Second Generation Terrestrial

The World's Digital Terrestrial TV Standard

What is DVB-T2?

DVB-T2 is the world's most advanced digital terrestrial television (DTT) system, offering more robustness, flexibility and 50% more efficiency than any other DTT system. It supports SD, HD, UHD, mobile TV, radio, or any combination thereof.

Background

Since its publication in 1997, over 70 countries have deployed DVB-T services but this is now rapidly changing with the massive and fast adoption of DVB-T2 around the world. Both DVB-T and T2 benefits from massive economies of scale and very low receiver prices.

Due to the European analogue switch-off and increasing scarcity of spectrum, DVB drew up Commercial Requirements for a more spectrum-efficient and updated standard. DVB-T2 easily fulfils these requirements, including increased capacity, robustness and the ability to reuse existing reception antennas. The first version was published in 2009 (EN 302 755) and the 2011 update added the T2-Lite subset for mobile and portable reception.

How does it work?

Like its predecessor, DVB-T2 uses **OFDM** (orthogonal frequency division multiplex) modulation with a large number of sub-carriers delivering a robust signal, and offers a range of different modes, making it a very flexible standard. DVB-T2 uses the same error correction coding as used in DVB-S2 and DVB-C2: **LDPC** (Low Density Parity Check) coding combined with **BCH** (Bose-Chaudhuri-Hocquengham) coding, offering a very robust signal. The number of carriers, guard interval sizes and pilot signals can be adjusted, so that the overheads can be optimised for any target transmission channel.

Additional new technologies used in DVB-T2 are:

- **Multiple Physical Layer Pipes** allow separate adjustment of the robustness of each delivered service within a channel to meet the required reception conditions (for example in-door or roof-top antenna). It also allows receivers to save power by decoding only a single service rather than the whole multiplex of services.
- **Alamouti coding** is a transmitter diversity method that improves coverage in small-scale single-frequency networks.
- **Constellation Rotation** provides additional robustness for low order constellations.
- **Extended interleaving**, including bit, cell, time and frequency interleaving.
- **Future Extension Frames (FEF**) 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 two bottom rows 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 **bold**)
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	2.0% of total	**0.4%-2.4%** (0.4%-0.8% in 8K-32K)
Bandwidth	6, 7, 8 MHz	**1.7, 5**, 6, 7, 8, **10** MHz
Typical data rate (UK)	24 Mbit/s	**40 Mbit/s**
Max. data rate (@20 dB C/N)	31.7 Mbit/s (using 8 MHz)	**45.5 Mbit/s** (using 8 MHz)
Required C/N ratio (@24 Mbit/s)	16.7 dB	**10.8 dB**

T2-Lite

T2-Lite is the first additional transmission profile type that makes use of the FEF approach. It was introduced in July 2011 to support mobile and portable TV and to reduce implementation costs. The new profile is defined as a subset of DVB-T2 with two additional LDPC code rates. Because only elements relevant for mobile and portable reception have been included in the T2-Lite subset and the data rate is restricted to 4 Mbit/s per PLP, the implementation (chipset) complexity has been reduced by 50%. The FEF mechanism allows T2-Lite and T2-base to be transmitted in one RF channel, even when the two profiles use different FFT sizes or guard intervals.

