

analysis



The switch from analogue to digital TV releases a digital dividend

ACCESS EVERYWHERE

Mobile broadband services could benefit from the Digital Dividend Spectrum, writes **Simon Saunders**

IN JUNE OF THIS YEAR, a little-known group of European regulators reached a recommendation for the use of the spectrum released after analogue TV services are switched off, which could have momentous implications for the future of the mobile industry. The UK communications regulator,

Ofcom, took a leading role in these discussions to enable maximum flexibility in the use of this *digital dividend* spectrum, while providing confidence for the industry to develop equipment and services. This spectrum has the potential to support many different future services, including high definition digital television and mobile broadband. But supporting proposals for this spectrum involved a challenging balance of apparently conflicting approaches to regulation for Ofcom.

Cellular mobile services, such as 2G GSM and 3G UMTS, mostly operate at frequencies above 900 MHz, with UK operators having spectrum at 900, 1,800 and 2,100 MHz. The general trend for new spectrum has been upwards in frequency, driven by the lack of availability of lower frequency spectrum and the increasing need for high capacity for data services. For example, Ofcom is currently considering the best way to make available spectrum at around 2.6 GHz, which is well suited to the expansion of mobile broadband services. However, lower frequencies, including the 470-862 MHz range considered as part of the digital dividend, provide significant benefits in reducing the costs of deploying mobile networks, especially for providing coverage to rural and remote areas and for providing a high quality of service deep inside buildings.

New evolutions of mobile broadband technologies will each require coverage over wide areas. These include the IMT-2000 and IMT-Advanced family of technologies which comprises all of today's major mobile standards, including GSM, UMTS, future technology evolutions such as LTE and potentially Mobile WiMAX. Since existing 2G and 3G systems will continue to require support, operators are faced with the prospect of deploying several new networks and maintaining all of them simultaneously, increasing spectrum demands even before the capacity need is apparent.

SWEET SPECTRUM

The digital dividend provides a unique opportunity for reducing the cost of these networks. The switchover of TV services from analogue to digital in 2012 will release 112 MHz of cleared spectrum, as well as providing 'interleaved' spectrum in locations where the digital TV services are not required. This spectrum is firmly in the 'sweet spot' of frequencies, which are low enough to provide good coverage with relatively few transmitters, while accommodating bandwidths large enough to

JARGON BUSTER

Digital Dividend – The spectrum made available after converting television services from analogue to digital transmission.

Digital Switchover – The time at which analogue TV services cease to be available.

DTT – Digital Terrestrial Television.

ECC/TG4 – The Task Group of the Electronic Communications Committee, the committee that brings together the radio- and telecommunications regulatory authorities of 45 member countries.

FDD – Frequency Division Duplex

GSM – Global System for Mobile Communications: the second generation (2G) technology used in most of today's mobile phones.

IMT-2000 – International Mobile Telecommunications-2000, the term used by the International Telecommunications Union (ITU) for several standardised third-generation (3G) wireless services.

IMT-Advanced – The ITU term for wireless systems which provide capability beyond IMT-2000, such as data rates up to approximately 100 Mbps. Also known as 4G.

LTE – Long Term Evolution: the standard evolved from UMTS and targeted as a member of the IMT-Advanced family.

Mobile WiMAX – The version of WiMAX based on the IEEE802.16e standard for mobile broadband wireless access. A candidate for membership of the IMT-2000 family.

TDD – Time Division Duplex

UMTS – Universal Mobile Telecommunications System: the IMT-2000 3G standard used most widely within Europe.

provide capacity for mass-market services such as mobile communications.

However, mobile services are by no means the only candidates for use of this valuable spectrum. Other potential services include high-definition television, local television and the radio microphones and wireless cameras essential to generate content for the entertainment industry. Ofcom has been consulting on the needs of these services for digital dividend

spectrum and received around 750 responses.

Our approach to determining the appropriate balance of services is generally to provide liberalised (technology- and service-neutral) access to spectrum and to implement market mechanisms (such as auctions and spectrum trading), which allow the market to decide the most valuable use of spectrum, since it is better informed and able to react faster than a regulator. This approach helps us secure the optimal use of the spectrum to meet our primary duty, which is to further the interests of citizens and consumers and thereby to meet our principal objective for the Digital Dividend Review – to maximise the value of the digital dividend to society.

But this flexibility can also produce uncertainty. The mobile industry uses sophisticated technology, which can make access to these services costly. This is especially the case for mobile handsets and other consumer devices, which must be produced in quantities of tens or hundreds of millions in order to yield the necessary economies of scale and enable services to be delivered to consumers at an attractive price. For manufacturers to commit the funds needed to develop and manufacture such equipment, they need confidence that

services will be available and taken up in a large market. This has usually been achieved via harmonisation, where a particular frequency band is allocated exclusively for a particular technology. A prime example is GSM technology, where over two billion mobile users worldwide benefit from these economies of scale.

