Deregulating Futures: The role of spectrum

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Introduction

Wireless communication services are an integral part of everyday life. Wireless services range from mobile phones to broadband connections, taxi radios to WiFi-enabled laptops, and include radio and TV broadcasting. Wireless communications are also essential to safety of life, used by people such as the emergency services, air-traffic controllers and the railway system. It is hard to put a true value on all these uses – studies in the past have conservatively estimated that the use of radio spectrum adds around £24bn per year to the UK economy and that this value grows significantly year-on-year.

Ofcom has been considering carefully its management of this vital resource and published the "Spectrum Framework Review" for consultation in November 2004. The responses were taken into account in publishing a subsequent Spectrum Framework Review Statement in June 2005. This morning, I'd like to take you through the key concepts of the Review and the implications for innovative new technologies that use spectrum.

Why spectrum is regulated and what Ofcom's duties are

With such a valuable resource on which we are so dependent it is clearly important firstly to ensure that nothing disrupts current usage and secondly that the value that our society can extract from the spectrum is maximised. Achieving this requires some degree of management and regulation.

First let me discuss the prevention of disruption: The use of spectrum would be disrupted if interference occurred. Interference happens if two users transmit on the same frequency at the same time and sufficiently close to each other. It may result in the radio signal being degraded such that it may become indecipherable. By ensuring that there is sufficient distance between reuse of the same spectrum the regulator can prevent most forms of interference. Such a transmission right is sometimes referred

to as “access to the spectrum” and users will sometimes refer to having bought “spectrum at auction”. There is often an international dimension to this as radio signals do not stop at international borders.

Now let me turn to maximising the value derived from the spectrum: Spectrum is a finite resource. There is only a fixed amount of spectrum in the most valuable frequency bands and many potential applications that it could be used for. Value is maximised if each piece of spectrum is assigned to the optimal use. As might be expected, with many thousands of different uses and spectrum spanning a wide range of frequencies, this is a hugely complex task. Much of our strategy is focussed on solving this problem.

Finally let me explain Ofcom’s duties: In the UK, Ofcom is responsible for managing spectrum for civil use. The Communications Act 2003 requests that Ofcom encourage the optimal use of spectrum and maximises the economic benefits. As well as fulfilling these duties Ofcom has a wider ambition to make the UK a leader for wireless investment and innovation.

How spectrum was managed and why this should be changed

Now I’d like to explain how spectrum has historically been managed. Spectrum has been managed in the UK for around 100 years. Initially the emphasis was on the protection against interference, only more recently has there been a focus on maximising the value generated by using the spectrum.

The general approach adopted world-wide during this period has been for the spectrum manager to decide, often in accordance with an agreed international framework, on both the use of a particular band and which users are allowed to transmit in the band. This approach was appropriate while there were relatively few uses and users so that the spectrum manager could have as good an understanding of the best use of spectrum as the market itself and hence could sensibly control all aspects of spectrum usage.

This approach has been generally successful at avoiding interference. However, it is less clear that it has maximised the value of the spectrum. Understanding which set of uses would maximise the value is almost impossibly complicated. Generating all the information needed to understand the business case for each possible mix of different uses would require enormous resources, well beyond the capability of any regulator. In facing problems such as this, economists have generally pointed out that

each company understands its own business case and that market mechanisms can allow different companies to compete for resources, enabling the market itself to distribute the scarce resources in the most optimal manner. Of course, markets are used in many aspects of our life and are being extended into areas such as pollution rights and fishing quotas. As a result, some have argued that the value of spectrum is more likely to be optimised if the market determines the optimal use, rather than the regulator.

Whether regulatory intervention is more or less likely to maximise the value of the spectrum than the market is virtually impossible to determine definitively. If the market approach were better then it would allow new and changed uses of the spectrum to emerge more rapidly than the current approach. Since it is not possible to observe the non-emergence of a new use it is hard to prove definitively that the current approach is not as good as any other. There is some evidence in countries such as the US which have more market-oriented approaches that a wider range of technologies are deployed, but it is hard to decouple this from other influencing factors such as the availability of venture capital. However, it seems intuitively sensible that the wider market must know more about the relative value of different applications than the regulator and therefore that a well-functioning market would, most likely, generate a greater value from the spectrum than a centrally managed system.

How spectrum might be managed

Having talked about how spectrum has been managed, I'd now like to turn to look at how it might be managed in the future. In outline, there are three different ways to manage the radio spectrum in order to achieve the dual goals of minimising interference and maximising value:

1. The regulator manages the radio spectrum in a similar fashion to the way it has been managed for the last 100 years. This is often known as "command & control" and until recently has been used for around 95 per cent of the spectrum.

2. The market manages the radio spectrum within the boundaries of terms in the licences as set by Ofcom. This is known as "market mechanisms" and was strongly recommended in the Review of Radio Spectrum Management (the "Cave Report"). It is currently being introduced in the UK thorough the introduction of spectrum trading and liberalisation.

3. Nobody controls who uses the spectrum, but power constraints or other mechanisms restrict usage to reduce the probability of interference. This is known as “licence-exempt use” or sometimes “spectrum commons”. Around 5% of the spectrum in the UK is currently set aside for licence-exempt use.

How we select between the different options

It is up to the regulator to determine the best balance between these different types of spectrum management. The market alone cannot decide, for example, how much spectrum should be licence-exempt, because licence-exempt users are typically individuals and it would be difficult to coordinate their actions to acquire spectrum through a market mechanism. We have selected the balance between the different options by:

- Firstly assessing how much spectrum we believe should be licence-exempt.
- Secondly using market mechanisms to manage as much of the remaining spectrum as possible.
- Thirdly, any remaining spectrum is managed using command & control.

