



# postnote

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## DIGITAL TELEVISION

**Digital technology<sup>1</sup> is changing the way television is broadcast and watched, with more channels, interactive services and easier recording. The Government is committed to turning the analogue terrestrial television signal off, starting within the next four years, so eventually all television broadcasting will be digital. Over 55% of UK households already receive digital television, but there are many issues that need to be addressed before the switch over to digital is completed. This POSTnote looks at the implications of and progress towards digital switchover.**

### Background

Until 1998, all television (TV) services in the UK were transmitted and received in analogue (see next section). Now, all TV services are transmitted digitally as this format has several advantages, including taking up less 'space' to transmit. Five public service broadcasting (PSB) channels (BBC1 and 2, ITV1, Channel 4/S4C and 5) and the public teletext service are also transmitted in parallel in the traditional analogue terrestrial form.

The terrestrial form of transmission (received by aerial rather than satellite dish or cable) has limited 'space', or spectrum bandwidth. Therefore, the Government, which owns and controls the radio spectrum by issuing licences (through the regulator, Ofcom), decided in 1999 that the analogue terrestrial transmissions should be turned off, moving everyone completely over to digital reception. The Government suggests that this will:<sup>2</sup>

- Free up about a third of the spectrum currently used by analogue transmission (as digital transmission is more efficient). This will then be available for new digital services (see p4, Use of freed spectrum bandwidth).
- Benefit the UK economy as a whole by £1.5 to £2 billion in Net Present Value Terms.<sup>3</sup>
- Bring digital terrestrial television (DTT) signals to the 25% of the population who live in areas that cannot currently receive them because of spectrum limitations.
- Increase quality and choice for viewers.

- Reduce costs for broadcasters, who will no longer have to transmit services in both formats.

However, switching off the analogue transmission of TV will mean that all current analogue TV sets will need to be converted to receive digital TV. This will affect TVs, and possibly reception aerials and video cassette recorders (VCRs), in domestic settings, including tenanted households and multiple-dwelling units; non-domestic settings such as hospitals; and also TV rental businesses.

### Digital TV

Analogue TV is transmitted as a continuously variable signal. Digital TV encodes the original television picture as a series of binary numbers and then uses computer processing to compress it so it can be transmitted in a fraction of the bandwidth, or 'space', taken by the equivalent analogue TV signal. Digital technology is used in the production, transmission and reception of TV.

### Production

Most TV programmes are now produced using the more efficient and economic digital technology. It is also easier to store and re-use material. Even the five PSB channels still transmitted as an analogue signal are first produced in digital form and then converted prior to transmission.

### Transmission

Both analogue and digital terrestrial TV are transmitted in the radio frequency band of the spectrum. A single frequency channel can carry:

- a single analogue TV service or;
- a multiplex of DTT services, consisting of 4 to 8 digital TV, digital radio and text-based services or;
- a single high definition TV (HDTV) service (see Box 1).

DTT services currently occupy 6 digital multiplexes, which are transmitted in between the frequencies used for analogue services. They are kept at a low power to avoid interference with the reception of the analogue services. However, the power of transmission of a channel

determines the coverage area so this also restricts coverage of the DTT services.

### Box 1 High definition television (HDTV)

Many digital programmes are being made at a very high quality, particularly where they have export potential and/or are deemed to have a long commercial shelf life. However, this high definition format (HDTV) requires much more spectrum bandwidth for transmission than does the standard definition TV (SDTV) format. Transmission at SDTV quality is currently used in the UK because it is similar to analogue TV quality for conversion and display on existing sets – and to maximise the number of channels available. HDTV is particularly suitable for action intensive programmes, but to receive it a specific HD widescreen TV set and HDTV decoder are needed. Some broadcasting companies are planning HDTV services in the next few years on satellite and cable.

### Receiving digital television

Digital TV in the UK can currently be accessed by three main methods:

- digital satellite (DSat), mainly provided by Sky;
- digital terrestrial (DTT), provided through TV aerials by, for example, Freeview (a consortium of the BBC, Crown Castle International and Sky) and Top Up TV;
- digital cable (DCable), via, for example Telewest or ntl:.

DSL (Digital Subscriber Line – Broadband) TV, provided along telephone lines to TV sets by, for example, Kingston Interactive (BBCi Hull - only available in Hull) and Video Networks (HomeChoice - only available in parts of London) is a fourth method which currently has a minimal share of the market, but is predicted to become more popular as broadband technology<sup>4</sup> and coverage increases.

