

Chapter 16

The Future of the Spectrum: A Road Towards More Flexibility

The radio spectrum does not exist by itself and spectrum management does not organize an existing and limited natural resource. The spectrum resource is actually created by the regulation and management of a natural and universal phenomenon: radio waves. The ever increasing development of radiocommunications depends on technological progress, regulation and management principles. Together they are mapping the future of the spectrum; they are not independent:

- regulation and management adapt themselves to the possibilities of the present technology;
- technology promises to inspire new ideas for regulation and management.

The spectrum efficiency depends on their convergence on a common strategy and a new “paradigm”. Today, the leading idea to improve this global efficiency and “create” resources is flexibility.

However, the spectrum cannot be ruled in a single way. So many different services and applications share the resource that a careful case-by-case analysis is needed to decide which the appropriate direction is.

Among existing services and usages, many find the present situation convenient, particularly if they are internationally managed. This is the case for aeronautical and maritime services, satellite services, scientific research, HF band services and some others. Traditional spectrum sharing methods seem to be well adapted to such needs which want to be protected by a strict regulation, from the beginning.

Defense and public security services probably have similar views, being managed by governmental bodies, such as ministries, which want to be sure of their communication means and cannot accept any dependence on a too mobile and uncertain radio environment. Even when they benefit a “primary” status, they remain very cautious towards the “secondary” services which they allow to share their bands.

If changes should happen for such usages, they will be decided by their users, under their full responsibility.

Many more aggressive questions are asked about civil telecommunications and broadcasting services. Altogether they may only represent 40% of the spectrum use (see Chapter 6), but they represent by far the greatest share of the market activity, notably for private customers and business. This is also the domain where the economic competition is the highest and consequently where the pressure to obtain spectrum resources culminates. Thus, for years now, a fierce debate has been raging to create new opportunities through a deep reform of the regulation: the challenge is to increase the efficiency by greater flexibility.

It is interesting to mention that such bands and uses are now generally managed by independent regulators whose views and policy may depend on their country and legal responsibilities. They try to harmonize their choices, being fully in line with regional conference proposals, such as CEPT in Europe. However, they are criticized by some economic and political actors as being too conservative and technically oriented, with incompatible decisions and short-term strategies. The European Commission clearly wants to change this situation, to relax technical regulations, to open up the market to greater efficiency and to make the economic actors less dependent on the national regulators.

The “3G story” was crucial for such an evolution of minds.

“3G is dead, long live 4G”. Some telecommunications observers at the 3GSM trade show in Barcelona, in February 2007, said 3G has failed to deliver on its promises of rapid growth, as a spring board for new mobile multimedia services. Operators worldwide have spent billions buying licenses on spectrum to run 3G networks, only to find that the technology was harder to implement than they had expected. Even where 3G networks are up and running, after years of delays, demand for the video and multimedia services they make possible has been rather disappointing. Expectations have been scaled down to the point where many mobile operators now view 3G as a way to boost their capacity for voice calls in overloaded parts of their 2G networks, rather than as the revenue goldmine once promised.

If it is remembered that 3G was the most heralded project in 2000 with operators, regulators, governments, experts and working parties convinced that it was strategic, it can be thought that technical and business perspectives may sometimes be wrong and damaging. It can also be said that spectrum management should probably not be carried out this way, with tremendous efforts to allocate spectrum to applications which do not meet their market.

Thus, what can be done?

In the spectrum sections of its “proposed changes”¹ to the Review of the European Union regulatory framework for electronic communications networks and services, the European Commission establishes a coherent, comprehensive and original set of forward-looking spectrum policy principles. By emphasizing the role of trading and market flexibility, technology and service neutrality, it departs from traditional spectrum management bases. However, by stressing the need for a clear justification of exclusive usage rights, it differentiates itself from the simple idea that only a free open spectrum market fits all situations.

Let us focus on what should be clarified and what roadblocks must be circumvented for this framework to be properly implemented and provide the positive results that can be expected.