Let me describe how we carried out these steps in more detail.

Assessing the need for licence-exempt spectrum: There is no widely agreed and simply applied method for determining the optimal amount of licence-exempt spectrum. We have developed a new methodology which we believe will provide a good indication as to the optimal amount. I don’t have the time to explain it here, but suffice to say it suggests a ceiling of 800MHz on the amount of spectrum needed for licence-exempt use. Ofcom has already made 535MHz available in the 2.4GHz and 5GHz bands. As a maximum, then, an additional 250MHz or so of spectrum might be needed for licence-exempt use. While this may seem like a small increment it should be remembered that a very large amount of spectrum has been recently reserved for licence-exempt use in the 5GHz band which is broadly unused at present.

While this puts a ceiling on the total amount that might be useful, it does not address whether such an allocation would maximise the value of the spectrum. To do this, Ofcom would need to compare the economic benefits of licence exempt usage with the benefits of licensed usage. This is a difficult comparison as it requires forward-looking assessments of the best use of the spectrum. However, since at present, the existing part of the

5GHz band set aside for licence exempt use is little used, it seems unlikely that immediately providing additional spectrum will be economically sensible. Therefore, instead, Ofcom will monitor the usage of the 5GHz band in order to predict when demand in the band might exceed capacity.

Once it is clear that this is likely to happen at some predictable point in the future, we will conduct an economic study to assess whether more spectrum should be made available for licence-exempt use and will act accordingly.

Determining what spectrum cannot be managed by market mechanisms: While our preference is to make use of market mechanisms to manage spectrum, there are some areas for which market mechanisms cannot be fully applied, particularly in making allocation decisions. These are:

- Spectrum where there are unavoidable, important or valuable international issues. For example, spectrum assigned to satellite operation is generally covered by international obligations and there may be valid economic reasons why the UK would like to see these continue;

- Spectrum which relates to a broader social objective. Ofcom is generally not in favour of spectrum allocation and assignment being used as a mechanism to achieve social policy. However, there are some current licences where policy conditions are, or will be attached and it will not be possible to remove them. This applies to broadcasting spectrum and to some of the emergency services; and

- Spectrum where it is important to maintain international harmonisation for operational reasons, eg aeronautical and maritime where the use of common frequencies world-wide is essential.

Summary: By using the mechanisms set out above, we are able to firstly set aside some spectrum for licence-exempt use, and then secondly apply market mechanisms in all but those areas where command & control management is required.

This will lead to a major shift away from command & control to the use of market forces between 2000 and 2010, with a smaller increase in licence-exempt spectrum in the bands above 3GHz.

Why this framework will bring benefits

At the start of my talk, I said that the primary reasons for managing spectrum were to avoid interference and maximise value. I also set out a number of aspirations for Ofcom's management of the spectrum.

Ofcom expects that the proposals contained within the SFR Statement and summarised here will increase the value that the UK gains from the radio spectrum. With users able to trade spectrum and change its use, the market should allow higher value uses to emerge with the resulting increase in value to the country. We also expect the proposals to promote innovation and investment by allowing those with innovative ideas to have simple and rapid access to spectrum which has relatively few constraints on its usage.

We believe these proposals will be neutral with respect to interference. Under the previous management approach interference was generally managed well and we see no reason for that to change under the new approach.

These changes represent a significant change in the way that radio spectrum is managed. Users, particularly of fixed and mobile systems, will have new opportunities opened up for them. Equally, this will be a significant change for those already using spectrum and there needs to be appropriate transitional arrangements to recognise existing investments. It is not Ofcom's role to predict possible developments, but by way of illustration, here are some of the things that might happen:

- An operator acquires some spectrum previously used for fixed applications and deploys a WiMax mobile data service, providing multi Mbits/s mobile laptop coverage across major parts of the country;

- Cellular operators gain more spectrum, enabling a raft of new applications like interactive gaming and personal broadcast services at low cost;

- Emergency services gain temporary access to spectrum when they need it to enable video from the helmet of fire-fighters and emergency medical workers, resulting in many lives saved; and

- Consolidation occurs in the private mobile radio market, resulting in a low-cost but higher capacity service, reducing operating costs for taxi companies, despatch riders and many others.

What actually happens may be very different from this. Importantly, changes will be based on real market need rather than the regulator's assumptions.

These are the most wide-ranging changes to spectrum management since the first act of Parliament regulating radio spectrum in 1904. We expect them to bring major benefits to investors, manufacturers, operators, users of the radio spectrum, citizens and consumers.

The vision

In this speech I have set out how Ofcom believes that the markets are more likely to maximise the value of spectrum than central control from the regulator. I have shown how we will allow market mechanisms to be used in the majority of spectrum, after setting aside an appropriate amount for licence-exempt usage and excluding spectrum where central management is still needed. Our vision for spectrum where market forces can be applied can be summarised as:

The Ofcom Spectrum Vision

1. Spectrum should be free of technology and usage constraints as far as possible. Policy constraints should only be used where they can be justified;

2. It should be simple and transparent for licence holders to change the ownership and use of spectrum; and

3. Rights of spectrum users should be clearly defined and users should feel comfortable that they will not be changed without good cause.

We will achieve this by:

- Providing spectrum for licence-exempt use as needed, but our current estimates are that little additional spectrum will be needed in the foreseeable future, growing to 7 per cent of the total spectrum;

- Allowing market forces to prevail through the implementation of trading and liberalisation where possible. We will fully implement these policies in around 72 per cent of the spectrum; and

- Continuing to manage the remaining 21 per cent of the spectrum using current approaches.

This significant step in deregulating spectrum will, we believe, make it simpler and more attractive to develop and deploy innovative new technologies and services in the UK.