2nd Generation Terrestrial

The world's most advanced Digital Terrestrial TV system

What is DVB-T2?

DVB-T2 is a digital terrestrial transmission system developed by the DVB Project. It is the most advanced such system in the world and introduces the latest modulation and coding techniques to enable highly efficient use of valuable terrestrial spectrum for the delivery of audio, video and data services to fixed, portable and mobile devices. DVB-T2 is not designed to replace DVB-T in the short to medium term; rather the two standards will coexist in many markets for many years.

Background

The most widely adopted and deployed standard for Digital Terrestrial Television (DTT) is DVB-T, published in March 1997. Services are on air in more than 35 countries with many more set to launch in the coming years. A mature and well-established standard, it benefits from economies of scale that lead to very low receiver prices and is flexible enough to enable a wide range of business models. (See separate DVB-T Fact Sheet.) Nonetheless, the approach of ASO (Analogue Switch-Off) in Europe and other developed DTT markets generated an impetus to update the standard, as had already been achieved with DVB-S2 for satellite broadcasting. There will be many competing demands for the spectrum that will be released at ASO – with DVB-T2 the DVB Project offers broadcasters a means of using that spectrum in the most efficient ways possible using state-of-the-art technology.

More than sixty DVB member companies have contributed to the work on DVB-T2, which generated hundreds of meeting days and thousands of emails. As with all DVB standards, the final specification is based on a carefully considered set of Commercial Requirements. Key requirements included an increase in capacity and improved robustness. The new standard was also required to be able to reuse currently existing receive antennas and downlinks.

How does it work?

As with its predecessor, DVB-T2 uses OFDM (orthogonal frequency division multiplex) modulation, with a large number of sub-carriers delivering a robust signal. Also in common with DVB-T, the new specification offers a range of different modes making it a very flexible standard. In the realm of error correction, DVB-T2 uses the same coding that was selected for DVB-S2. LDPC (Low Density Parity Check) coding combined with BCH (Bose-Chaudhuri-Hocquengham) coding offers excellent performance in the presence of high noise levels and interference, resulting in a very robust signal.

Several options are available in areas such as the number of carriers, guard interval sizes and pilot signals, so that the overheads can be minimised for any target transmission channel. A new technique, called Rotated Constellations, provides significant additional robustness in difficult channels. Also, a mechanism is provided to separately adjust the robustness of each delivered service within a channel to meet the required reception conditions (e.g. in-door antenna/roof-top antenna). This same mechanism allows transmissions to be tailored such that a receiver can save power by decoding only a single programme rather than a whole multiplex of programmes.

DVB-T2 also specifies a transmitter diversity method, known as Alamouti coding, which improves coverage in small-scale single-frequency networks. Finally, DVB-T2 has defined a way that the standard can be *compatibly* enhanced in the future through the use of Future Extension Frames.

	DVB-T	DVB-T2
FEC	Convolutional Coding + Reed Solomon 1/2, 2/3, 3/4, 5/6, 7/8	LPDC + BCH 1/2, 3/5, 2/3, 3/4, 4/5, 5/6
Modes	QPSK, 16QAM, 64QAM	QPSK, 16QAM, 64QAM, 256QAM
Guard Interval	1/4, 1/8, 1/16, 1/32	1/4, 19/256, 1/8, 19/128, 1/16, 1/32, 1/128
FFT size	2k, 8k	1k, 2k, 4k, 8k, 16k, 32k
Scattered Pilots	8% of total	1%, 2%, 4%, 8% of total
Continual Pilots	2.6% of total	0.35% of total

Figure 1. Table comparing available modes in DVB-T and DVB-T2

Market Deployment

In the years ahead, in countries where DVB-T services have become well-established, regulators will be keen to achieve full Analogue Switch-Off (ASO) and, in the process, release valuable UHF and VHF spectrum for other purposes. Some countries have already completed ASO. One option at ASO will be the introduction of new services using DVB-T2 technology. This could enable, for example, the roll out of new nationwide multiplexes offering multichannel HDTV services, or perhaps innovative new datacasting services. As with DVB-T, the new standard is certain to target not just roof-top and set-top antennas, but also PCs, laptops, in-car receivers, and a whole range of other innovative receiving devices.

In countries where DVB-T services are already on air the transition from DVB-T to DVB-T2 will need to be carefully managed, if such a transition happens. DVB-T and DVB-T2 services are likely to co-exist side-by-side for some time to come - and it's clear from the experiences in Australia (DVB-T, MPEG-2 video coding) and France (DVB-T, MPEG-4 video coding) that terrestrial HDTV services are perfectly viable without using DVB-T2. Having said that, it is inevitable that DVB-T2 equipment prices will fall in the coming years, thus making it a valid option for the launch of DTT services in countries where no such services exist.

The first country to deploy DVB-T2 will be the UK, where ASO is already under way. The regulator there, Ofcom, has stated its intention to convert one nationwide multiplex to DVB-T2 with the first transmissions of multichannel HDTV set to begin at the end of 2009. Test transmissions began immediately after the approval of the standard in June 2008.

Next Steps for DVB-T2

The DVB-T2 specification was approved by the DVB Steering Board at the end of June 2008. On approval it was released as a DVB BlueBook and sent to ETSI (European Telecommunications Standards Institute) for publication as a formal standard. Its publication is expected in the second quarter of 2009. Vendors are working on the design of DVB-T2 equipment; the first prototypes appeared at the end of 2008. In parallel, further work is required within the DVB Project and elsewhere on the creation of implementation guidelines, validation testing, etc.

The DVB-T2 Validation and Verification (V&V) group, coordinated by the Technical Module TM-T2 working group, completed its first Plug Fest at the RAI Research Centre in Turin during March 2009. The aim of the Plug Fest was to validate the DVB-T2 specification through the interoperability of independent hardware implementations, a goal which was achieved with equipment from nine companies.

Links

- www.dvb.org – the main website of the DVB Project
- www.etsi.org – all DVB standards are available for download directly from the ETSI website
- www.digitag.org – DigiTAG aims to facilitate the implementation of DTT based on DVB standards