Only a minority of EU Member States have already embraced the flexibility through market perspective. Most of them still think that three issues justify preserving the status quo or only minor departures from it:

- the prevention of interferences;
- the prevalence of harmonization and standardization;
- the institutions.

Today, those issues are translated into general policy principles, in conjunction with critical industrial choices. However, they do not object to more long-term technological evolutions which will impact on spectrum usage and management.

To begin with interferences, the Commission makes it clear that:

[It is appropriate] to require that the granting of exclusive usage rights on the basis of individual licenses [must] be subject to clear justification that the risk of harmful interference cannot be managed in another way.

¹ Brussels, 29.6.2006 COM(2006) 334 final, Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions, on the Review of the EU Regulatory Framework for electronic communications networks and services.

A problem is that a clear and comprehensive view of interference prevention, what is possible and what is not, based on existing and future probable technologies, is still lacking. Status quo proponents argue that a structured frequency allocation is needed as long as no wide-ranging tested alternative has been demonstrated. This case will remain a major roadblock obstructing the concrete application of the framework and confining it to abstract management principles.

Let us now consider harmonization and standardization issues. The principle of technological neutrality is stressed in the European “proposed changes”. Some exceptions can be made to avoid harmful interferences or when they can be strictly justified on the basis of a limited number of legitimate general interest objectives”. The words harmonization and standardization do not even appear.

In the past, however, harmonization and standardization have been at the root of the major successes of EU initiatives. Many in the industry and EU governments consider that the road should not be closed to such initiatives in the future. The absence of reference to such possibilities appears to be an error to those who think that it is in the interest of the European industry to harmonize and standardize. The Commission’s proposals regarding the spectrum appears, in this respect, to be a complete reversal in attitude, which neglects what has made the European industry successful.

A reasonable policy would be to identify, even restrictively, application areas which deserve harmonization and standardization and, having achieved this, leave the rest to technological neutrality.

Do not let us forget that difficult institutional issues also constantly confront the Commission. A notable example is given by the present impossibility of achieving common views on convergence between audiovisual and telecommunications industry and also their dedicated regulators, which may slow down new services, such as TV on mobile, or, on the other hand, waste spectrum in parallel incoherent projects.

Both audiovisual and telecom industries have views on the hundreds of millions of paying customers to be reached by TV on mobile terminals and on the revenue stream that they may generate. However, the telecom industry feels short of convenient spectrum resources in that respect, as the TV industry can take advantage of frequencies which are made available by digital broadcasting modulations. Such a situation created by the historical spectrum regulation may be found unfair. However, simultaneously, widebands are open to 3G and 4G mobile telecommunications services with uncertainties on their market, as discussed above.

This leads us to definitely long-term considerations. The excessively repeated invocation of spectrum “scarcity” actually reflects three sets of limiting factors which should be overcome.

The first is the technical ability to use spectrum efficiently. Technologies have made enormous progress in recent years, driven both by the economic necessity to extend the spectrum commercial usage and by the hugely increased data transmission and integration needs of the military. Spectrum sharing is now commonly used with more and more sophisticated tools to prevent interferences, such as dynamic access (in GSM for instance). It will expand, as will software-defined and cognitive radios, culminating 10-15 years from now in an extension of dynamic access to ever larger bands and across technologies and services. Technical limiting factors will never completely disappear, but spectrum efficiency should be greatly improved.

Secondly, administrative and economic regulations must also evolve. How spectrum usage rights, in the form of property rights or others, are assigned and handled should be reviewed, depending on usage sectors, to become more efficient. It appears, and this lesson has been learnt at a high price, that market mechanisms, under the watch of public interest, public goods care and competition monitoring, are often more clever than administrative mechanisms. Competition monitoring includes provisions that creates barriers to entry, which though impossible to surmount in all cases, are not created by the spectrum regulation and assignment process themselves. Economically driven players will have an incentive to use spectrum efficiently, unless institutions allow them to do otherwise. It is a common experience that once exclusive property rights are established, they are all the more harshly defended at an institutional level that they are not economically justified. Consequently, and as a matter of efficiency and realism, every time that a “sharing” or “open spectrum” solution seems technically feasible without evident drawbacks, it should be preferred to any other solution.

