



The past – analog

- Obsolete
- Static, snow and ghosts
- Limited choices
- Mono or stereo sound only
- 4:3 standard screen



The future – DTV

- Interactivity
- Better picture
- Dolby Digital AC-3 sound
- Multiple audio tracks
- Up to four video streams per channel
- 16:9 widescreen

A GUIDE TO DIGITAL TELEVISION (DTV)

What is DTV?

The jump to DTV is even more significant than the change from black-and-white to color. DTV is more than just a new kind of TV set, and more than just high definition (HDTV) programs. DTV is a new way to broadcast and receive TV that gives you a better picture, better sound and more choices than ever before.

Depending on what you're watching and what kind of equipment you have, digital television may enhance your viewing experience in any number of ways. You may see movies or sports in stunning HDTV resolution on a 16:9 widescreen with Dolby Digital sound. Every DTV program you watch will have DVD-quality pictures without any snow, ghosts or static. Some programs may offer multiple audio tracks, and some TV stations may offer up to four programs on a single channel. And others will give you access to interactive content, for learning more about your TV show, shopping online and more. The possibilities are endless.

In this guide, we'll show you everything you need to know about DTV, including receiving DTV and HDTV broadcasts; choosing a digital television set; picking the right set-top box; and exactly what the FCC has to say about DTV. The good news is DTV is affordable, available and easier to understand than you ever thought possible.

WHY SWITCH TO DTV?

Pure, clear, digital picture

What excites people most about DTV is its brilliant picture quality. There are several reasons why DTV images are so much crisper and clearer:

1. DTV broadcasts are fully digital, so there's never any analog interference such as static, snow or ghosting like you get with analog TV transmissions.

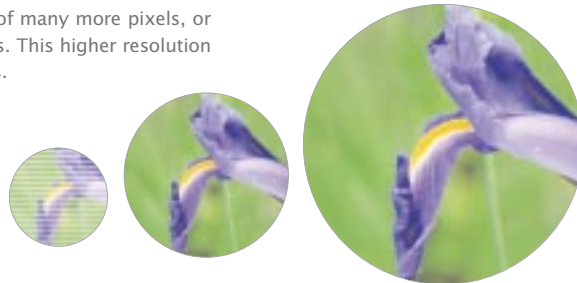


Analog picture distorted by snow, ghosts and static



Crystal-clear DTV picture

2. DTV images are often comprised of many more pixels, or picture elements, than analog images. This higher resolution creates sharper, more precise images.



Analog (NTSC)

SDTV (Digital)

HDTV (Digital)

3. Many DTV programs are "progressive scan" (as denoted by the "P" in 480P). This means that every pixel on the screen is refreshed simultaneously, for a flicker-free image. Progressive scan makes text more legible and fast-motion video smoother than on analog TVs with "interlaced" scan. Interlaced scanning (e.g., the "i" in 480i) involves refreshing pixels in alternation – first the odd lines, then the even lines. As a result, only half of the pixels on screen are "active" at any given moment.



Interlaced scan



Progressive scan

4. Digital TV sets are capable of displaying the true digital picture and sound without down-converting the signal as analog TVs do. Digital TV sets are even capable of making most analog signals look better, by doubling the lines of resolution to a progressive scan image, and through the use of digital filters that remove the unwanted artifacts that can degrade an image.

DTV, SDTV, HDTV – What does it all mean?

