopters

- Early Adopters of DTV
  - Pay Big \$ for sets
- Bonanza First Color TV show
  - Needed program to showcase and sell the new color sets



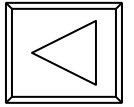
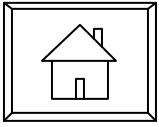
# B&W, Color

- First Came B&W
- Color had to fit in 6Mhz bandwidth so it would be compatible with B&W
- This Analog Color System is known as NTSC (United States Japan)
  - 30 Frames Per Second
  - Interlaced



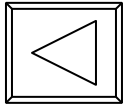
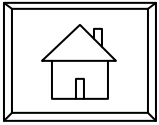
# Interlaced Scanning

- Interlaced Scan
- Used in NTSC Video
  - Scans Odd lines 1<sup>st</sup> (1, 3, 5 Etc)  
(1/2 Picture) aka Field
  - Then Scans Even Lines (2, 4, 6 Etc)  
(1/2 Picture) aka Field
  - Puts 2 Fields together to make 1 FRAME



# Progressive Scanning

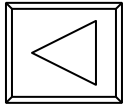
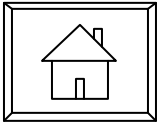
- Progressive Scan
- Used in Computers
  - Scans lines in order
    - (1,2,3, 4 Etc)



# Other Analog Standards

- Other Analog Video Standards
  - PAL – Europe
  - SECAM – France & Former Soviet Union

**TV STANDARDS LINK**

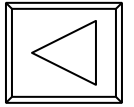
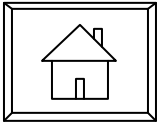


# Film

- Film

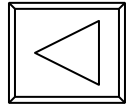
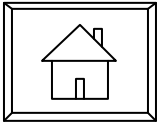
- 24 Frames/Second





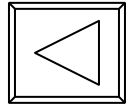
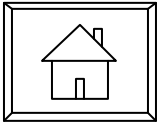
# DTV Compatibility

- DTV is NOT compatible with NTSC Analog TV
- Can't Receive DTV with NTSC set
  - May have converter DTV to NTSC
    - What's the point?
    - Use your Old TV when NTSC Goes Away



# DTV Receivers

- Need to have a “Digital TV receiver”
  - May have a built in “Decoder Box”
  - May be “Digital Ready”
    - Capability to accept and “External Box Later”
    - May be able to Receive NSTC Video, but is capable of the higher DTV Scanning Rates



# Aspect Ratio

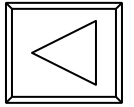
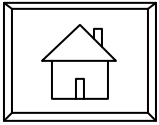
## ● Aspect Ratio

16:9

4:3

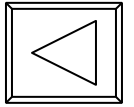
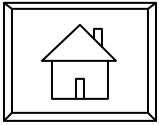


*The Tonight Show* is being telecast simultaneously in both 16:9 HDTV (left) and 4:3 NTSC (right). The dual-path production is going through some growing pains typical of any pioneering program. The NTSC "overscanned," off-air image now often shows two-shots tighter than before.



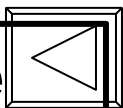
# 16:9 to 4:3 Conversion

- To Fit 16:9 on a 4:3 Screen
  - Chop Off Sides
  - Shrink Picture (Letterbox)

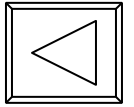
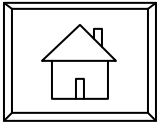


# Multiple DTV Formats

- Formats for DTV
- Multiple formats
- **NOT ALL ARE HIGH DEFINITION**
  - **1,080, 720 considered High Def**

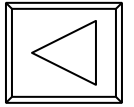
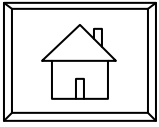


