

Regulation and Competition

Harmonizing Spectrum Policy in the EU The WAPECS Concept (*)

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Defining a strategy for efficient spectrum management is a key goal of the *i2010 Information Society Initiative*. This policy seeks to promote an open and competitive digital economy within the European Union (EU). The EU faces unique challenges in relation to spectrum reform and its ambition to develop a pan-EU approach to spectrum management. This stems from the need for a uniform policy prescription across the historically disparate regulatory regimes of member states. Such a policy must account for powerfully entrenched vested interests, policy constraints (both national and international) as well as legacy technologies.

It is in this context that the Wireless Access Policy for Electronic Communications Services (WAPECS) has been proposed. The initiative seeks to establish a framework for the provision of electronic communications services within a given set of radio frequency bands. The specified bands will be identified and agreed upon by EU member states so that a range of networks and services may be offered on a technology and service neutral basis.

(*) Paper prepared for European Network for Communication and Information Perspectives EuroCPR Conference, Seville March 26th-28th, 2006. Special thanks to Professor William Melody for our many discussions on this subject and to participants of the EuroCPR 2006 Conference in Seville for their helpful comments. An extended version of this paper is available in the journal *info*, vol. 8, no. 6 (October 2006).

This paper evaluates the WAPECS proposal. An outline of the spectrum market and the importance of spectrum management to the *i2010* initiative is provided. This is followed by an evaluation of the WAPECS proposal through a discussion of the institutions responsible for its development and operation with reference to the wider EU objectives as set forth in the Lisbon Strategy.

The Spectrum market

The radio spectrum describes the range of frequencies used by wireless technologies that send information in free space through the use of electromagnetic waves¹. Spectrum is generally regarded as a scarce resource. Its scarcity is a function of the interference that results from conflicting transmitting signals or energy emissions². Regulation was justified historically to ensure the avoidance of interference between users, as well as to safeguard public interest objectives, such as the provision of emergency services and military applications. The allocated uses of spectrum were determined on the basis of broad wireless service categorizations, namely fixed, mobile and broadcasting since these applications made use of distinct frequency ranges. The spectrum was partitioned accordingly. This regulatory approach is commonly referred to as the 'command and control' model.

New technologies promising enhanced spectrum use

Advancements in technology promise enhanced spectrum use and prompt the need for spectrum reform. In the past, governments granted exclusive licenses to specific users (subject to use conditions) to ensure that the negative externalities associated with interference could be mitigated. However, improvements in technology have served to increase the ratio of information transmitted in relation to the bandwidth occupied.

¹ This has been defined as "radio waves in frequencies between 9 kHz and 3000 GHz; radio waves are electromagnetic waves propagated in space without artificial guide." Decision no. 676/2002/EC Art. 2 of the European Parliament and of the Council of March 7th 2002 on a regulatory framework for radio spectrum policy in the European Community.

² The ITU Radio Regulations, Art. 1.166 define interference as: "The effect of unwanted energy due to one or a combination of emissions, radiations or inductions upon reception in a radio communication system, manifested by any performance degradation, misinterpretation or loss of information which could be extracted in the absence of such unwanted energy".

Market structure for spectrum

These new technologies will be adopted by a range of users in a variety of novel circumstances. As noted above, uses of spectrum fall within the categories of fixed mobile and broadcasting technologies. The users of the spectrum include government, private operators (for example providing mobile services, T.V., or satellite communications) as well as consumers. The supply of spectrum to users has typically been accomplished through license assignment (in the case of users requiring dedicated access to the spectrum resource) or designating the spectrum for use on a 'licenced-exempt' basis (where devices must adhere to specified power restrictions and are not protected against interference). As a result, the government can stimulate spectrum demand by either granting rights to access the resource or rights to exclude other potential users.

The market for spectrum does not fit in well in relation to the attributes commonly associated with well-functioning competitive markets. For example, significant monopoly power exists in the broadcasting sector, where large initial infrastructure investment coupled with often onerous licensing requirements form a significant entry barrier for new entrant competitors. In the case of emergency services, the potential for catastrophic market failure looms large. Here, the inability of the private sector to provide 'public goods' is particularly acute.