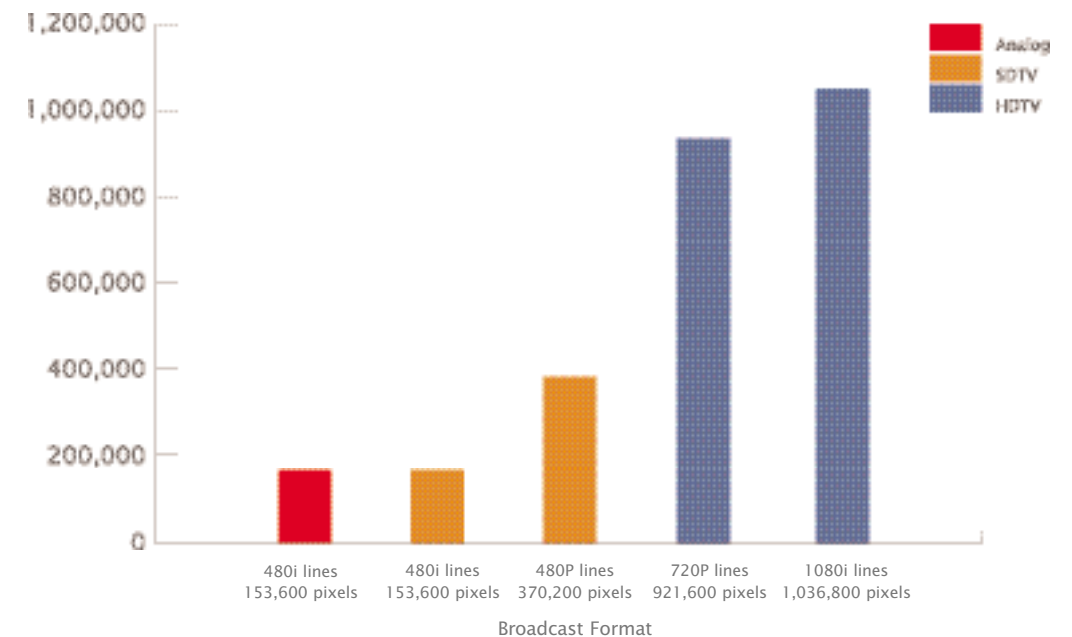
DTV is actually an umbrella term that describes any TV signal that is digital. There are two main types of DTV that you need to know – standard definition (SDTV) and high definition (HDTV). The main difference between them is that HDTV has many more pixels and much greater resolution.

HDTV is the most robust and detailed TV image you can have. It's even sharper than a DVD. Depending on the format, an HDTV image can have more than 1,000,000 active pixels. HDTV has a minimum resolution of 1280 x 720 pixels progressive scan (720P) or 1920 x 1080 pixels interlaced (1080i).

Standard definition TV can have either the same resolution (about 150,000 active pixels) or double the resolution of analog TV, depending on whether it is presented as interlaced (same) or progressive (double) scan. But SDTV outshines analog TV because it is not prone to static, snow and ghosts the way analog is. SDTV can also be either 4:3 standard aspect ratio or 16:9 widescreen.

Number of Active Pixels

Resolution by Active Pixels



Multicasting

HDTV images are so big that one HDTV signal takes up as much bandwidth as several SDTV signals. So by broadcasting smaller, SDTV programs, TV stations can pack up to four different streams of video into a single channel. This is called “multicasting” and it opens up a whole range of broadcast possibilities. For example, a broadcaster could cover an event from several angles and let you pick which one to watch.



Multicasting allows you to choose from up to four images on the same channel

Datacasting

DTV will allow you to interact with your television much like you do the Internet. Through minor data channels that are broadcast along with the video and audio tracks, you’ll be able to see related Web pages, find out what song is playing in the background and even order the CD on-line from a Web-enabled TV.



Datacasting allows broadcasters to “supplement” a TV program with information screens similar to Web pages.

Better sound

DTV programs can include up to six channels of Dolby Digital sound instead of NTSC’s two plus a second audio program (SAP). If you have a Dolby Digital home theater or TV set, you will be able to enjoy full Dolby Sound.

Dolby Digital 5.1 is one of the standards for digital home theater systems and DVDs. To create 360° of surround sound, the audio signal is split into 5 channels with an additional subwoofer signal (that’s the “.1”). The channels are Front Left, Front Right, Center, Rear Left and Rear Right.