Viewers need a set-top-box or an integrated digital TV set (iDTV) to decode digital signals. Currently, set-top-decoders for converting DTT signals can cost under £60, although the cheapest boxes tend to be less sophisticated and can be less user-friendly. iDTVs have the decoder built in and are often easier to use than separate set-top decoders, although they are still evolving. The aerial for DTT reception also needs upgrading in a significant number of households, which can cost between about £80 and £300. Freeview is free to watch, with no extra costs after conversion. Top Up TV requires a slightly more complicated set-top-decoder or iDTV with a conditional access capability and is a 'pay-light' subscription service.

For satellite TV, installation of a receiver dish and satellite decoder is necessary. The majority of premium channels are received as part of a Sky subscription package, which includes equipment and installation, or pay-per-view. However, Sky also offer a free-to-view service, Freesat, with a one-off set-up charge of £150, with the hope of converting some viewers over to pay-TV. Included with Freesat are the BBC channels, S4C and some one-way interactive services (see Box 2). The other PSB channels are free with a decryption card (many satellite signals are encrypted to control the coverage). The BBC are likely to launch a freesat service soon as well. Cable and DSL television are available on subscription and pay-per-view, mainly in densely populated areas.

### Box 2 Features of digital television

#### Interactive

Interactive (red button) facilities offer a wide range of additional services to scheduled TV. These vary dependent on the available bandwidth and whether a telephone line or cable is attached to the TV for the viewer to send information to the provider. All operators offer one way interactivity such as text, programme information and watching alternative sporting events or news stories to those scheduled. Digital text services, which are continuously improving in speed and useability, will completely replace the public analogue teletext services at switchover. In addition, satellite and cable, which have a return telephone line connected, offer shopping, gambling and banking for which viewers can go online and communicate with the service provider and complete transactions. The Government has its own interactive facility, DirectGov, which gives information on and access to national and local government services. NHS Direct and services for teachers and education sector workers are also being set up.

#### Electronic Programme Guides (EPGs)

Some set-top decoders, iDTVs and personal video recorders (PVRs - see below) have EPGs that enable viewers to see the available programmes by date, time and subject. Lists can be built of favourite channels and programmes and specific channels or certain programmes can be blocked. EPGs enable easy programming of PVRs. The order that channels are listed on EPGs has been shown to influence the watching pattern of many people. The regulator, Ofcom, requires EPG providers to give due prominence to PSB channels and to deal with all channels in a fair, reasonable and non-discriminatory way.

#### Benefits to communities

Digital technology is allowing services to target specific communities. Many programmes are now signed and/or subtitled for the deaf and hard-of-hearing and have audio description available for the blind and partially sighted. Ofcom announced two new codes in July 2004 that will require TV broadcasters to offer such increased services, including services for deaf and blind people using EPGs, although the availability will still be minimal. Digital TV and radio channels can be more localised and community specific.

#### Video-on-demand (VOD)

This allows viewers to select videos from an online library for downloading and watching at a time of their own choosing. This can be via cable or, increasingly, via DSL TV services. BT is currently trialling a DTT set-top decoder with a DSL connection for VOD.

#### Personal video recorders (PVRs)

PVRs such as Sky+, TiVo and similar DTT devices, are digital recorders. Rather than recording programmes onto a tape, they use a large hard disc drive (up to about 80 hours). VCRs will record digital TV (in analogue form), but PVRs have the advantages of: digital recording; easy programming; being able to watch a recorded programme whilst recording another; transfer facility to DVD, CD or video cassette for archiving; a digital index, so no fast forwarding or rewinding; and being able to "pause" live programmes (by recording the parts transmitted after the pause).

### Take-up and coverage<sup>5</sup>

By 30 June 2004 over 55%<sup>6</sup> of UK households had digital TV, giving an average increase of about 5% every 6 months since the end of 2002. Sky, which launched its digital service in 1998 and switched off its analogue service in 2001, have converted over 7 million homes to Dsat. The introduction of Freeview in 2002 rapidly increased the uptake of DTT, with a wider choice of free-

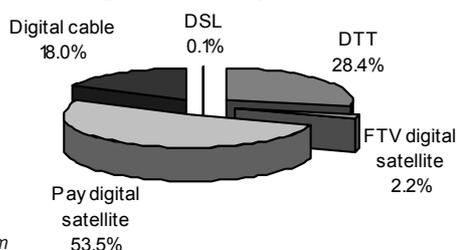
to-view channels and decoders becoming more affordable. The diversity of distribution methods is important in ensuring widespread access to digital TV, taking into account affordability and geographical coverage<sup>7</sup> (see Table). The market share of the various different platforms is illustrated in the figure.