Indeed Melody has questioned the desirability of creating market system for spectrum as a policy goal. This, he argues, is due to the divergence of social and private valuations of spectrum, the non-competitive nature of the spectrum market, the inability to accommodate government uses via private markets and the fact that a market system would not be capable of achieving broader economic, social and political objectives (MELODY, 1980, p. 395).

Despite the highly imperfect nature of the spectrum market, the proposal to establish a market in spectrum rights, first made by Herzel (HERZEL, 1951) is the mainstay of current proposals for spectrum reform. Herzel's rationale that market criteria should provide the basis for spectrum allocation, with particular reference to the market valuation of licenses was developed by Coase (COASE, 1959). Coase argued against government intervention in the allocation of scarce resources such as spectrum. He instead favoured well-defined legal entitlements that would serve to prescribe the transaction costs associated with market exchange. For Coase, legislators went down the wrong path when they failed to realize that spectrum could be allocated using economic imperatives.

However market mechanisms have led to some erroneous outcomes. The failure of the European 3G mobile auctions to either enhance efficiency or promote competition has been cited as an example of what can happen when auctions are designed by governments to extract monopoly rents. This was achieved through the creation of artificial scarcities in imperfect markets (MELODY, 2001).

The spectrum market can be viewed as varied, on account of the different uses and users; dynamic, as a result of technological advancements; and imperfect, due to its incongruence with the criteria associated with well-functioning competitive markets. Competitive market theory has been the basis of many of the proposals dealing with spectrum reform. It is suggested that an analysis based upon the institutions associated with the management of spectrum is also required.

Spectrum management

According to Bauer, spectrum management seeks to address three interrelated problems: 1) the allocation of the correct amount of spectrum to certain uses or classes of uses; 2) the assignment of the correct amount of spectrum to certain users or classes of users; and 3) the adjustment of these allocations and assignments as technologies and markets evolve over time (BAUER, 2002, p. 118). These problems are by no means static; digitization and technological advances such as digital compression and space-division multiplexing technology have reduced frequency interference and permitted more conservative bandwidth usage (ITU, 2004). These advances have resulted in calls to relax the command and control regulatory model in favour of more decentralized approaches to spectrum management.

However, as LANSFORD has noted:

"Unfortunately, the benefits from device-centric spectrum management (as opposed to policy-based spectrum management) are only fully realized when all devices in a frequency band are cognitive, so that they can negotiate." (LANSFORD, 2004, p. 36).

Thus by the same token, the growing number of technologies, competition (and competitors) users and uses of spectrum has the potential to result in transmission interference and spectrum congestion. Spectrum management is therefore a dynamic process. Policies need to be continually adjusted in order to respond to new market conditions.

The Lisbon strategy and EU spectrum law and policy - WAPECS

As part of a renewed commitment to the reform agenda the i2010 Information Society Initiative was launched in June 2005. The initiative seeks to promote an open and competitive digital economy, as well as an integrated approach to information society and audio media policies in the EU.

The WAPECS concept seeks to further the objectives of the Lisbon agenda, and more specifically, the *i2010 Information Society Initiative*. This is to be achieved by creating the conditions necessary to ensuring that spectrum is available across a wide variety of services and applications. This complies with the overarching policy goal of fostering the EU internal market, as well as European competitiveness. It is envisaged that electronic communication services³ will be provided over a range of networks via one or more frequency use allocations (i.e. mobile, broadcasting or fixed) delivered via terrestrial, and or satellite platforms, using a variety of technologies. The view taken is that this will lead to a technical solution fashioned by market forces.

It is believed that this approach will stave off the legacy effects of earlier decisions made by member states. Unilateral action taken by national governments is likely to lead to market fragmentation and sub-optimal convergence. The technologies making use of WAPECS spectrum are expected to operate on either a licensed or licensed-exempt basis. The term is a significant departure from the traditional *ex ante* command and control approach to allocation in favour of a broad definition that seeks to stimulate delivery of all digital technologies within their capabilities, using any frequency band, subject to technical coexistence rules within the specific band of operation.