Explosive growth of HDTV programming

There’s already a lot of HDTV out there – with more on the way every day. From movies and prime-time programs to talk shows and sports, many major networks are already shooting and broadcasting high definition TV. Here’s a quick list of what’s being broadcast in high definition:



All filmed prime-time shows, NCAA college football, college basketball, golf and tennis championships, and movies – Format 1080i



Filmed prime-time shows, *The Tonight Show With Jay Leno*, and *Late Night with Conan O’Brien* – Format 1080i



Filmed prime-time shows and many movies; sports in 2003, including the Super Bowl, Stanley Cup, NBA Finals and Monday Night Football – Format 720P/Dolby Digital 5.1



Several prime-time filmed programs – Format widescreen 480P, some with Dolby Digital 5.1



Numerous prime-time specials and documentaries – Format 1080i, some with Dolby Digital 5.1



Some movies and live concerts/specials – Format 1080i



Selected baseball, arena football, hockey, and lacrosse games – Format 1080i



Programming from Discovery Channel, The Learning Channel, Animal Planet, Travel Planet and Discovery Health Channel – Format 1080i



(starting April 2003): Select games from Major League Baseball, NBA, NFL and NHL; college championship events; original programming – Format 720P



Four prime-time shows – Format 1080i

The end of analog TV

The FCC has mandated that as of January 1, 2007, all analog commercial TV broadcasts are scheduled to stop, provided 85 percent of all homes with televisions are capable of receiving DTV.

Will it happen on schedule? Probably not, but the switch to DTV is inevitable. After the changeover, all analog TVs will become obsolete because all broadcasting will be digital. You’ll still be able to use your old analog TV by hooking up a digital set-top box (your TV must have A/V inputs), but you won’t be experiencing true digital picture and sound.



HOW DO I GET DTV?

As easy as 1, 2, 3!

Getting digital TV is easy. There are three things that you need to view true, all-digital DTV: First, you need a digital source such as over-the-air broadcast, digital satellite or digital cable. Second, you need a set-top box to receive, tune and decode the signal. Third, you need a digital TV to display the brilliant digital picture and sound.

1



Digital source

2



Digital set-top box

3



Digital TV monitor

Taking it step by step

The good news is you don't have to upgrade to DTV all at once. You can view a DTV source on an analog TV by connecting a digital set-top box. Or you can get a DTV set, which will give you the most from every source you watch – then add a set-top box and digital source later. If you have a progressive scan DVD player, you'll immediately notice the difference that DTV makes.

1. Digital TV sources

Free over-the-air DTV broadcasts

Free over-the-air (OTA) HDTV broadcasts are already available to most TV viewers in the United States. It's very likely that your existing outdoor TV antenna or a small indoor antenna will be all you need to receive free DTV signals. With OTA DTV reception, you don't pay a monthly or per-program charge to watch TV – the broadcasts are free.



Digital satellite service

You can receive DTV with a direct broadcast satellite (DBS) dish and DTV satellite receiver. Though you will have to pay a monthly fee, digital satellite service can provide you with hundreds of channels of digital picture, Dolby Digital sound and interactive features like on-screen program selection. Most DTV satellite programming is SDTV, but some channels or special events are presented in HDTV (check with your provider).



Digital cable

Another way to receive DTV programs is via digital cable TV service. Digital cable service is being rolled out across the United States, and several cable service providers are now adding HDTV program channels to their standard digital cable channels. If you have cable TV service, your cable provider may already be carrying digital SDTV and HDTV signals. Your digital cable provider will supply you with a proprietary digital set-top box for decoding its service. You are typically billed each month for the rental of this unit.



Getting both Satellite DTV and OTA HDTV

Receive both digital satellite SDTV and HDTV broadcasts with Samsung's T160, a DTV set-top receiver that combines and DIRECTV® and OTA reception. You will also need a second satellite antenna and LNB to receive DIRECTV® and HDTV programs.

2. The set-top box

Why you need a set-top box

DTV signals are broadcast in a variety of ways by different providers. For example, an HDTV signal and a digital satellite broadcast are very different, and must be received and decoded differently. That's where a set-top box (STB) comes in. Each STB is designed to receive and decode a different type of broadcast. Most DTVs require the addition of an STB because it would be too costly to equip them with tuners and decoders for every type of broadcast. It wouldn't make sense to pay for a TV with a satellite receiver if you're only planning on getting over-the-air HDTV. That's why you'll see terms like "HDTV monitor" or "HDTV upgradable." This means that the TV is capable of displaying true HDTV, but it does not have a built-in HDTV tuner.



