

HDTV and Mobile TV: post Digital Switchover

An Independent Expert Industry Group Report

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Background

In May 2006, we produced a discussion paper examining the future market demand and technical opportunities for digital terrestrial broadcasting. We proposed the adoption of new technologies – the MPEG4 video coding standard and a new broadcasting standard, now called DVB-T2 – that would enable the existing UHF spectrum to be used much more efficiently to carry both HDTV and mobile broadcast services alongside existing Freeview services once UK analogue TV broadcasting ends in 2012.

That paper contributed to a UK and an international dialogue that has led to the recent publication of proposals from Ofcom and the public service broadcasters to introduce terrestrial HDTV services in the UK, based on the new DVB-T2 standard. Ofcom has also indicated that it plans to auction off 14 of the UHF channels currently used for analogue broadcasting, leaving 32 channels to carry 6 digital TV multiplexes (networks).

Last autumn the authors of the original paper came together again to build on the progress made over the previous 18 months and to develop their earlier proposals taking into account the full potential for digital terrestrial broadcasting in the UK. This paper makes a set of radical proposals that build on current plans. If adopted over the next several years, these would enable the UK to retain its world leadership in digital terrestrial broadcasting bringing significant incremental benefits to every stakeholder – consumers, manufacturers, broadcasters and media companies, network operators, regulators, and the Government.

Proposals – For Discussion

We take as a working assumption that digital switchover will be completed by 2012 and that Ofcom's proposals for the sixth multiplex will eventually go ahead, offering HDTV services using MPEG4 and DVB-T2. We believe these steps are **not** sufficient to meet consumers' or industry's needs. (It should also be noted that a separate proposal to introduce terrestrial HDTV using DVB-T and MPEG4 has been made.)

Therefore, we have developed a coherent set of proposals that would be relevant and valuable to both the successful acquirers of released UHF channels who wish to use their spectrum for TV, radio or mobile broadcast services, and to broadcasters who wish to expand their services using the existing retained UHF channels much more efficiently for a wider choice of standard or high-definition TV services. We contend that these proposals, when combined and implemented in a coherent way across the UK, would make a transformational change to

terrestrial broadcasting enabling it to make a much greater contribution to the economic, social and political goals of the UK than current plans would allow.

The key elements of our proposals are: -

1. MPEG4 and DVB- T2 are essential for HDTV services if all stakeholders' goals are to be met. They should be introduced together, at the earliest practical date, as a "one step change" for free-to-air TV consumers. DVB-T2 and MPEG4 together give an increase of around 100% in carrying capacity over the existing digital terrestrial broadcast system.
2. A plug-in module could be available to enable the easy upgrade of suitable existing HD-Ready TV sets which incorporate the common interface (a regulatory requirement in screen sizes over 30cm). This depends on manufacturer support for software upgrades to support modules which may vary from vendor to vendor. In principle this could enable the installed base of suitable HD-ready TV sets to receive terrestrial HDTV and other new DVB-T2 services for a small one-off cost. We note that these new services will also be available via new dedicated DVB-T2/MPEG4 set top boxes and flat panels with integrated MPEG4 and DVB-T2 tuners.
3. There should be a progressive move towards the use of Single Frequency Networks (SFNs) to maximise spectrum efficiency. If all services could be carried on SFNs, then this alone would offer a gain of around 380% in spectrum efficiency over existing national Multi-Frequency Networks (MFNs) that are configured for regional use. The optimum end-point would be the adoption of national SFNs for all services that don't require any regional content and the retention of 3 Multi-Frequency Networks (MFNs). These 3 MFNs would be used for services requiring maximum coverage and regional capability e.g. PSB channels. A further opportunity to improve spectrum efficiency, where additional regional capacity is required or where frequency clearance for a national SFN is difficult to achieve, would be to use a limited number of regional SFNs to carry these services.
4. To enable the most efficient use of spectrum and optimise the long-run economic and other benefits from the UHF spectrum, there should be a consumer friendly upgrade path to Advanced Digital Television services such as HDTV and newer mobile TV systems. This would commence immediately after the current DSO programme completes in 2012. This could be achieved at the earliest possible date, by using two channels from the digital dividend spectrum to enable the migration to purely MPEG4 + DVB-T2 broadcasting and, ultimately, the switch-off of MPEG2 and DVB-T. The same principle could also be applied to single frequencies acquired by purchasers of spectrum who wish to transmit TV programmes.
5. If the UK is to retain its world leadership in terrestrial broadcasting then the market opportunity for mobile TV, including free-to-air public service broadcasting, needs to be effectively addressed. Our proposal includes provision for a viable set of mobile TV services which require the robustness offered by the DVB-H mobile TV standard. There is a second strategic problem that can also be resolved by this, as follows: -
6. We believe that there will be significant problems, not yet fully recognised, with TV reception on portable sets and indoor aerials in many locations after analogue switch-

off using the existing DVB-T digital TV system. This could be resolved by broadcasting a set of standard definition TV services to portable sets and mobile receivers as a single integrated proposition. This opportunity can be delivered using an initial national SFN from 2012, to simulcast the 5 public service TV channels without regional variations. This could be carried on channel 36, or on one of the digital dividend frequencies. The mobile / portable proposition could grow to 1 regional and 3 national multiplexes during the course of the transition to Advanced Digital Television services.