Challenges and constraints

The RSPG has noted a number of constraints associated with designating bands for WAPECS use (RSPG, 2005, p. 11). There are legacy issues associated with the initial rights assignment that need to be taken into

³ The Framework Directive 2002/21/EC Art. 2 (c) defines 'electronic communications services' as "...a service normally provided for remuneration which consists wholly or mainly in the conveyance of signals on electronic communications networks, including telecommunications services and transmission services in networks, including telecommunications services and transmission services in networks used for broadcasting...".

account. Certain previously awarded licences may be inflexible with respect to regional and international agreements. They may also have prescribed conditions attached. In addition, there are also the services of general economic interest, such as public service broadcasting and emergency services to consider. The RSPG suggests that a long-term objective may be: "the establishment of a set of principles which should ensure *equitable competition between wireless access platforms offering similar services and addressing similar markets*". (RSPG, 2005, p. 13, emphasis added).

The notion of 'equitable competition' is an interesting one; it suggests a competitive environment driven by prerogatives other than or in addition to competition. This is perhaps a tacit acknowledgement that competitive market theory does not have all the answers, but, rather, asks some of the right questions. These answers will come from the organizations that have an interest in how the spectrum is administered. We are thus directed to consider alternative analytical reference guides that more squarely focus on the institutional changes taking place.

Evaluating the WAPECS proposal

As we have seen, new technologies can potentially use the spectrum resource with greater technical efficiency. Given the impossibility of predicting demand and the dynamic nature of innovation, a departure from the traditional command and control management structure is warranted. This reform, however, has largely been premised on market-led principles aimed at increasing the decentralization of administrative processes. This permits increased ownership reconfiguration and use variation both in exclusive and shared use models.

However, in light of the fact that the spectrum market is highly imperfect; mechanisms for error correction and governance must be considered. Unbridled faith in market forces must be informed by experience; otherwise we will be proceeding on the mere belief that the market will somehow magically 'work.' The WAPECS proposal can be evaluated in the light of the points discussed above.

Constraints of the WAPECS proposal

The RSPG identified the following five constraints that member states may have which will limit the potential for WAPECS use. These include: 1) The legacy issues arising from the initial assignment of rights to use

frequencies; 2) The lack of flexibility in some existing licences, particularly arising from international agreements; 3) The excess technology prescription in some licences; 4) The use of bands by services pursuing general interest objectives and 5) The use of bands by other applications which do not constitute electronic communication services⁴ (RSPG, 2005, p. 11). What is not explained are the challenges faced by implementing institutions (i.e. The Radio Spectrum Committee and EU Commission). There are significant questions relating to the division of power between the EU Commission and member states. Without greater clarity in this area there will unlikely be any significant private sector commitment to make investments directed toward pan-EU services. In addition, there is a conspicuous absence of discussion of RSPG deliberations regarding the prospect of greater unlicensed spectrum sharing to meet requirements for the next generation of radio technologies. This is perhaps an indication that the RSPG is operating on what Forge and Blackman refer to as the 'common assumption' of administrative allocation or spectrum markets with controlled or uncontrolled resale to form secondary markets (FORGE & BLACKMAN, 2006, p. 9).

The assumption rests on the notion that strict control of spectrum is necessary. This is achieved with dedicated access and separated bands. Overlaps indicate interference. A greater emphasis placed on how radio technologies are actually evolving is likely to lead to less formal and more decentralized governance models being developed. Such arrangements may be the basis for a new framework for spectrum management policy within the EU. This may serve to better align technological developments with EU information society initiatives.

How much spectrum is actually needed to be set-aside for EU common use and when this will be made available is of critical importance. This is particularly salient in relation to the proposal to earmark the spectrum 'freed' from the switch-off of analogue terrestrial T.V. in 2012⁵ as well as the facilitation of multimedia services⁶. Exactly how changes of use will operate

⁴ Cf. Definition of electronic communications services *Supra*. Government services are not electronic communication services as defined since they are not 'normally provided for remuneration'.

