Spectrum for beginners

By Kip Meek

The management of the radio frequency spectrum is a technical topic that divides the technician from the rest of us like no other. Try and get a spectrum novice to engage on the topic and you switch straight to the blank stare and the 'I can't seem to get this car in gear' feeling which is the sure sign of failed communication.

If you count yourself amongst those whose eyes glaze over at the mention of the word 'spectrum', but you feel a little guilty about it, read on. In two pages, I will attempt to give you the bluffer's guide.

Firstly, why does spectrum matter? Mainly because it is a fundamental resource for a variety of different activities that helps society function. The military are big users; so are many other public sector entities involved with keeping us safe – fire, ambulance, police, air traffic control, etc. Television and radio broadcasting, the glue in British society, also use big blocks of spectrum. And then there is mobile – few of us could now contemplate a life without a mobile phone. The services that use spectrum are important to us a society - but also matter economically. Europe's competitiveness is particularly associated with good communications infrastructure and the mobile sector is one of the few economically significant arenas in which Europe has had a leading position.

But, while spectrum matters, we are in danger of running short of it – or at least that part of the spectrum which is cost effective for mobile. The reason for this is that our demand for mobile spectrum is growing by leaps and bounds.

To put this in context – we now have about five times more mobile spectrum in use than we did when mobile was launched in the 1980s. There is scheduled to be an important auction of further spectrum next year which will increase the spectrum available for mobile by another 75%. Despite the periodic additions to mobile spectrum – in 1991 and 2001 and, all being well, 2012 - during the last thirty years or so, we have all become so dependent on mobile telephony that inevitably the spectrum has become very intensively used.

But the growth in traffic to date will be dwarfed by what happens next. For most of its history, mobile telephony has carried predominantly voice traffic. Over the last few years, Blackberries, iPhones and other smart phones have meant that data traffic has been layered on top of voice. But data comes in many forms. As devices and technology develop, one of these forms has become more possible – video. Video eats up bandwidth (or capacity - the capacity to carry traffic). Just as the video carried on the iPlayer threatens to clog up our creaking fixed broadband infrastructure, so does the ability of iPads and other devices to carry video threaten to clog up our airwaves. Many people forecast that the amount of traffic carried by developed world mobile networks, if unconstrained by spectrum shortage, would grow at 30% plus for the rest of this decade. Even though we are learning how to use spectrum more and more efficiently, most pundits agree that this means we need at least twice as much spectrum reserved for mobile as we have at the moment.

Unfortunately, the cupboard is bare. Spectrum is inexhaustible, in the sense that, if you use it today, it's still there tomorrow - but it is finite. So far, the insatiable mobile industry has been able to extract spectrum from other users - the upcoming auction, referred to already, is selling some low frequency spectrum, previously used for analogue TV (hence its moniker, the 'digital dividend'). But,

while there is some scope for more of this in future, inevitably it will get harder and harder to find the spectrum we need.

This means that politicians and the wider community of policy-makers need to ditch their blank stares and get engaged with spectrum policy. Here are some things they should do.

1. Build a good picture of what is going on at the moment. We need to know precisely how intensively spectrum is used, such that we can figure out where we can look to free it up. Ofcom has done some work on this, but not enough.

2. Understand and act on the fact that all spectrum is not equal. Low frequency and high frequency spectrum have different propagation characteristics – low frequency travels further and penetrates walls better, delivering cost and service benefits. The rest of Europe has done more to work through the implications of this than we have done in the UK.

3. Explore the scope for new technological-cum-regulatory approaches. To give an example – a family of new technologies called 'cognitive radio' technologies allows frequencies to be shared between users in a way that was not possible previously. Users who make only partial use of their spectrum could be encouraged to share with others, rather than give up their spectrum altogether. For this to happen, changes in international and national regulation need to be pushed through.

4. Think long term. A second digital dividend is due in about 15 years and will deliver spectrum which is harmonised for mobile and low frequency. We should start planning for this early. Also we should at least ask the question about if and when we might turn off the digital terrestrial signal, as well as the analogue terrestrial. Is it efficient to maintain four methods of getting a broadcast signal into our homes – satellite, cable, broadband and digital terrestrial?

5. Avoid designing siloed interventions. In the UK and the rest of Europe, there has been an evident desire to promote fibre in remote areas, followed, as we get closer to the spectrum auctions, by priority being placed on mobile coverage. Governments could usefully think about how to encourage coverage in a more technologically neutral fashion.

6. Don't forget WiFi: WiFi is becoming an important way of transmitting data in people's homes and also a feature of public spaces ('hotspots'). Most mobile companies are beginning to think hard about where it fits in their ecosystem. WiFi has developed organically and without government involvement and government should not get involved without really good reason – but WiFi can play a part in delivering public policy objectives and so should not be overlooked.

7. Take another look at market-based approaches. Ofcom introduced spectrum trading and liberalisation, policies which embodied liberal economic principles, in 2004; since then, these policies have not achieved a great deal. The European Commission has adopted a more pragmatic blend of policies and both government and regulator in the UK could usefully think again.

I have written this piece as if no politician or policy-maker has ever heard of spectrum – in fact, Ofcom has always treated spectrum as an important issue and is placing it at the top of its priorities this year; both the last government and this one want to press ahead with the auction next year for good fiscal reasons, but also because they understand the economic importance of spectrum; and the mother of parliaments too, in the shape of the Culture, Media and Sports Committee's enquiry into spectrum, has focused on the issue. But it still remains the case that interest from policy-makers as a class is too low relative to the importance of the subject matter.