7. We propose that the latest technology from DVB-T2 together with a technical feature known as MIMO should be incorporated into a new “DVB-H2” standard for mobile and portable TV reception. These services would be transmitted over existing broadcast masts and selected mobile phone masts to provide robust delivery to handheld and portable receivers.
8. The transition to Advanced Digital Television Services would enable not 4, but 12 HD services to be available from end 2012, with a subsequent migration to 6 national and 3 regional multiplexes across the UK. Potentially this offers up to 40 HD services, further capacity for mobile / portable services AND the release of 5 frequencies including, if appropriate the 2 additional channels via the DDR. These 5 channels could then be used for other purposes in addition to the 12 Digital Dividend channels, releasing 17 frequencies in total.
9. The UK should drive through its leadership in this new mobile TV market by launching at least one mobile / portable multiplex for a pilot service in the London area in time for the 2012 Olympic Games, using the proposed ‘DVB-H2’ MIMO standard. This would carry a diverse range of sports across a number of channels to handheld receivers for the duration of the Olympics. The 2014 Commonwealth Games, hosted in Scotland, could also be covered by a dedicated service for the duration of that event.
10. In parallel to this, there should also be a pilot HDTV service using DVB-T2 and MPEG4 in the London area as a proof of concept, at the earliest available opportunity. This will require a spectrum allocation and collaboration by all players in the value chain. It would also ensure UK terrestrial HDTV coverage of the 2012 Olympics would be secured.
11. As part of its national HD strategy, the UK should move towards a progressive scanning standard for all terrestrial broadcasting - 1080p/50 – as there are now strong indications that it would require a similar bit-rate to the 1080i format now in use internationally for HDTV. This would ensure that terrestrial broadcasting can offer the same full-HD picture quality as Blu-ray discs and other digital HDTV broadcast platforms, and maximise compatibility with PC standards and Internet-delivered HDTV services.
12. There are a number of possible variations available for the specific allocation of spectrum to fixed and mobile services, based on the core proposals outlined above. Fixed HDTV services using 6 national SFNs and 3 regional MFNs, plus mobile / portable services on 3 national plus 1 regional SFNs using DVB-H2 could be achieved

using 29 frequencies. This would offer an Advanced Digital Bonus of 3 additional frequencies, on top of the Digital Dividend.

13. There is a trade-off between the number of frequencies used for the duration of the transition to Advanced Digital Television Services and the speed with which the switch-off of all existing MPEG2 + DVB-T services can be achieved. The three Advanced Digital Bonus frequencies could be auctioned off, and the proceeds (an Advanced Digital Endowment) used to accelerate the completion of the consumer transition to Advanced Digital Services. We note other television transmission changes, such as the shut-down of the original 405-line TV services took 16 years without any market intervention, with the current UK transition to all digital MPEG2 broadcasting taking 14 years by 2012. Using the 'Advanced Digital Endowment' to subsidise a receiver conversion programme to MPEG4 + DVB-T2 would accelerate implementation of the whole programme (along the lines of those currently being implemented in the United States for the current US digital transition to all MPEG2 broadcasting, and in the UK targeted help scheme). Could this transition to Advanced Digital Television Services be delivered by the end of the next decade?
14. Once a consensus is reached around the proposals outlined above, an implementation strategy for the UK would need to be developed with input from industry specialists with a detailed understanding of, and expertise in, frequency planning, international spectrum coordination, receiver design and market economic modelling. Some carefully judged decisions will need to be made about the way these proposals are implemented in order to optimise the commercial, social and public benefits to the UK.

Conclusions

The proposals in this paper together offer a radical new approach to the use of the UHF spectrum for broadcasting in the UK. The 100% gain from DVB-T2 plus MPEG4, when combined with the 380% gain wherever national SFNs can be used (across about half the UHF spectrum) offers an overall gain of 285% in spectrum efficiency over the current proposals from Ofcom. This would make a compelling proposition for the UK.

Substantial benefits are available to virtually every terrestrial broadcast stakeholder – consumers, manufacturers, broadcasters, regulators and network operators - and Government requirements for long-run spectrum efficiency are met. The incremental benefits, over and above a programme that provides just one HD multiplex ,(whether using DVB-T or DVB-T2), are so substantial that a detailed dialogue on implementation planning and an optimised allocation of end-state services should begin immediately. Although there are a number of risks and issues that would need to be overcome, a national consensus to deliver a radical digital terrestrial strategy would position the UK once again as the global leader in this field with substantial and sustained benefits for all stakeholders and for the UK as a whole.