	<b>Vertical Size</b>	<b>Horizontal Size</b>	<b>Aspect Ratio</b>	<b>Frame Rate &amp; Scan</b>
<b>HD</b>	1,080	1,920	16:9 (Square Pixel)	24p, 30p, 30i
	720	1,280	16:9 (Square Pixel)	24p, 30p, 60p
<b>SD</b>	480	704	4:3 (Non- Square Pixel)	24p, 30p, 60p, 60i
	480	704	16:9 (Non- Square Pixel)	24,p, 30p, 60p, 60i
	480	640	4:3 (Square Pixel)	24p, 30p, 30i, 60i

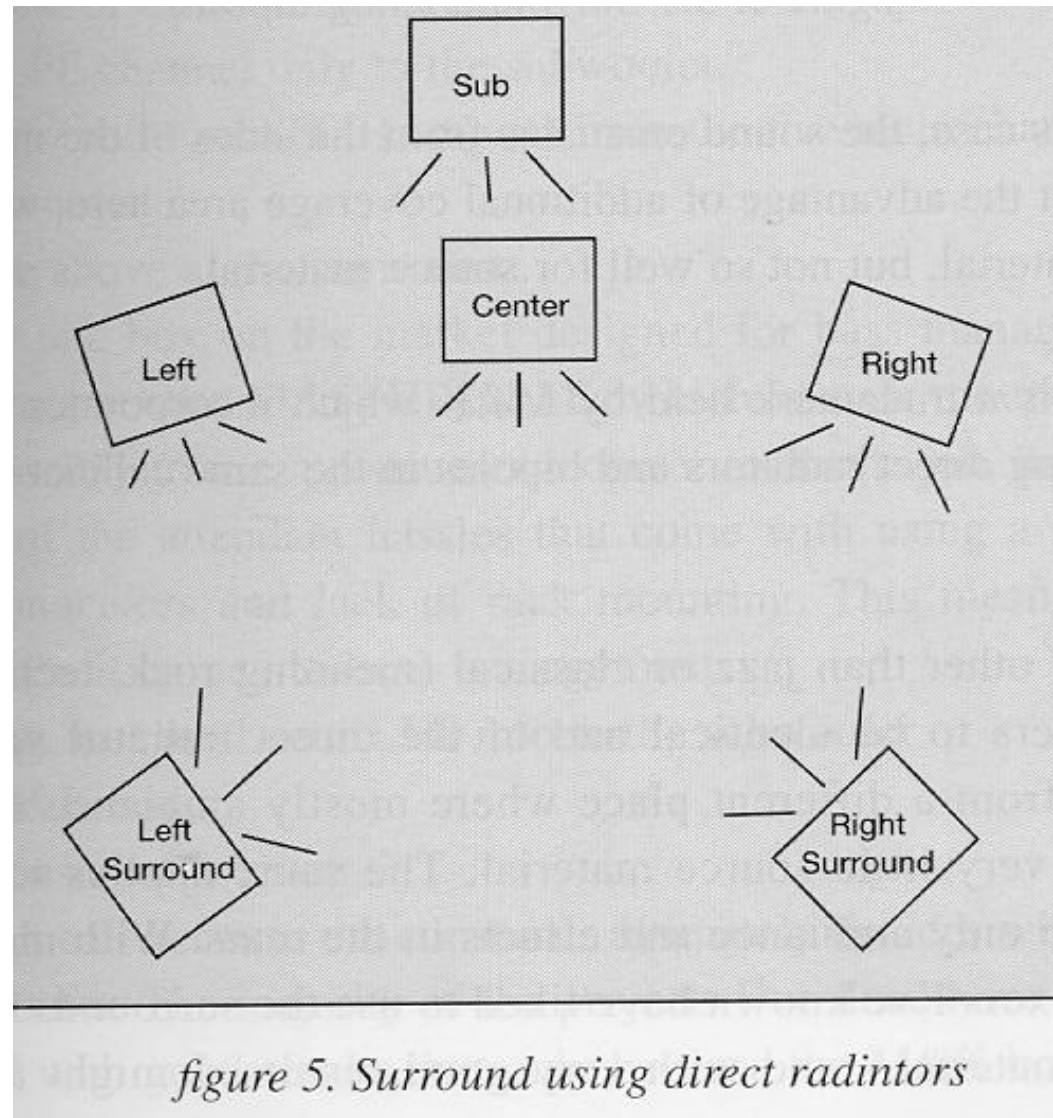


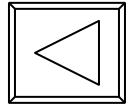
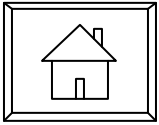
# 5.1 Audio

