

# Review of Unlicensed Radio Wave Policy

Seong-Min Cha

*Department of Law, Han-Nam University  
70 Hannam-Ro, Daeduk-Gu, Daejeon 34430, Korea  
smcha@hnu.kr*

## **Abstract**

*Generally speaking, frequencies with a license are used for exclusive use for a certain period of time; whereas frequencies without requiring a license are not necessary for licenses and a large number of users who do not allow access to them can use them. With the rapid increase in the use of frequencies, policies for efficient use of such unlicensed frequencies are becoming important more and more. In this paper, I would like to derive some suggestions, after comparing and examining the management method concerning unlicensed frequency and overseas cases.*

**Keywords:** *Radio spectrum, Unlicensed spectrum, Spectrum policy, Radio spectrum committee, Ultra wideband*

## **1. Introduction**

As a rule, frequencies requiring licenses are exclusively granted the right to use them for a certain period of time, and at the same time they can receive protection from outside interference. On the other hand, frequencies unnecessary for licenses are not granted to users exclusive use rights for frequencies, but many users use this without giving rise to interference to specific frequencies. The use of these unlicensed frequencies is permitted in two forms.

First, there are strict output limitation and a method in which a user of a small output wireless device that does not interfere with an authenticated device uses the same band simultaneously with an existing user using a high output device. Second, it is a method that uses wireless devices that are certified in a frequency band distributed in a license-unnecessary frequency band like the 2.4 GHz ISM band.

Revitalization of the radio industry through opening of unlicensed frequency bands can be a very important and urgent task because of lack of frequency resources.

## **2. Radio spectrum policy type**

### **2.1. Command and control approach**

Due to concern that indiscriminate use of frequency resources, which are rare public goods, can lead to interference, in most countries, frequency resources have been strictly managed directly. In this way, the government-led "command and control" method, which had been in place when there was not a lot of commercial demand, set the reference value of the

---

#### **Article history:**

Received (July 28, 2016), Review Result (September 21, 2016), Accepted (October 01, 2016)

frequency output, the application of the related equipment and technical standards, can be controlled to a certain level by administrative regulation. This is a model that was introduced mainly for public purposes, such as national security and safety of life in particular.

However, with the rapid increase in social demand for frequency, existing command and control method faced criticism that it can interfere with efficient and flexible utilization of frequency resources. In addition, awareness that it is necessary to introduce a service-friendly and flexible frequency management method has grown, and a market-based management model and network open/shared management model have come into existence [1].

## **2.2. Market-based approach**

As Coase and other economists mentioned, frequency is also one of the essential production factors like land and labor, so it is not good that the government determine allocation of frequencies, Market-based method is a frequency management method that was born by insisting that distribution and allocation by price system are efficient. Under this system, regardless of the type of service or technology, frequencies are allocated via auction agents, and frequency resale and exercise of usage rights are free.

In addition, because frequency owner's secondary sales are made possible, reflecting the practical demand of frequency application in the market by providing opportunities for those who need the frequency to use it. It has the advantage of being able to do. However, it is pointed out that there is a possibility that the trading cost of frequency becomes excessively large, ownership of frequency becomes one of entry barriers, rather it may not reflect real demand of frequency application.

## **2.3. Open approach**

The open approach is a frequency management scheme that enables a number of entities to use frequencies without a license. According to the view supporting this system, it is not only the most efficient to make it possible to enter the market regardless of license as long as even technical standards are met so that the emergence of new mobile technologies and applications and services. It will lead to the improvement of the welfare of the user. If the technical matters comply, the possibility of frequency interference also decreases, and the "scarcity" of the frequency starts from the current system which gives exclusive rights to a specific business operator, so the conversion to the opening of the network is expected to be able to alleviate the scarcity of frequency [2].

## **2.4. Common and sharing approach**

Basically, the network sharing scheme (Common & Sharing approach) is distinguished from the network opening system in that it maintains the frequency license structure. This can be a compromise between the market-based method and the network opening method as a method of owning a frequency having an exclusive license to rent a frequency that he or she is not using to a non-licensed business. This method is free from the problem of possibility of monopoly by market-based method, can be maintaining the open attitude of new technologies and services. In addition, there is an advantage of efficiently and stably managing the frequency. However, in order to maintain the QoS of the existing service, a protection device is required from interference such as "underlay" type sharing scheme.

