

Delivering 3DTV to Viewers

The unique 3DTV standard for the world.



What is DVB-3DTV?

DVB-3DTV is the first delivery format for 'Plano-stereoscopic' 3D television developed by the DVB Project. It enables the left and right images needed to be delivered over existing HDTV infrastructures, including to viewers with existing HDTV set top boxes. DVB-3DTV can be used for cable, terrestrial and satellite broadcast and broadband channels. The 3DTV channel has approximately the same bit rate requirements as a compression-artefact-free HDTV channel.

To watch in 3D, viewers need a 3D display that provides the functionality required by the specification. DVB-3DTV is independent of the type of technology in the viewer's 3D display (polarisation-plane discrimination, display time-multiplexing, or autostereoscopic). The specification offers the option of signalling independent depth positioning for the sub-titles of different scene characters. This can be used with new set top boxes, or existing set top boxes that can be appropriately software-upgraded.

The DVB specifications relating to 3DTV form a suite of the following documents:

- DVB-3DTV specification (DVB BlueBook A154)
- DVB-SUB addendum for 3D subtitles (DVB BlueBook A156)
- DVB-SI service information (DVB BlueBook A38).

Background

Stimulated by the increasing popularity of 3D movies in the last decade, TV display manufacturers commercialised several techniques to allow two images to be directed to each of the left and right eyes, by a combination of screen arrangements and special viewer glasses. Large displays that achieve the same effect without the glasses are not yet available, but are expected in the coming years.

Interest in broadcast, cablecast, and broadband 3D-TV came initially from operators of Pay TV services who have a large installed base of set-top boxes. Their need was a system that would not disenfranchise the STBs. An analysis in the ITU and elsewhere identified a progression of technologies for delivering 3DTV, as technology evolves in the decades ahead. The DVB Project concluded that the initial need was for a 'Frame Compatible' system that would provide a 3D image of 'full colour' and be usable with (among other arrangements) existing set-top boxes.

How does it work?

3D-TV is the addition of depth or volume to television pictures. Today's systems provide two images (the 'left image' and the 'right image'), which are arranged to be seen by the corresponding left and right eyes of the viewer. The brain is 'tricked' to interpret the differences ('binocular disparity') in the images as depth in the picture, because it would see the same two images if the depth were really present.

The full colour 3D-TV broadcast in DVB-3DTV arranges for the left and right colour images to be geometrically compressed so that the two images fill the frame of a broadcast HDTV image – this is a 'spatial multiplex'. Two general forms of geometrical compression are used, called 'Side-by-Side' and 'Top-and Bottom'. This is called '**Frame Compatible Plano-Stereoscopic 3D-TV**'.

The DVB specification allows for eight combinations of formats and geometrical compression. Broadcasters throughout the world use different formats for programme production and broadcasting. The specification is intended for use throughout the world, and therefore includes options which will give, respectively, the highest resulting picture quality for 3D-TV viewers depending on the local HDTV production and broadcast formats used. The specification provides signalling to pass to the TV for the different forms. The TV 'unravels' the spatial multiplex appropriately, and arranges for the correct display of the left and right images.

2D or 3D? That is the question.

The DVB-3DTV specification provides a range of other signalling about the type of content (3D/2D) the channel provides, and to help transitions from 3D to 2D content. This signalling could be used to automatically switch the TV to 3D or 2D modes from programme to programme, without needing to press the dedicated 3D button on the remote control. The subtitle signalling allows the service provider to signal regions of the picture that will have different apparent depth locations in the scene. Subtitles can then be placed into these regions in order to display the subtitles in front of the character that is speaking.

In an informative annex, the specification also gives information on a way of instructing the receiver to show one of the two images as a 2D image, which may or may not be practical to use, depending on national circumstances. An alternative way of doing so, using an interactive application, may also be possible.

Market Deployment

Services using DVB-3DTV are already available in a number of countries (US, UK, France, Spain, Germany, etc.) by satellite or broadband. Initial terrestrial broadcasts were made in the UK in summer 2011. Many sporting events of world-scale are now shot in 3D and broadcast using the DVB-3DTV system. 3D-TV consumer displays are available throughout the world that can interpret the DVB-3DTV signals.

Next Steps

As identified by the ITU and others, 3D technology is likely to evolve over the next decades, and this may allow elements to be provided such as higher resolution images and the possibility of motion parallax with head movement. The DVB project is currently considering commercial requirements for future 3DTV systems, which will ensure DVB specifications match the capabilities of technological evolution.

On a more general note; With all 3D, special care must be taken with 3D-TV production grammar to minimise viewer eye-discomfort. Furthermore, many 3D displays advise viewers to be mindful of the potential eye discomfort.

www.dvb.org



3DTV demo using DVB-S2, DVB-T2 and DVB-C2 at the DVB stand at IBC 2010