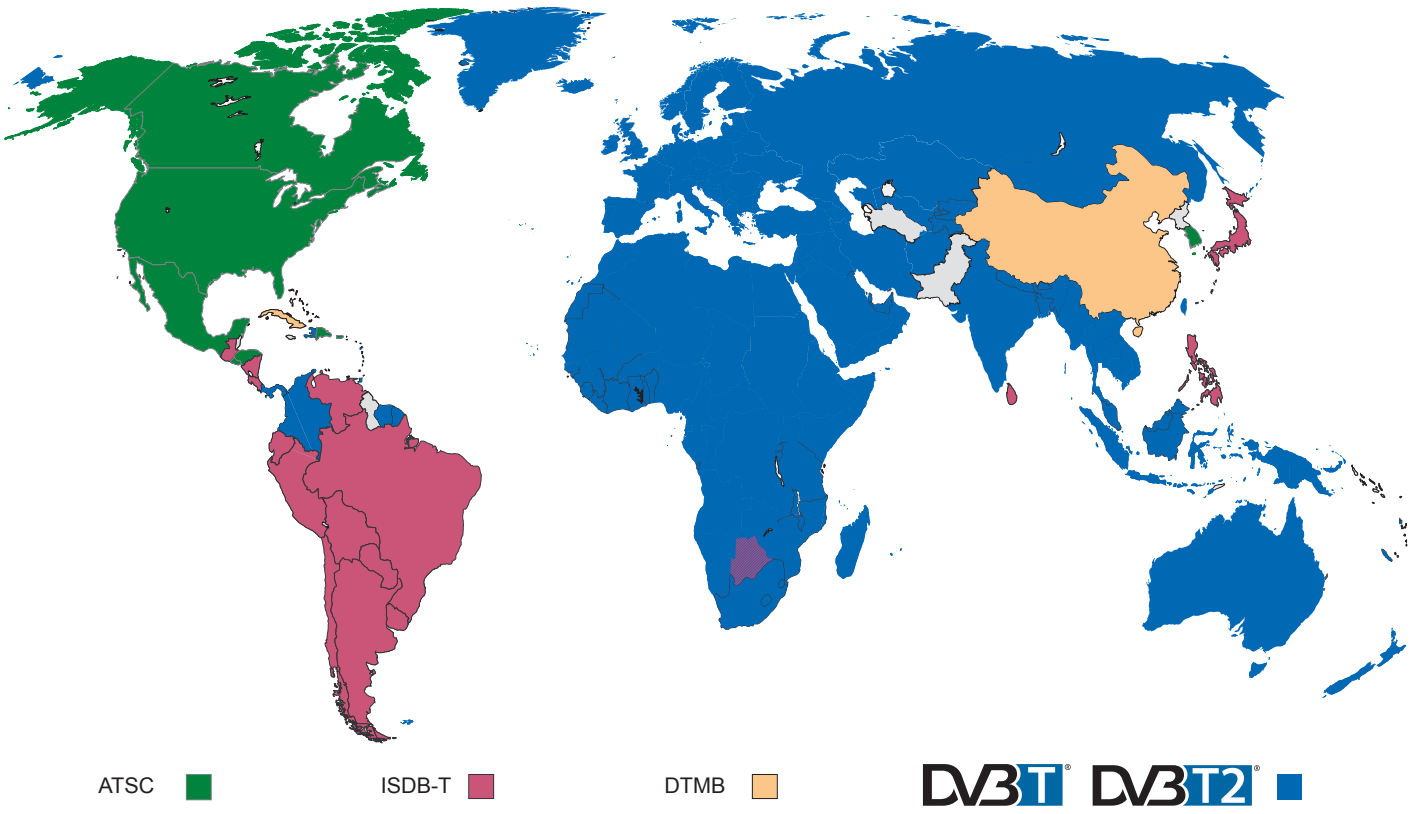
Market Deployment

Like DVB-T, DVB-T2 targets not just roof-top and set-top antennas, but also PCs, laptops, in-car receivers, radios, smart phones, dongles, and a whole range of other innovative receiving devices. In countries where DVB-T services are already on air DVB-T and DVB-T2 services are likely to coexist side-by-side for some time, but many green-field countries that had not yet deployed DTT services, jumped directly to DVB-T2. A future-proof solution!

Almost all modern TV sets sold in DVB countries now have integrated DVB-T2 tuners and DVB-T2 receiver prices have rapidly dropped towards the level of DVB-T prices.

The first DVB-T2 service was launched in the UK in March 2010. Sweden and Finland followed shortly and almost every European country now has far-advanced plans to switch from DVB-T to T2. In Africa DVB-T2 pay-TV services were launched in Zambia, Namibia, Nigeria, Kenya and Uganda and many other countries on the continent have followed since. The Middle-East, India and the Asia-Pacific region also have selected DVB-T2 in the past years. South-America includes multiple T2-only countries and even non-T2 countries like Argentina that also feature DVB-T2 pay-TV services.

So far, 166 countries have adopted or deployed DVB-T and DVB-T2. A true global standard!



Digital Terrestrial Television Systems. Blue indicates countries that have adopted or deployed DVB-T and DVB-T2. July 2016

Get the latest deployment details and high resolution map on :
www.dvb.org/worldwide

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