⁵ CEC (2005): "EU spectrum policy priorities for the digital switchover in the context of the upcoming ITU Regional Radiocommunication Conference 2006 (RRC-06)", COM (2005) 461 final.

⁶ Radio Spectrum Policy Group (2006): "The introduction of multimedia services in particular frequency bands to the broadcasting services", draft RSPG Opinion # 5.

within a frequency range once harmonized has yet to be discussed. As a result, the ability of markets to engage in spectrum valuation will be limited.

Making sense of WAPECS

Structuring scarcity with respect to spectrum will be crucial to the success of the WAPECS proposal. This will delineate property rights, which will in turn facilitate the creation of the EU internal market for spectrum.

If a piecemeal approach is taken or scarcity is induced artificially (as was the case with the 3G mobile auction), the efficacy of the policy is likely to be greatly diminished. Once common frequency ranges are identified (a Herculean task in itself), a strategy will be needed to facilitate transition into the WAPECS framework.

This being the case, some measure of central co-ordination will almost certainly be necessary so that the uniform deployment of WAPECS can take place. The current method of EU co-ordination does allow for flexibility of implementation at the member state level. However, there will probably be a need for justified rules that bind all states in order to prevent fragmentation. The nature and scope of these rules will require further examination. The issue of enforcement of WAPECS is also likely to require some centralization in order to ensure uniformity of application. This will be of particular importance for contentious issues such as hoarding, congestion and allegations of unequal treatment.

There will also be a need to consider structured approaches to the enforcement of WAPECS spectrum (viz., conflicts over scarcity). This may involve traditional *ex post* measures premised on interference concerns; but it may also require the use of *ex ante* policing which may take the form of registration requirements or closer monitoring of the standards setting processes (WEISER & HATFIELD, 2005).

Beyond the development of homogenized legal and regulatory regimes, the WAPECS proposal must make sense to business interests, since public interest spectrum users are unlikely to push for change in favour of EU administered spectrum. What is needed perhaps is a 'quick-win.' This may mean making a smaller than planned amount of spectrum commercially available at the EU level. Once one service is successfully offered across Europe, the business demand for having WAPECS is likely to be stimulated. This would put pressure on NRAs and better direct them towards the long-term policy goal of developing the EU "internal market and European

competitiveness, by ensuring an innovation-friendly and coherent regulatory environment, which facilitates rapid access to spectrum for new technologies and leads to the provision of a wide variety of wireless electronic communications services and networks" (RSPG, 2005, p. 12). This would also create a context through which EU institutions can begin to develop the competence to administer WAPECS spectrum.

Conclusion

The *i2010 Information Society Initiative* has identified spectrum management as an important area. This paper seeks to evaluate EU spectrum reform with reference to the WAPECS initiative. It is suggested that much of the market-led spectrum reform takes its cue from the Coasian analysis. Though this approach does much to indicate areas of static inefficiency, it does not fully capture the range of uses, users and dynamics of the spectrum market.

In particular, the Coasian approach does not provide an adequate account of institutional change. This is of relevance in the EU context, where institutional change is seen as a key driver for reform. The 'freed' spectrum sought for European use as a result of the switch off of analogue terrestrial T.V. in 2012 and the over-arching policy goal of creating an internal spectrum market is almost certain to portend new institutions and rules that will be created to negotiate the operation and development of what will be a form of pan-European property rights.

Extra-market valuation, which is a concern of law, policy and regulation, is more likely to lead to the 'equitable competition' that the EU Commission seeks to facilitate. This does not mean that market-led reform cannot continue, but rather a framework that considers wider the socio-political objectives, needs to be established in order to more fully articulate the nature and complexities of spectrum management. It is argued that institutional analysis can structure the process of spectrum management in such a way as to better meet the long-term needs of end-users. This paper contends that, although problematic from a theoretical stance, this offers a better prospect of arriving at workable solutions in this policy-making arena.

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