Samsung HDTV Tuners:
SIR-T151 and SIR-T165



Samsung-DIRECTV®
Multi-Satellite Receivers:
SIR-S70 and SIR-S75



Samsung All-In-One DIRECTV®
and HDTV Tuner: SIR-TS160

Three types of set-top boxes

1. HDTV tuners
Tune and decode free over-the-air HDTV and DTV signals with an antenna.

2. DIRECTV® receivers
Tune and decode digital satellite signals with a satellite dish.









3. All-in-one receivers
Tune and decode both over-the-air and satellite DTV and HDTV signals. Requires both a satellite dish and an antenna.

Connecting a set-top box

There are myriad ways to connect your digital set-top box to your TV. Some of the top-of-the-line set-top boxes even offer fully digital DVI and FireWire™ (IEEE-1394) video outputs and optical Dolby Digital 5.1 audio outputs.



Rear panel jacks*

-  **DOLBY DIGITAL OUT (OPTICAL)** – Use to connect the Digital Audio input of your TV or audio component.
-  **DOLBY DIGITAL OUT (COAXIAL)** – Use to connect the Digital Audio input of your TV.
-  **RESOLUTION SELECT SWITCH** – Switches between 1080i (interlaced scanning), 720P (progressive scanning), 480P (progressive scanning), and 480i (interlaced scanning) formats.
-  **DTV OUT (RGB FORMAT)** – You can connect RGB to a TV, computer monitor or another video component input. 1080i, 720P, and 480P are available by setting the RESOLUTION SELECT switch.
-  **COMPONENT VIDEO INPUT (YPBPR FORMAT)** – 480i/480P are available by setting the RESOLUTION SELECT switch.
-  **DTV OUT COMPONENT (YPBPR FORMAT)** – You can connect YPBPR to a TV, computer monitor or another video component input. Like DTV OUT (RGB format), 1080i, 720P and 480P are available by setting the RESOLUTION SELECT switch.
-  **DVI OUT** – It's pure digital all the way. So instead of alternating from analog signals to digital signals, the T165 is a purely digital connection.
-  **FIREWIRE™ INPUT/OUTPUT** – Use to connect external devices (D-VHS, HDD, etc.).

*Image shows Samsung SIR-T165 HDTV Tuner. Terminals vary by manufacturer.

3. Digital television monitors

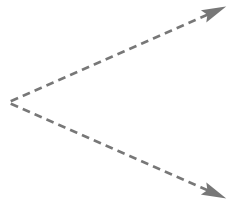
Get the best TV experience possible

Digital TV monitors are clearly the best choice when it comes to buying a new TV. They represent the state of the art in technology, features, sound and picture. Only DTV monitors are capable of displaying digital sources in their native format – the way they were meant to be seen. For example, if you have a progressive-scan DVD player, it can send out a 480P signal. If you connect it to an analog TV that can only handle 480i, you're missing half the picture quality! By connecting your progressive-scan DVD player to a DTV that can handle 480P, you'll be able to see DVD content with the highest possible picture quality.

Only a digital TV with progressive-scan capabilities can show your digital sources with the highest possible picture quality.



DVD player with progressive-scan capabilities.



DTV: 480P



Analog TV: 480i

DTVs even make analog TV better

Digital TV monitors can also make your analog sources, such as cable TV and VHS players, look better. All Samsung DTV monitors are equipped with Digital ProChip™, a progressive-scan line-doubling system that converts your analog TV signal into a crystal-clear, digital, progressive-scan image. Samsung DTVs also have digital filters that help to remove unwanted picture "noise," static and artifacts from analog images. Whatever you want to watch, a digital TV can give you the best possible viewing experience.

Widescreen versus standard screen

DTVs are available in both standard (4:3) and widescreen (16:9) picture aspect ratios. HDTV programs (which are always widescreen) viewed on a standard display are letterboxed. The widescreen picture fills the width of the frame and black bars are seen on top and bottom. Similarly, when standard TV programming is viewed on a widescreen display, it may appear with a vertical black bar on each end of the screen.



