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A policy spectrum for spectrum economics

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ABSTRACT

Recent reforms to radio spectrum regulation have sparked controversy over the respective merits of two mutually exclusive liberalization regimes: property rights and commons. This debate is restrictive because it is largely incomplete and misunderstood. It is also costly in terms of opposition and delays to reforms. Goals of efficient spectrum allocation are better served by a wider policy toolkit, inclusive of hybrid and intermediary regimes. In this article I sketch the contours of a 'spectrum of spectrum regimes', triangulating regulatory, private ownership and unlicensed approaches. I illustrate this triangulated model, which I then apply to confront allocative decisions in digital dividend policy, such as the FCC's open access clause in the 700 MHz auction and Ofcom's current review of UHF spectrum release in the 800 MHz band.

1. Introduction

How we allocate usage rights to the radiofrequency (RF) spectrum is of vital importance for the future of the information and communication industries. The allocative debate over digital dividends (the spectrum released by the switch of analog terrestrial broadcasting to digital in UHF bands) and the white space movement are the most recent expressions of this quest to meet ever increasing demand for wireless applications in the face of tightening constraints on capacity expansion, and mounting frustration over band idleness. Long the creed of interference-managing authorities, centralized management by regulatory agencies ('control and command' – C&C) cannot on its own offer an appropriate response to these challenges. Since the early 1990s, a group of mainly Anglo-American countries has taken the lead in gradually reforming C&C arrangements to improve spectrum access to new users, meet consumers demand and encourage flexible use.

How is this objective to be achieved? A cursory read through the literature would suggest there are really only two alternative regimes currently under experimentation. In the first (property rights), specific spectrum bands are usually auctioned, their buyers endowed with fee simple property rights or their equivalent, and then trading of these rights is permitted on secondary spectrum markets. This solution uses the market's 'invisible hand' to address excess demand (by freeing bands), band idleness (by trading bands) and social valuation (by pricing bands). The second option on the table is the establishment of a spectrum commons. In this model, an unfenced regime powered by new technologies enables near simultaneous band use, and use is self-ruled by community etiquette or government-specified rules for all in the spirit of open source software projects. The spectrum commons solution also addresses the demand side (by sharing rather than trading bands) but relies more strongly on the supply side (e.g. agile technology) for its implementation.

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These two propositions have sparked controversy over their respective merits. Advocates of the property rights approach condemn the commons model as a utopian collective project better suited to managing open resources in the small pastoral communities from which it takes its inspiration, than for conducting economy-wide policy. In their view, open-access spectrum would simply be permanently contested, congested, and basically useless. Similarly, advocates of the commons model warn against the usual suspects in pro-market policy. How could one alleviate spectrum scarcity and band idleness with fences and 'keep out' signs? What warrants government withdrawal in new, untested and imperfectly competitive markets? Would exclusive spectrum rights not merely perpetuate command and control's taste for restricting spectrum access, re-branding the privileges of a few while reducing government oversight?[1]

In short, both camps echo serious misgivings about the alleged net gains that would arise from adopting their competitor's alternative. And both are mostly right. Few among reform advocates have been willing to concede that spectrum property rights and spectrum commons are polar, confronting propositions. What is more, these two propositions severely mischaracterize the true policy toolkit, which is currently being deployed by regulatory agencies. These two options to reform spectrum management policy are not the full set of available choices for regulators, nor is that how the regulators see it. In fact, many reform experiments with auctioned and unlicensed bands are not typical examples of full spectrum privatization or collectivization, and could just as well be re-branded as 'control and command lite'. There are strong hints that regulatory agencies did in fact take their cues (as they should have) from the mixed approaches taken to manage other common resources such as water, air or land[2]. Yet, mixed or piecemeal reform approaches are often confused with one side or the other of the ideological debate. Common ground between shared and exclusive access seems hardly ever acknowledged.

This is surprising. Given the large degree of heterogeneity in spectrum bands' physical properties (propagation, throughput, heat, etc.) – in technologies, in wireless applications (high vs. low power, long vs. short range, continuous vs. one off, etc.) and seemingly endless variety of devices and markets – reforms engineered with a 'two sizes fit all' culture appear a dubious way to promote and achieve their avowed goals of allocative efficiency.

The debate remains so polarized partly because it lacks clarity. There are no taxonomies of existing regimes, and licensing and legal terminology widely differs among reform countries, making it difficult for practitioners to share their experience and communicate efficiently over these issues internationally. Mischaracterization of choices and lack of clarity must necessarily lead to ill-informed judgments, lost opportunities and knowledge gaps, resulting in inefficient outcomes. Yet this is not all. A polarized debate comes with costs of its own; strong opposition to reforms from entrenched or ideological positions, implementation delays, passive resistance, etc., all of which prevent the very type of dynamic adjustments needed for reforms to achieve their objectives.

This article is an attempt to clarify the debate. I contend here that the issue of most relevance to reform-minded countries (allocative efficiency) is better served by a near-continuum of policy options (the 'true' set of policy choices), of which exclusive property rights and open access are only two sub-segments. Why? Intuitively, if increased choice delivered by competitive forces is the source of social welfare gains in wireless markets, a similar line should guide the principles applied to efficient spectrum rights policy (which by analogy is currently characterized by a polarized duopoly).

To characterize this 'true set' of policy options I present a model, which sketches the contours of a 'spectrum of spectrum regimes', triangulating regulatory, private ownership and unlicensed approaches The model aims at clarifying the spectrum regimes under experimentation on the ground and helping de-polarize the debate by suggesting nuanced alternatives and flexible transition paths. Reforms and their economic goals could gain a lot from a better understanding and modeling of the full array of available policy choices. At stake is the future of consumption, investment and innovation in the rapidly developing wireless mobile industry.

The paper is organized as follows. I first review the rationales behind the reforms drive, and the merits and limitations of the so-called 'trychotomic model' (command and control, property rights and open access/commons). I examine next the attributes of intermediary ('easement') models, which together with other properties, I use to characterize a triangulated model of spectrum management. I then describe and illustrate the main policy options identified by the model, giving due consideration to the various trade-offs between regime attributes. Finally, I apply the model to some recent issues in digital dividend policy, including the Google clause granted in last year's 700 MHz auction in the US, and Ofcom's current review of UHF spectrum release in the 800 MHz band.

2. The economic objectives of reforms

Spectrum management is first and foremost a matter of addressing demand while exercising interference control. With no interferences there would be no scarcity and the matters of spectrum pricing, allocation and social evaluation would present few difficulties (Melody, 1980). Indeed, although the RF spectrum is an infinitely renewable resource, it is the huge potential for interdependency among business users that makes the spectrum a finitely available resource at any point in time. As demand grows, this induced scarcity increasingly brings about the need to

[1] To gain a sense of the debate's polarization one could consult the economic/markets literature (e.g. Hazlett, 1998; Spiller and Cardilli, 1999; Bittlingmayer and Hazlett, 2002; Cave and Webb, 2004; Faulhaber, 2005; Baumol and Robyn, 2006), and contrast it with the arguments of the commons/unlicensed/open access movement (e.g. Melody, 1980; Benkler, 1998; Noam, 1998; Lessig, 1999; Reed, 2001; Buck, 2002; Werbach, 2004; Snider, 2006).

[2] Land/real property management offers a large array of mixed approach metaphors, such as public access to private buildings, privately operated public car parks, public rental of private property and conversely, etc.