**Table showing the take-up and coverage of digital TV<sup>†</sup>**

	Households with digital		Coverage	No. of services
	%	million	%	TV and radio
DTT	16	4	73	46
DSat	30		98*	
Pay		7		400
FTV <sup>A</sup>		0.3		220 (approx.)
DCable	10	2.5	50	200
DSL	0.4	0.009	6	100

<sup>†</sup>All figures are approximate.<sup>6,7</sup> \*Some areas are in a satellite shadow and some buildings cannot have a satellite dish due to planning restrictions and to tenancy/lease restrictions. <sup>A</sup>FTV = free-to-view

### Market share of digital homes by 30 June 2004



Source: Ofcom

### Analogue-digital switchover

In 1999 the Government committed to turning the analogue signal off. It set two pre-conditions for switch-off:

- availability – everyone who can currently receive the main PSB channels on analogue TV must be able to receive them digitally by one or more methods;
- affordability – switching to digital should be affordable for the vast majority of households.

The Government is working with key stakeholders, under the Digital Television Project<sup>8</sup> (DTP - see box 3), to prepare the way for the switchover process. This process will then be implemented by a successor project, in which a broadcaster-led (but with involvement of the other key stakeholders) organisation, currently known as SwitchCo, will play a major role.

A date for switchover - the switching-off of the analogue signal - has not been set yet; although it was originally hoped to be between 2006 and 2010, it is now likely to start in 2007 or 2008. The end of 2012 was suggested by the BBC as a completion date for switchover, and this has been reiterated by Ofcom in their draft Digital Replacement Licences, to be issued this year to the PSBs they regulate. To achieve this completion date a Government decision to proceed on this basis would need to be made within the next few months to allow for transmission contract negotiation, planning, transmitter procurement and two years notice for viewers in each region ahead of the switchover period.

### Box 3 The Digital Television Project

In 2001 the aim was set for "the UK to have the most dynamic and competitive market for digital TV in the G7, as measured by take up, choice and cost".<sup>9</sup> The DTP was established in 2001 under the joint stewardship of the Department of Culture Media and Sport and the Department of Trade and Industry as a partnership between Government, broadcasters, manufacturers, retailers, consumer groups and other stakeholders. Its objective is to ensure that the criteria set for switchover are met, so enabling Ministers to decide how and when to proceed, and then help prepare for SwitchCo, a successor organisation expected to be set up in 2005, to carry out switchover. A working group is currently trying to get agreement on the role, remit, structure and governance of Switchco.

The terrestrial analogue signal will be turned off region-by-region over a period of four to five years. In each region, one analogue TV channel would be converted to carry a digital multiplex carrying PSB services and after a period of time (likely to be several weeks) the remaining analogue channels would be switched off (see Switchover issues, below). Technical trials are being carried out (see box 4).

### Box 4 Technical trials

A technical trial was carried out in 2002 that researched the implications of fully converting households to digital by simulating conversion for a small group of houses. This showed that interest in digital TV increased after it was experienced. A fuller trial is ongoing in two Welsh villages, which will lead to the analogue signal being switched off. All basic equipment to access digital TV will be provided but the viewers will have to install it themselves. This will gauge technical issues at the transmitter and household ends as well as consumer response.

### Switchover issues

Left entirely to the market, switchover will not happen, partly because not all households can affordably receive digital TV and partly because some do not see the need to convert any or all of their TV sets to receive digital TV. The Secretary of State for Culture, Media and Sport has said that it is apparent that more concerted action by broadcasters, retailers and manufacturers, supported by Government and Ofcom, is required if the full benefits of digital TV are to be made available to the whole population within the desired period. Barriers that still need to be overcome before analogue switch-off is achieved are discussed below.

### Communication and marketing

A survey for the DTP<sup>10</sup> shows that many people are not fully aware of what digital switchover will mean - that the analogue signal will be turned off. It is thought that when a definite date is announced for analogue switch-off this will make a difference to the rate in which people convert. However, 5% of respondents to the survey said they would never convert and millions of consumers see no reason to adopt digital TV at all; they see the analogue switch-off policy as coercive, think the new technology is too expensive, confusing and difficult to use, or are simply happy with what they have already.

