

2009

Digital Television Information Guide

A legendary video engineer in K-12 education since 1980, Timothy R. Beekman, President of SAFARI Montage, is sought-after by the leading school districts in the country for advice on integrating digital video networking technology in the classroom.

SAFARI Montage

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What Is Digital Television? (DTV)

According to the Federal Communication Commission, Digital Television is “an advanced broadcasting technology that will transform your television viewing experience.”

Digital Television allows broadcasters to offer increased sound and picture quality, while providing multiple programming choices. Broadcast spectrum is a scarce resource; converting to DTV will not only “free up” some of the spectrum, but would also provide a necessary resource for services such as public safety and advanced wireless services. (Federal Communications Commission, 2008)

Advantages of Digital Television

Digital Television has several advantages:

- Better picture quality regardless of display size.
- A digital signal can support a higher resolution, so the picture will still look good when shown on a larger TV screen.
- The video can be progressive rather than interlaced (the screen shows the entire picture for every frame instead of every other line of pixels).
- TV stations can broadcast several signals using the same bandwidth; this mechanism is known as multicasting.
- Interactive content or additional information can be incorporated in any broadcast that uses a DTV signal.
- It can support high-definition (HDTV) broadcasts.

Cost and Challenges Associated With Switching to Digital Television

Digital Television also has several challenges to overcome:

- Technical difficulties (analog TVs can't decode and display digital signals).
- Network Costs

- Consumer costs
 - Replacement of analog equipment (analog TV sets).
 - Purchase converter boxes.

(Grünwald, 2001)

Quality Levels of Digital Television Programming

Digital television can be categorized by quality. The most common categories are Standard Definition, Enhanced Definition and High Definition, with High Definition being the top tier of all digital signals.

- **Standard Definition TV (SDTV)** - SDTV is the basic level of quality display and resolution for both analog and digital. Transmission of SDTV may be in either the traditional (4:3) or widescreen (16:9) format.
- **Enhanced Definition TV (EDTV)** - EDTV is a step up from Analog Television. EDTV comes in 480p widescreen (16:9) or traditional (4:3) format, and it provides better picture quality than SDTV, but not as high as HDTV.
- **High Definition TV (HDTV)** - HDTV in widescreen format (16:9) provides the highest resolution and picture quality of all digital broadcast formats. Combined with digitally enhanced sound technology, HDTV sets new standards for sound and picture quality in television. (Note: HDTV and Digital TV are not the same thing — HDTV is one format of Digital TV.) (Federal Communications Commission, 2008)

Digital Television vs. High Definition Television

The Advanced Television Standards Committee (ATSC) has set voluntary standards for Digital Television. These standards include how sound and video are encoded and transmitted. They also provide guidelines for different levels of quality. All of the digital standards are better in quality than analog signals. The ATSC has created 18 commonly used digital broadcast formats for video. The lowest quality digital format is about the same as the highest quality an analog TV can display. The 18 formats cover differences in:

- **Aspect ratio** - Standard television has a 4:3 aspect ratio, it is four units wide by three units high. HDTV has a 16:9 aspect ratio, more like a movie screen.
- **Resolution** - The lowest standard resolution (SDTV) will be about the same as analog TV and will go up to 704 x 480 pixels. The highest HDTV resolution is 1920 x 1080 pixels. HDTV can display about ten times as many pixels as an analog TV set.
- **Frame rate** - A set's frame rate describes how many times it creates a complete picture on the screen every second. DTV frame rates usually end in "i" or "p" to denote whether they are interlaced or progressive. DTV frame rates range from 24p (24 frames per second, progressive) to 60p (60 frames per second, progressive).