- Audio 5.1
- Dolby Digital (AC3 Surround)
  - Front Left
  - Front Right
  - Front Center
  - Rear Left
  - Rear Right
  - Subwoofer (.1)

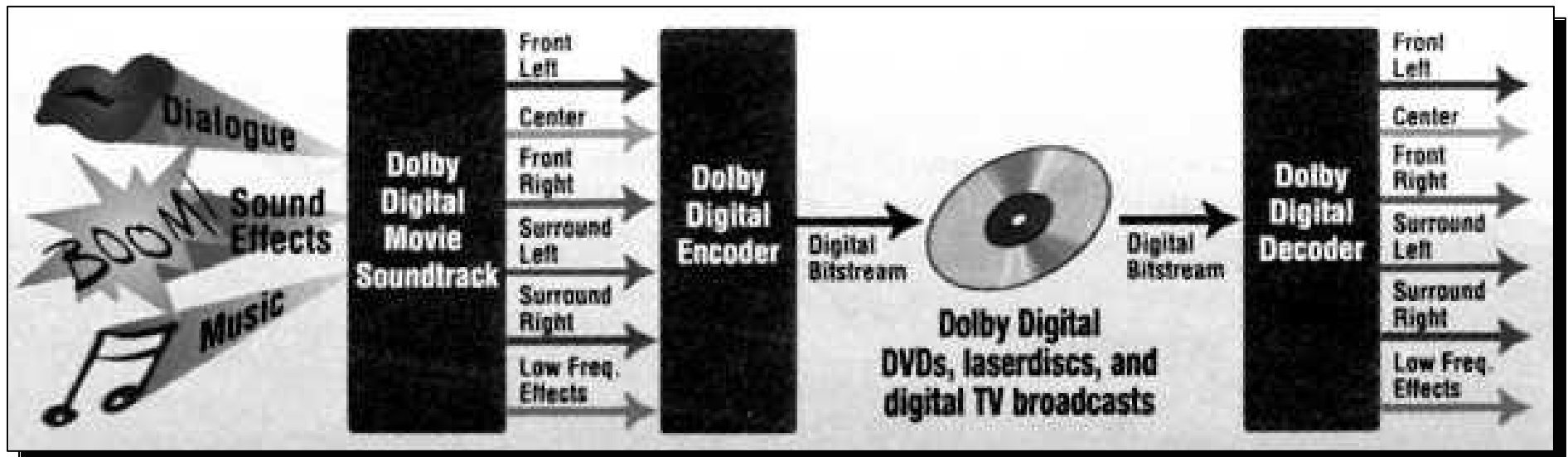


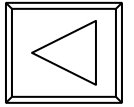
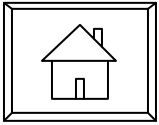
# 5.1 Audio





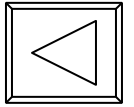
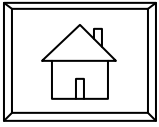
# 5.1 Audio





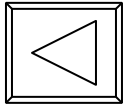
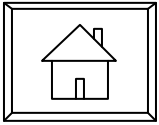
# Data on DTV

- DTV not only Picture and Sound
  - Data
    - Newspapers
    - Stock Quotes
    - Internet
    - ETC



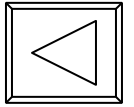
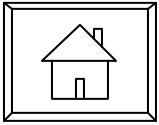
# Enhanced TV