Widescreen – 16:9 aspect ratio



Standard – 4:3 aspect ratio



Standard programming viewed on a widescreen display



Widescreen programming viewed on a standard display

Watching DTV on an analog set

Depending on the analog TV set you own, you may be able to view a digital source, but it will be downgraded in picture quality. You can add a digital set-top box to an analog TV (if it has A/V inputs), but you will not be getting digital picture or sound. The digital signal will be downgraded due to the limitations of your set. You also won't be able to watch 16:9 widescreen DTV broadcasts unless your set has a letterbox viewing mode.

SAMSUNG'S LINE OF HDTV MONITORS

Samsung's HDTV monitors are sleek and beautiful. They're available in 16:9 widescreen and include the latest features and powerful, integrated sound systems.

Plasma

The future of TV has arrived in the form of plasma flat panel TV. Stunning big picture quality executed in an amazingly thin and light TV is achieved with the new Samsung plasma models. Samsung's 63" is also the largest widescreen plasma TV you can buy. Available in 42", 50" and 63" widescreen models.



DLP™

Samsung is the first to market with these advanced new DLP™ (Digital Light Processing) micro-display panels. DLP™ is the leading display technology for products like small portable conference room projectors, the professional venue entertainment systems, and the more recent DLP™ Cinema Theater projectors that are revolutionizing the movie theater experience. Available in 43", 50" and 61" widescreen models.



LCD

Put TV in its place with Samsung's line of digital LCD TVs. They're even PC-capable, so you can hook up your computer and surf the Web while you watch TV. Available in 15", 17", 28" and 40" standard and widescreen models.



Rear-projection

Get the big picture with Samsung's rear-projection HDTV upgradable TVs. Incredible brightness, contrast and great features make these projection TVs the best in the business. Available in 54" and 62" standard and 47", 55" and 65" widescreen models.



DynaFlat

Affordable and beautiful, these fully digital, direct-view sets offer a host of cutting-edge features. Available in 27" and 32" regular screen, and 30" widescreen models.



CHOOSING AN ANTENNA FOR DTV PROGRAMMING

There are many different types of antennas on the market for receiving both DTV and traditional analog TV. You'll need to get the correct type of antenna for the area in which you live. Your local store probably offers antennas that are appropriate for your area. Over-the-air (OTA) digital TV broadcasting uses the same channels as analog TV along the UHF and VHF bands. So if you have a TV antenna, it may work well for receiving DTV signals. For extra gain with weak signals, a small preamplifier can be added at the antenna terminals to boost signal levels and minimize noise.



Most antennas can be installed in attics or overhead crawl spaces, if there isn't too much foil insulation or metal roofing material present.

Yagi or log periodic

Typically used for reception over long distances. This type of antenna is directional and works best when aimed at the TV station's antenna. These antennas also have the ability to minimize unwanted signals that are received from the rear or either side of the antenna. You can use a rotator to turn the antenna for best reception, or simply mount it permanently.



Omnidirectional

For locations where digital TV signals come from more than one direction. These antennas are often shaped like a disc or a loop, and some are "powered" designs that incorporate a preamplifier for weak signals.



Bow-tie

More directional than a disc or loop antenna, but doesn't have quite as much gain as a yagi or log periodic design. Used for reception of UHF signals that may come from two or more directions no more than 90° apart.