Many of these standards have exactly the same aspect ratio and resolution but, their frame rates differentiate them from one another. (Wilson, 2001)

DIGITAL TELEVISION FACTS AT A GLANCE		
Analog	DTV	HDTV
<ul style="list-style-type: none"> • Date for final transition to digital may be February 17, 2009. (This date is subject to change due to the recent recommendation by President Barack Obama for a delay.) After that date, full-power stations will only broadcast digital signals. • Consumers will always be able to connect an inexpensive receiver, a digital to analog converter box, to their existing analog TV to decode DTV broadcast signals. • Digital to analog converter boxes will not convert your analog TV to high-definition. • Analog TVs will continue to work with cable, satellite, VCRs, DVD players, camcorders, video game consoles and other devices for many years. 	<ul style="list-style-type: none"> • Digital cable or digital satellite does not mean a program is in high-definition. • Digital pictures will be free from the "ghosts" and "snow" that can affect analog transmissions. • Multicasting is available. • HDTV is available. • Data streaming is available. 	<ul style="list-style-type: none"> • High-definition broadcasts offered. • Best available picture resolution, clarity and color. • Dolby theatre surround-sound. • Dolby surround-sound. • Wide screen "movie-like" format.

(Federal Communications Commission, 2008)

Digital Resources

ATSC Digital Television Standards

The Advanced Television Standards Committee has mandated several standards for digital television, some of which are listed below. (ATSC, 2007)

**ATSC Digital Television Standard
Part 1 - Digital Television System
(A/53, Part 1:2007)**

http://www.atsc.org/standards/a_53-Part-1-2007.pdf

**ATSC Digital Television Standard
Part 2 - RF/Transmission System Characteristics
(A/53, Part 2:2007)**

http://www.atsc.org/standards/a_53-Part-2-2007.pdf

**ATSC Digital Television Standard
Part 3 - Service Multiplex and Transport Subsystem
Characteristics
(A/53, Part 3:2007)**

http://www.atsc.org/standards/a_53-Part-3-2007.pdf

**ATSC Digital Television Standard
Part 4 - MPEG-2 Video System Characteristics
(A/53, Part 4:2007), with Amendment No. 1**

http://www.atsc.org/standards/a_53-Part-4-2007-w-Amend-1.pdf

**ATSC Digital Television Standard
Part 5 - AC-3 Audio System Characteristics
(A/53, Part 5:2007)**

http://www.atsc.org/standards/a_53-Part-5-2007.pdf

ATSC Digital Television Standard
Part 6 - Enhanced AC-3 Audio System Characteristics
(A/53, Part 6:2007)
http://www.atsc.org/standards/a_53-Part-6-2007.pdf

Online HD Video Streaming

Below is a listing of High Definition resources that can be found online. (Carta, 2008)

- **Apple** - Provides an excellent HD Video section with plenty of movie trailers, music videos and more.
- **Microsoft**- Added support for HD Video to their Windows Media player. Their WMV HD showcase has plenty of IMAX clips in HD as well as some movie trailers.
- **SmoothHD** - This is a joint effort from Microsoft and Akamai for delivering HD content over HTTP with the help of SilverLight as part of the Open Video Player initiative.
- **Hulu** - Offers an extensive HD gallery of movies. There are full-length feature films you can experience in HD for free.
- **Adobe** - Added HD support to their Flash player technology.
- **YouTube** - Plays high quality video if it's available and if you have a fast Internet connection.
- **NASA** - Extensive collection of HD space exploration videos.
- **NY Times** - The popular newspaper has recently launched an HD Video Portal based on Brightcove's player.

Broadcast TV Channels in HD

- **CBS** - Maintains a wide selection of HD Videos you can watch in their entirety, such as CSI: NY, The Amazing Race and many more.
- **ABC** - Streams many of their shows online in HD. Requires you to install a small movie plug-in for your browser.

- **NBC** - NBC streams their shows online in HD. Keep in mind that not all of their video content is in HD format. Look for the HD symbol next to the show name to verify. Also, you can download many shows in HD from their NBC Direct service for free.

HD TV Resources

- **Boxee.TV** - Software that lets you connect video sites to your HDTV so you can enjoy HD video on your big screen.
- **Vudu** - Set-top Box that allows you to watch a slew of HD and HDX video instantly from an online selection.
- **AppleTV** - Apple also provides a set-top box that lets you play HD movies, TV shows and more.
- **XBox 360** - Microsoft has a set-top box that plays HD Video content such as movies and TV shows.
- **Tivo HD** - The new line of Tivo boxes support HD and Internet access, which means you, can stream HD video from online services such as YouTube and NetFlix.

Works Cited

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