Like technology, but perhaps at a slower pace, administrative and economic regulations also make progress. Already vast and notable changes have been cleverly handled: spectrum re-farming and relocation operations have been efficiently and quietly carried out. Technical neutrality is no longer ignored in newly issued authorizations. Service neutrality is making a cautiously watched appearance while trading is being progressively introduced. Spectrum institutions, however, are anxious not to disrupt the delicate functioning of the huge and complex operation of multiple wireless devices and services. Some spectrum agencies are more optimistic than others in their administrative and technical ability to navigate on the open seas, once the Pandora’s box of market winds has been opened. However, the point is that a process has been launched and will undoubtedly gain momentum as the outcome of the whole set of “flexibility” tools being implemented is observed and assessed.

The next steps of spectrum management evolution will be determined not by ideology or reference to theoretical principles, but by experience.

Thirdly and lastly, broader social and institutional factors are to be considered. Let us only cite one example from large spectrum holders. The arguments put forward by terrestrial TV operators to keep their large and almost free spectrum share include the role they play in social and cultural diversity and their general interest obligations. These are strong requirements to be respected. Yet it remains to be seen whether they justify retaining their whole frequency domain in the digital transition. In fact, mainly historical regulations and lobby pressures are heard in the debate, more than rational and economical arguments, to examine the social role and general interest obligations of terrestrial television and, consequently, to define the conditions and extent of its legitimate access to the spectrum. In this process, a global view of the multiple broadcasting channels on TV sets: digital terrestrial, DSL, cable, satellite, would definitely be examined, in parallel.

To conclude, it appears that technical progress in wireless systems will mostly complement some market mechanisms in fostering the efficient use of spectrum, on the condition that institutional factors do not interfere (barriers to entry). In this sense, there is a good chance that the curse of spectrum scarcity can be lifted or alleviated, without a risk of degrading the current quality of radio services.

Concerning the radio services to private or business customers, debates on industrial strategies and public policies with their impact on spectrum usage and management are urgently required. They present intrinsic technical difficulties: which services, which technologies, in which frequency bands? However, furthermore, they take place on another background debate concerning the regulatory institutions in Europe and their principles for action. In this context a consensus cannot be immediately reached on future methods for the use of the radio spectrum and the appropriate management of the various frequency bands.

There has been a longstanding tradition of technical consultations on spectrum usage among government agencies and interested parties, especially within the ITU and CEPT. Since the UMTS license awarding process, there has also been a growing awareness of the shortcomings of the case-by-case, nation-by-nation approach to spectrum policy and management. CEPT, the European Commission, RSC and RSPG have now been exploring for some time possible future policies with the Commission cautiously making proposals for more coherence between spectrum policy, the internal market, the regulatory framework and competition policy. However, the risk exists of a clash between institutions and cultures, both within and across member states in the EU. The question is: what are the possible outcomes, what are the chances of coming up with a completely new and improved spectrum regime from the top?

Hopefully, in spite of these tensions and in parallel with the progress and convergence of technologies, the future is awakening in the field: frequency bands are used in a more general purpose way, a greater freedom is given for the choice of technologies, even of services. It is the emergence of a new paradigm in which flexibility is the rule and where harmonization and standardization are introduced on a case-by-case basis in view of considerations of markets and industrial situations. This paradigm of increased flexibility can include a mix of market mechanisms and institutional guidance. The environment of the radio operator in Europe is going to change, but in a more evolutionary than revolutionary way. In the interest of industry and consumers, it would be important that this evolution is made in a coordinated way throughout Europe and that the fragmentation of the market is avoided.