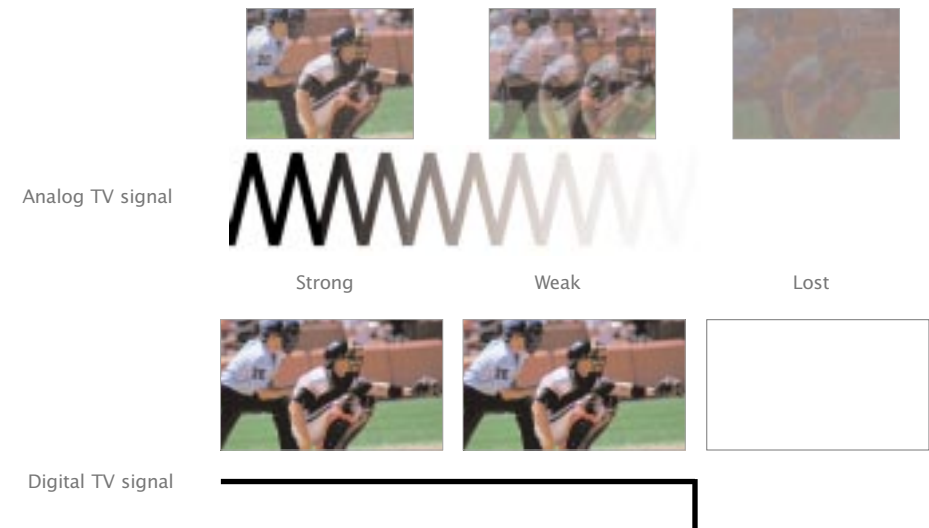


A crisp, clear, HDTV picture with an antenna

If the word antenna makes you think of static, snow and generally poor picture – fear not! DTV is different. The clear benefit of DTV is that the strength of the signal needed to produce high-quality images and sound can be lower than with analog TV receivers. Because they are digital, even weak DTV signals can easily be restored to their original quality and strength by your DTV set-top box.

The DTV signal is always perfect if it is received. Why the "if"? That's because of a characteristic of digital transmission known as the "cliff effect." Unlike analog transmissions, which get progressively weaker the farther the signal travels from the TV station, digital transmissions simply stop if the signal becomes too weak or is interrupted. This happens so quickly, it's as if the digital signal had fallen off a cliff.

As a result, you won't get any images or sound if your antenna is too far away from the transmitter. Frequent DTV signal drop-out can occur in areas with lots of buildings, hills or objects that cause signal reflections (known as multipath).



The cliff effect – As analog signals get weaker, the picture degrades. Digital signals remain crisp and clear until the signal is lost completely.

The Telecommunications Act of 1996 allows residents of condominiums, townhouses, or members of neighborhood associations to put up outside antennas for reception of broadcast TV signals as long as those antennas are not located in "common" areas and do not exceed 12 feet in height.

GLOSSARY

Aspect Ratio – The ratio of a TV picture's width to its height. Our current system uses a 4:3 aspect ratio, whereas HDTV uses a wider 16:9 aspect ratio.

Datacasting – A technique by which additional program data or interactive information is transmitted along with a program, such as catalog pages or even Web content.

DBS – Direct Broadcast Satellite, such as DIRECTV® or Dish Network.

8VSB – The signal modulation system used for OTA digital TV.

HDTV – High definition television. HDTV pictures have 720 or 1080 lines and are always widescreen.

Multicasting – A technique by which two or more minor channels (programs) are simultaneously broadcast on one major channel.

Multipath – A condition where one or more echoes or reflections of a TV signal interfere with or cancel out the original TV signal.

OTA – Over-the-air TV broadcasts.

PSIP – Program and System Information Protocol. This is the digital information transmitted by a DTV station that includes the time and date, major and minor channel numbers, and program information.

QAM – The signal modulation system used for digital cable TV.

SDTV – Standard definition television. These 480i or 480P signals have no more lines of detail than analog TV or DVDs, but can be presented in a widescreen format.

Additional information on digital TV

There are many places to find information and program listings. There are also informative newsletters and program guides to help you along. Here are some suggested Web sites:

www.samsungusa.com – Samsung Electronics Web site

www.ilovehdtv.com – HDTV Magazine, a daily HDTV program guide

www.antennaweb.com – Useful information on selecting antennas

www.projectorexpert.com – Information on antennas, receivers, TVs

www.cbs.com – CBS Network HDTV program schedules

www.pbs.org/dtv – PBS HDTV and SDTV program schedules

www.ce.org – Consumer Electronics Association Web site

www.nab.org – National Association of Broadcasters Web site

www.titantv.com – Information on antennas and active DTV stations

For more information, log on to www.samsungusa.com

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