DVB Fact Sheet - January 2011

2nd Generation Terrestrial

The World's Most Advanced Digital Terrestrial TV System

What is DVB-T2?

DVB-T2 is the world's most advanced digital terrestrial transmission (DTT) system offering higher efficiency, robustness and flexibility. It 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. These new techniques make DVB-T2 50% more efficient than any other DTT system in the world.

Background

DVB-T is the most widely adopted and deployed standard for Digital Terrestrial Television. It was published in March 1997 and 68 countries have deployed DVB-T services and 59 more have adopted the standard. 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. Nonetheless, the approaching analogue switch-off in Europe generated an impetus to create a more spectrum-efficient and updated standard, as had already been achieved with DVB-S2 for satellite broadcasting.

As with all DVB standards, the specification is based on carefully considered Commercial Requirements. Key requirements included an increase in capacity, improved robustness and the ability to reuse existing reception antennas. The DVB-T2 specification was approved and published as a DVB BlueBook in 2008 and published by ETSI in Sept. 2009 (EN 302 755).

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. Just like DVB-T, DVB-T2 also offers a range of different modes, making it a very flexible standard. DVB-T2 uses the same error correction coding as in DVB-S2 and DVB-C2: **LDPC** (Low Density Parity Check) coding combined with **BCH** (Bose-Chaudhuri-Hocquengham) coding offers 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 optimised for any target transmission channel. The key new DVB-T2 technologies are:

- **Rotated Constellations** provide significant additional robustness in difficult channels.
- **Multiple Physical Layer Pipes** allow separate adjustment of the robustness of each delivered service within a channel to meet the required reception conditions (e.g. in-door or roof-top antenna). It also allows transmissions to be tailored such that a receiver can save power by decoding only a single service rather than the whole multiplex of services.
- **Alamouti coding**, a transmitter diversity method, improves coverage in small-scale single-frequency networks.
- **Extended interleaving**, including bit, cell, time and frequency interleaving.
- **Future Extension Frames** allow the standard to be compatibly enhanced in the future.

As a result, DVB-T2 can offer a much higher data rate than DVB-T ***or*** a much more robust signal. For comparison, the last two rows of the table show the maximum data rate at a fixed C/N ratio and the required C/N ratio at a fixed useful data rate.

	DVB-T	**DVB-T2** (new / improved options in red)
FEC	Convolutional Coding+Reed Solomon 1/2, 2/3, 3/4, 5/6, 7/8	LDPC + 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, 19/128, 1/8, 19/256, 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
Typical data rate (UK)	24 Mbit/s	40 Mbit/s
Max. data rate (@20 dB C/N)	29 Mbit/s	47.8 Mbit/s
Required C/N ratio (@22 Mbit/s)	16.7 dB	8.9 dB

Market Deployment

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. 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 targets 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. 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, DVB-T2 receiver prices have already dropped significantly in its first year and are expected to drop to levels just slighly above those of DVB-T devices. This also makes DVB-T2 a valid option for the launch of DTT services in countries where no previous DVB-T services exist.

The first country that deployed DVB-T2 is the UK, where ASO is well advanced and DVB-T2 services were launched in March 2010. A multitude of DVB-T2 set-top boxes and integrated TV receivers from almost all consumer electronics brands are now available in the UK and receiver prices have already dropped to as low as 50 GBP (70 USD). When looking at the prices of integrated TV sets with DVB-T and DVB-T2, the price difference is only about 20 GBP (30 USD).

2010 and early 2011 also saw the launch of DVB-T2 services in Italy, Sweden, and Finland, all of which will eventually be nationwide.

Next Steps for DVB-T2

Advanced trials are currently also taking place in other European countries and with the positive results of the UK launch, more and more countries are considering DVB-T2 services for the near future. Outside Europe, the first countries that are seriously considering DVB-T2 are Australia, Singapore, Malaysia, Thailand and Kenya. Non-European countries that have already adopted DVB-T2 are India, Sri-Lanka and South Africa, bringing the total of active DVB-T2 countries to 32.

Deployed (4)	**Trials (7)**	**Adopted (7)**	**Adopted (SADC) (14)**	
UK	Denmark	Austria	Angola	Mozambique
Italy	Germany	Czech Republic	Botswana	Namibia
Sweden	Kazakhstan	India	DR Congo	Seychelles
Finland	Spain	Serbia	Lesotho	Swaziland
	Switzerland	Slovakia	Madagascar	Tanzania
	Thailand	South Africa	Malawi	Zambia
	Ukraine	Sri Lanka	Mauritius*	Zimbabwe

For a complete and up-to-date overview please visit: www.dvb.org/worldwide

*Mauritius has already completed its DVB-T transition and may go to DVB-T2 at a later point in time.

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

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