



History of the DVB Project

(This article was written by David Wood around 2013.)

Introduction

The DVB Project is an Alliance of about [200 companies](#), originally of European origin but now worldwide. Its objective is to agree specifications for digital media delivery systems, including broadcasting. It is an open, private sector initiative with an annual membership fee, governed by a [Memorandum of Understanding](#) (MoU).

Until late 1990, digital television broadcasting to the home was thought to be impractical and costly to implement. During 1991, broadcasters and consumer equipment manufacturers discussed how to form a concerted pan-European platform to develop digital terrestrial TV. Towards the end of that year, broadcasters, consumer electronics manufacturers and regulatory bodies came together to discuss the formation of a group that would oversee the development of digital television in Europe.

This so-called European Launching Group (ELG) expanded to include the major European media interest groups, both public and private, the consumer electronics manufacturers, common carriers and regulators. It drafted the MoU establishing the rules by which this new and challenging game of collective action would be played.

The concept of the MoU was a departure into unexplored territory and meant that commercial competitors needed to appreciate their common requirements and agendas. Trust and mutual respect had to be established. The MoU was signed by all ELG participants in September 1993, and the Launching Group renamed itself as the Digital Video Broadcasting Project (DVB). Development work in digital television, already underway in Europe, moved into top gear.

Around this time a separate group, the Working Group on Digital Television, prepared a study of the prospects and possibilities for digital terrestrial television in Europe. The highly respected report introduced important new concepts, such as proposals to allow several different consumer markets to be served at the same time (e.g. portable television and HDTV).

How Does it Work?

The Members of the DVB project develop and agree specifications which are then passed to the European standards body for media systems, the EBU/CENELEC/ETSI Joint Technical Committee, for approval. The specifications are then formally standardised by either [CENELEC](#) or, in the majority of cases, [ETSI](#).

The Project is managed by the DVB Project Office, whose staff are employees of

the [European Broadcasting Union](#) in Geneva, Switzerland, but work exclusively in the interests of the members of the DVB Project. The Project has been very successful to date, and shows no signs of losing momentum. Nearly 1 Billion DVB receivers are now in homes throughout the world, many of them carrying the DVB logo, created by Phillip Juttens.

When the project began, each of the participating groups brought a particular expertise to the table. The EBU was able to use its experience in organising technical meetings and publications to help establish a framework within which the work of the Project could take place. Industry brought a key element: the belief that specifications are only worth developing if and when they can be translated to products which have a direct commercial value. Thus DVB specifications are 'market driven'. This conscious effort was probably then unique in the world of standardisation and has contributed greatly to the success of DVB standards.

The Secrets of Success

The following key elements have contributed to the success of the Project:

- The committee structure of the project is critical. The project is bicameral with the checks and balances it affords. The Commercial Module decides, without discussing how they should be achieved, what features or cost levels are needed to make a product a success. Then the Technical Module is set the task of creating a technical specification which meets these needs. Finally, after the specification is prepared, the commercial module checks the technicians have done what was needed.
- The Project is virtually entirely paper-less, with only one working language (English), and extensive use is made of Internet.
- The leadership of the groups is exceptional, and the chairs of the key modules over the years have ensured that the work of the Project has reached and maintained the highest of standards.

The Core Principles

The DVB Project began the first phase of its work in 1993. The project's philosophy was as follows:

- The initial task was to develop a complete suite of digital satellite, cable, and terrestrial broadcasting technologies in one 'pre-standardisation' body.
- Rather than having a one-to-one correspondence between a delivery channel and a programme channel, the systems would be 'containers' which carry any combination of image, audio, or multimedia. They would thus be open and ready for SDTV, EDTV, HDTV, surround sound, or any kind of new media which arose over time.

- The work should result in ETSI standards for the physical layers, error correction, and transport for each delivery medium.
- It should also result in an ETSI report which outlines the baseband systems which are options for carriage.
- Wherever possible there should be commonality across the different delivery platforms, to lower costs for users and manufacturers. Only when there was no other choice would there be differences between different delivery media.
- The DVB Project should not re-invent anything, and would use existing open standards whenever they are available.

The DVB Project has used and continues to draw extensively on standards from the ISO/IEC JTC MPEG. The transport for all systems is the MPEG2 Transport Stream. The DVB report giving candidates for baseband systems follows the systems developed by ISO MPEG.

For convenience, the final documentation is arranged with sets of hyphenated initials which identify the area. For example, DVB-S2 is the specification for the second generation version of the DVB digital satellite system. Other areas include DVB-S (the first generation version of the digital satellite system), DVB-C (the digital cable system), DVB-T (the digital terrestrial broadcasting system), DVB-H (bringing digital terrestrial broadcasting to battery-powered handheld receivers), DVB-DATA (the cyclical data delivery system), DVB-SI (the service information system), and DVB-MHP (middleware for interactive television).

DVB-S, DVB-C, and DVB-T

At the beginning of the 1990s, change was coming to the European satellite broadcasting industry, and it was becoming clear that the once state-of-the-art [MAC](#) systems would have to give way to all-digital technology. It became clear that satellite and cable would deliver the first broadcast digital television services. Fewer technical problems and a simpler regulatory climate meant that they could develop more rapidly than terrestrial systems. Market priorities meant that digital satellite and cable broadcasting systems would have to be developed rapidly. Terrestrial broadcasting would follow.

The DVB-S system for digital satellite broadcasting was developed in 1993. It is a relatively straightforward system using QPSK. The specification described different tools for channel coding and error protection which were later used for other delivery media systems.