- Enhanced TV
  - Other Stuff
    - Links
    - Floor plan
    - Bill of Materials
    - Wine List
    - Etc



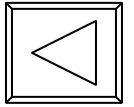
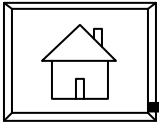
# Multi-Casting

- Multicasting
  - 1 HDTV Signal
- Or
- Up to 4 Standard Def. DTV Channels



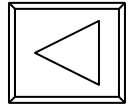
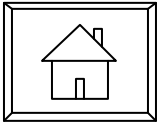
# Transmission NTSC/DTV

- TV Stations will be broadcasting in BOTH NTSC and DTV for a while
  - Different Channel Numbers
  - Madison WKOW
    - 27 NTSC
    - 26 Digital



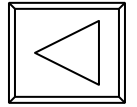
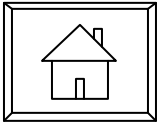
# Transmission / Upconverting

- Not all source material was produced in digital formats so it must be “UPCONVERTED” to digital
- Networks may “Pass On” Digital Programming to Affiliates
- At first very little local DTV production



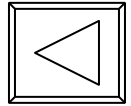
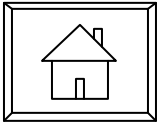
# Transmission-Timeline

- **ABC, CBS, FOX, & NBC  
Must Broadcast DTV:**
- **10 largest markets by May 1, 1999**
- **11-30 markets by November 1, 1999**
- **All commercial stations by May 1, 2002**
- **All noncommercial educational stations  
must start by May 1, 2003**



# DTV Transmission-Timeline

- Stations are allowed two six-month extensions just by filing a request. Any additional extensions must be granted by the full FCC Commission.
- **In theory, analog TV will be shut down in 2006**
- Depends on how many people still rely on their analog TVs-which can get **DTV with a set-top box**)



# DTV Transmission-Timeline

## FRAME GRAB

A look at consumer side of DTV.

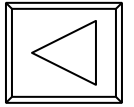
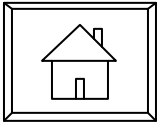
### Will NTSC ever die?

Without government rules or encouragement for multi-room video distribution, analog TV will be with us for another 25 years.

### US DTV Receiver Sales Forecasts Annual Shipments

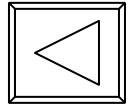
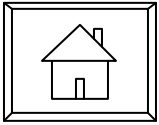
1999 .....	130,000
2000 .....	290,000
2001 .....	470,000
2002 .....	750,000
2003 .....	1,200,000
2004 .....	1,700,000
2005 .....	2,400,000

SOURCE: Strategy Analytics [www.strategyanalytics.com](http://www.strategyanalytics.com)



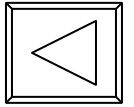
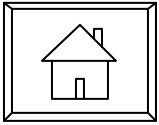
# DTV Transmission-Links

- Digital TV Channel Allotments for the USA
- DTV Stations on the Air
- Top 10 Markets' DTV Status
- Top 11-30 Markets' DTV Status



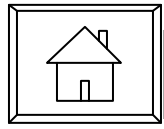
# Transmission

- All SDTV source material will suffer when upconverted to HDTV, compared with material originated in HD to begin with.
- 4:1:1 material is reported by some to be problematic in this aspect; certainly a 4:2:2 original will be more forgiving
- If upconversion is your primary goal, you may want to look closely at D-9 (Digital-S) or DVCPRO50

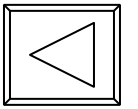


# Transmission

- ATSC Standard in a nutshell
- [http://www.broadcastengineering.com/html/2000/april/columns/00\\_04\\_atsc\\_standard.htm](http://www.broadcastengineering.com/html/2000/april/columns/00_04_atsc_standard.htm)



Panasonic/ABC 720P HDTV



Truck

HDTV Truck at Lambeau Field