HARMONISATION

In the past, harmonisation has often been mandatory – specifying that the only use that may be made of a particular band is a nominated service or technology. But there are many reasons why Ofcom believes that a mandatory approach to harmonisation is increasingly inappropriate. As a regulator, we might select the wrong balance between mobile applications and other potentially valuable uses of spectrum, reducing its potential for delivering benefits. Many parameters of the mobile systems which might occupy this band, such as channel bandwidths and duplexing arrangements, are currently undecided. If we made the wrong choice, we could inhibit rather than stimulate the mobile market. Particular to this band, our use of the spectrum is within a complex set of agreements with over 100 administrations negotiated under the auspices of the

Regional Radiocommunication Conference 2006. While the UK specifically included provision for some spectrum to be completely cleared following digital switchover – a true digital dividend – most other countries did not. In some cases the digital broadcast services are already on air and forcing change on them would be hugely disruptive and expensive.

Instead, the UK advocates a non-mandatory approach to harmonisation, where administrations could independently decide the details of whether and how to make the spectrum available, while the industry would have increased certainty regarding the frequency range and parameters of mobile services. In many ways this mirrors the approach which has already been adopted for digital terrestrial television (DTT), where the technical approach was agreed across many countries, allowing DTT to realise substantial economies of scale.

This position was presented to a task group of the European Electronic Communications Committee known as ECC/TG4, which had a mandate to study the feasibility of mobile services within the digital dividend. Ofcom conducted detailed technical studies to establish the ground rules whereby mobile, broadcasting and other services could share the band without undue interference. We then worked with our colleagues in other administrations to establish the options for placement of mobile services which would minimise the potential impact on existing services and maximise the size of the potential market which manufacturers could address.

As a result, a clear preference emerged for spectrum at the upper end of the digital dividend, between 798 and 862 MHz (channels 62-69). The spectrum is close to the existing 900 MHz cellular band – which is in short supply – and so offers the potential to reuse existing components and systems, benefiting further from economies of scale. This is

Web reading

- Ofcom is currently considering the best way to make available spectrum at around 2.6 GHz, which is well suited to the expansion of mobile broadband services. See www.ofcom.org.uk/radiocomms/spectrumawards/awardspending/award_2010/
- Ofcom has been consulting on the needs of these services for digital dividend spectrum and received around 750 responses. www.ofcom.org.uk/radiocomms/ddr/
- Over two billion mobile users worldwide use GSM technology. See www.gsmworld.com/about/history.shtml



THE FINDINGS OF ECC/TG4:

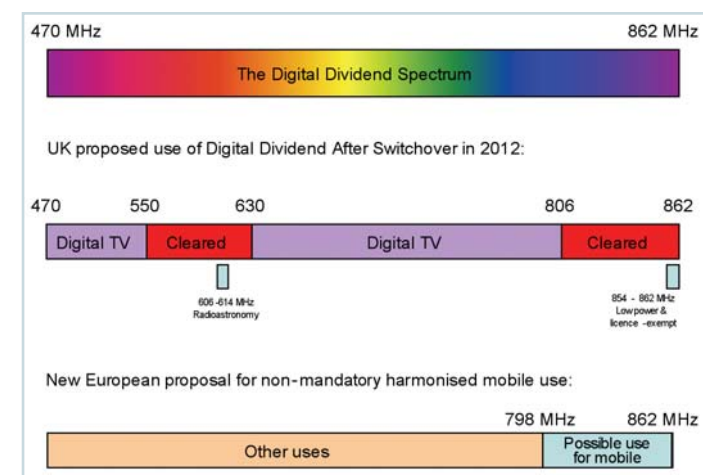
"... THE PREFERRED SUB-BAND for such harmonisation is the upper part of the UHF band, and should include, as a minimum, the range of channels 62-69 (798-862 MHz). The use of the harmonised sub-band for mobile communication applications should be subject to harmonised technical arrangements (e.g. band plans, options for the location of any duplex gap and spacing, and any guard bands required, for both FDD and TDD use). Appropriate technical arrangements will be set out in a subsequent Report of ECC/TG4. They should be as flexible as possible, within the limits of what is technically feasible, to facilitate the adoption of the harmonised sub-band by as many Administrations as possible"

to be a non-mandatory, non-exclusive use of the band: that is, individual countries are not compelled to implement mobile services in this range, and may vary the details of how mobile services are deployed. In the UK, for instance, channel 62 is used to provide important portions of the existing committed digital TV services, and channel 69 is used by a variety of low power users such as radio microphones.

Nevertheless, we believe that the decision made by ECC/TG4 is a potentially momentous one, creating new options for the evolution of mobile services which might not otherwise be well served and delivering opportunities for a quality and diversity of access to such services. It also shows how Ofcom's spectrum policies can yield the benefits of an open, market-led approach to deciding how to use spectrum while retaining the advantages of conventional spectrum harmonisation. ■

■ **Prof. Simon Saunders is spectrum policy consultant for Ofcom & Member, Ofcom Spectrum Advisory Board**

FIG 1



The UHF Band: Realising the Digital Dividend