The DVB-C system for digital cable networks was developed in 1994. It is centred on the use of 64 QAM, and for the European satellite and cable environment can, if needed, convey a complete satellite channel multiplex on a cable channel. The DVB-CS specification described a version which can be used for satellite master antenna television installations.

The digital terrestrial television system DVB-T was more complex because it was intended

to cope with a different noise and bandwidth environment, and multi-path. The system has several dimensions of receiver 'agility', where the receiver is required to adapt its decoding according to signalling. The key element is the use of OFDM. There are two modes: 2K carriers plus QAM, 8K carriers plus QAM. The 8K mode can allow more multi-path protection, but the 2K mode can offer Doppler advantages where the receiver is moving. Guidelines for the applications are available.

There are two systems for MMDS, Multi-channel Microwave Distribution Systems, one for systems which operate at radio frequencies below 10 GHz (DVB-MC, which is like the DVB-C system), and one for systems which operate at radio frequencies above 10 GHz (DVB-MS, which is like the DVB-S system). An MMDS system like DVB-T, DVB-MT, is also available.

A DVB video that introduces the DVB Project and covers the early years [can be found here](#).

Innovation: DVB-S2 and DVB-H

A higher efficiency digital satellite broadcasting system DVB-S2 has recently been developed. It has both DVB-S backwards-compatible and non-backwards-compatible versions. The non-compatible version allows about 30% more data capacity for the same receiving dish size compared to DVB-S. It uses 8-PSK and LDPC to achieve the efficiency increase. DVB-S2 is likely to be used for all future new European digital satellite multiplexes, and satellite receivers will be equipped to decode both DVB-S and DVB-S2.

A more flexible and robust digital terrestrial system, DVB-H was also developed. The System was intended to be receivable on handheld receivers and thus includes features which will reduce battery consumption (time slicing) and a 4K OFDM mode, together with other measures.

Multimedia Broadcasting and Interactivity

Digital broadcasting has the capacity to deliver multimedia in addition to television programmes. This can look like an electronic version of a 'magazine page' or a web page. It is either independent of the television programme or allied to it in some way. It can be 'one-way' multimedia which displays pictures and information on screen – superimposed or separate – or it can be two-way multimedia which uses a return path system to the broadcaster, to allow the viewer to interact directly with the broadcaster.

The information for the multimedia has to be delivered to the receiver in a way that can be predicted, and all the incoming information has to be coded in a language that is known to the receiver.

The delivery of one way material is usually arranged in a 'carousel'. This means that information is available in a repeating cycle. The receiver grabs the information the viewer has requested (via his controls) as it 'goes by'. There can be a finite waiting time for

broadcast multimedia whose length depends on luck and how much overall multimedia is being offered by the channel. The DVB Project has developed a transport system for such data.

The language of the data for multimedia, the Application Programming Interface or API, was studied in the DVB Project for many years before agreement was reached on a specification. In fact, at the time agreement was reached, a number of different proprietary and open systems were in quite wide use. The DVB developed API is thus an option rather than a mandatory part of the DVB family of systems.

At the start of the discussions there were already several proprietary APIs in use, with different capabilities. The Project agreed that it could not take any specific one of these as a DVB system, but needed an outside, new, and open system. The system developed was MHP the Multimedia Home Platform. It makes extensive use of JAVA.

Multimedia content can have degrees of sophistication, and there are considered to fall in two categories: declarative content and procedural content. In simple terms, declarative content simply gives a recipe for what should be on the screen at any time, rather as HTML does. Procedural content includes a list of instructions which are executed on cue in the receiver. Thus the capability for procedural content is needed, for example, for sophisticated animated graphics. Different APIs offer simply the capability of procedural content only, or for both procedural and declarative content. MHP is designed to allow both, and is probably the most sophisticated API available.

To make it 'future proof' MHP is arranged in a series of generations which will bring more tools to the disposal of the broadcaster when receiver complexity permits. The first generation MHP 1.0 allows enhanced multimedia and interactivity. Small refinements have been made to MHP 1.0 based on experience, and the current version is MHP 1.03. The next generation MHP 1.1 will offer more features which include seamless switching between broadcast multimedia and broadband or narrowband delivered web pages.

A compatible version of MHP is available which can be used with non DVB delivery systems, GEM (Globally Executable MHP), which is at the core of middleware systems used in Japan and the United States as well as having been adopted by the consortium responsible for Blu-ray disc technology.

Adoption and Use of DVB Systems

The DVB-S system was agreed in 1994, and the first DVB broadcast services in Europe started in spring 1995 by pay TV operator Canalplus in France. The DVB-T system was agreed later, in 1997. The first DVB-T broadcasts began in Sweden and the UK in 1998. DVB-T services started in parts of Germany in 2002, and in 2003, there was Europe's first analogue switch off in Berlin.

By 1997 the development of the DVB Project had successfully followed the initial plans, and the project had entered its next phase, promoting its open standards globally, and making digital television a reality. DVB standards were adopted worldwide and became the benchmark for digital television worldwide.

The DVB-S system is used across the world, though in some countries such as Japan and the United States other digital satellite systems are used as well as DVB-S. The DVB-C system is also widely used throughout the world. The DVB-T system is the least widely used, though the roll out of digital terrestrial television throughout the world has been slower than digital satellite and cable. It is estimated that nearly 1 Billion DVB receivers have been deployed around the world.

The Future of the DVB Project

2013 brought the 20th anniversary of the DVB Project and a chance to look back with pride on two decades of cooperation the success of which is plain to see around the world.

The three by-words of the DVB project have been the same since the project began – open, interoperable, and market driven. These are universal values which will always be appropriate. The DVB Project has used them to create suites of standards for digital television broadcasting and multimedia broadcasting.

There are certainly many challenges to come.