It is important for both manufacturers and retailers that there is not a surge in demand for digital equipment just before switchover in each region. The Consumer Expert Group (CEG), appointed by the Broadcasting Minister to advise Government,<sup>11</sup> have recommended that a public information campaign should be launched before switchover is announced to improve both consumer knowledge and awareness about switchover policy. Information and support should be available to consumers during the transition process, including assistance with purchases, domestic installations, retuning, aerial issues (see below) and help for low-income groups. The DTP recently has created the "Digital switchover logo". The logo is designed to brand reliable sources of information about digital switchover and also to indicate products and services that meet certain agreed technical criteria.

### Converting secondary TV sets

Even those households that have digital TV may be affected by switchover as many have additional analogue sets that have not been converted and still quite often watch analogue TV, even on sets with decoders. 41% of viewing in all homes is on additional sets, and only 14% of these have been converted so far. To be able to still use these additional sets, either a set-top decoder will have to be bought or an extra additional-set subscription paid for pay-TV services. Some boxes have multiple tuners that can feed from the main room into others, allowing different channels to be watched simultaneously.

### Reception problems

For the current DTT coverage area, 34% of households<sup>12</sup> are likely to need an aerial upgrade before they receive a reliable signal. Even after switchover some rooftop aerials will have to be adjusted or replaced to receive signals from a different transmitter, and there could be particular problems in multiple dwelling units. Many additional sets use set-top aerials through which it will be challenging to ensure good reception. The Government is working to relax the current permitted development rights for satellite dishes (see Table, p3) across the UK; new measures should hopefully be in place in early 2005.

### Coverage

Currently only 73% of UK households can receive the full DTT service. This will not change until the analogue signal starts to be turned off and the current number of transmitters (80) used for digital increased; to achieve the same coverage as analogue, broadcasters will have to convert virtually all the transmission sites they use in analogue (1154). The frequencies approved for high power transmission in the UK are currently used for analogue transmissions, so the PSB digital services will be transferred to these frequencies as the analogue signal is turned off, to give maximum coverage. However, this means that set-top decoders and iDTVs will need re-tuning and not all of them will do this automatically. DTT may still not be receivable by the whole country (98.5% is the figure aimed for), so subscription-free digital satellite will be necessary to give free access to the PSB channels to 100% of UK households. Satellite could also be a more economical means than DTT of getting a good signal to

consumers in some low-density population areas. A large increase in coverage of cable is unlikely due to the high costs of laying cables in lower density population areas.

### Recording method

Recording digital broadcasts on VCRs using a set-top-box is possible but is not easy. If viewers use the same set-top-box as they are using for their TV they cannot watch one digital channel whilst recording another digital channel. Therefore, to still use their VCRs as they are used to viewers will have to either convert their VCR as well as their TV or purchase a new digital recording device. The alternative is to use a Personal Video Recorder (PVR - see box 2). Digital recorders are beginning to increase in choice and decrease in price.

### Use of freed spectrum bandwidth

The use for the spectrum bandwidth freed by digital switchover will depend on international negotiations by Ofcom and the DTI at international radio spectrum conferences in 2007 and 2010. As well as increasing DTT coverage, possible uses are: additional broadcasting and interactive services; mobile broadcasting to mobile phones and public transport; management services such as traffic congestion information; and wireless connection of all home entertainment devices and remote control from a distance, for example to set the PVR, by mobile phone.

### Overview

- The analogue signal will be turned off, region-by-region, probably between 2007 and 2012.
- All analogue television sets will either need converting with a set-top decoder or replacing with an integrated digital television.
- Digital switchover has many advantages but several challenges have to be overcome to ensure that everybody benefits from it.

### Endnotes

- 1 Postnote 2001, '*e is for everything?*', December 2001.
- 2 Written Statement by The Secretary of State for Culture, Media and Sport, May 2004.
- 3 Digital Television Project, '*Cost benefit analysis of digital switchover*', September 2003.
- 4 POSTnote 181, '*Broadband internet access*', July 2002.
- 5 All figures in this section as of 30 June 2004.
- 6 Ofcom, '*Digital Television Update Q2 2004*', September 2004.
- 7 DTP, '*A Guide to Digital Television and Digital Switchover*', October 2004.
- 8 www.digitaltelevision.gov.uk
- 9 DTI/DEE White paper '*Opportunity for all in a world of change*', February 2001.
- 10 The Generics Group, '*Attitudes to Digital Switchover*', March 2004.
- 11 Consumer Expert Group, '*Persuasion or Compulsion? Consumers and analogue switch-off*', October 2004.
- 12 Ofcom, '*Driving digital switchover*', April 2004.

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