### 3. Overseas cases

#### 3.1. USA

In order to establish a new frequency management system as part of efforts to solve the problem of frequency shortage, the United States formed Spectrum Policy Task Force in June 2002. This Spectrum Policy Task Force studied conventional command and control method, market and sharing as a frequency management policy.

The goal of Spectrum Policy Task Force is to prepare a new direction to prevent interference, to switch from the conventional command and control to the system of property and the setting of the shared band, and to change the license or unlicensed radio wave band to take a way that users can approach frequencies in all dimensions. For this reason, the Spectrum Policy Task Force provided several frequency management policies as follows [3].

① In the noise level measurement for interference management, adopt a quantitative method such as interference temperature and set the performance specification of the receiver of the band and service through attraction measures and regulation.

② While eliminating restrictions on the use of frequencies and secondary markets, we continuously allocate frequencies for allocation and sharing through auctions in a balanced manner, and continue to apply command and control method and for traditional uses such as TV broadcasting and public safety. It means that U.S government uses the three models in a balanced manner, but keeps the supervision to clarify the direction of the frequency-related policy in the sense of sustainability.

③ Because most frequencies have already been allocated, it is necessary for personnel who are allocated frequencies to give more flexibility and accessibility to (intelligent) technology in all dimensions. In other words, the secondary user/easement user enables frequency usage under interference-free conditions (under interference temperature). This can be negotiated with market-based method and sharing method.

In the case of the United States, radio equipment is mainly categorized in association with license-unnecessary frequency. According to Part 15 of the Code of Federal Regulations (CFR), the use of license-unnecessary radio frequency in the United States is divided into three types: Intentional Radiators, Unintentional Radiators, Incidental Radiators.

Generally, unlicensed wireless devices mean Intentional Radiators based on CFR Part 15, and general small output wireless devices, band spread digital modulation devices, unlicensed PCS devices, unlicensed NII devices, Classified as UWB equipment. Regarding ISM equipment, it is regulated by detailed electric field strength reference values according to usage, output, frequency, etc. [4].

Recently, in the United States, unlicensed wireless equipment grows significantly compared to other communication and technical sector, management of license-unnecessary frequencies becomes increasingly important. Moreover, as new radio technology capable of more efficiently utilizing the existing frequency emerges and of minimizing interference, it is possible to overcome frequency shortage by efficiently utilizing the license-unnecessary frequency band. Now U.S. government is trying to construct a more flexible radio wave management system.

#### 3.2. EU

In March 2002, the European Union (EU) announces the "Framework Directive". This can be a basic framework of a new communication policy reflecting the convergence of communication and broadcasting. In this guideline, frequency policies are also mentioned.

Under Article 9 of this guideline, in the frequency policy, each Member State can take measures to enable efficient management of frequency resources and "transfer rights to use radio frequencies" [4]. In addition, the determination of the frequency announced at the same time (Radio Spectrum Decision), the EU constitutes the Radio Spectrum Committee (RSC) [5]. It was established by the 2002 Radio Spectrum Decision (676/2002/EC), the Radio Spectrum Committee (RSC) is assisting the Commission for the development of technical implementing decisions to ensure harmonized conditions across Europe for the availability and efficient use of radio spectrum. It also develops measures to ensure that information on the use of radio spectrum is provided accurately and in a timely manner.

The Committee exercises its function through advisory and examination procedures that are set out in the EU's Regulation 182/2011 of the European Parliament and of the Council of 16 February 2011. The comitology process allows the Commission to discuss its proposals with national administrations before implementation in order to ensure that any measure is optimized to the various national situations. The Radio Spectrum Committee (RSC) is responsible for specific technical measures required to implement the broader Radio Spectrum Policy. The RSC is composed of Member State representatives and chaired by the European Commission [6].

In the case of Europe, EU first tried accessing in an institutional dimension and introduced 'Wireless Access Policy for Electronic Communications Services (WAPECS). WAPECS is an initiative within the European Union to allow more flexible use of spectrum for mobile, broadcasting, fixed wireless and other electronic communication services. The WAPECS principle will be used within a set of frequency bands to be identified and agreed between the European Union Member States. In these bands all electronic communications network and electronic communications services may be offered, on a technology and service neutral basis, provided that certain technical requirements to avoid interference are met. WAPECS can apply to both licensed and unlicensed frequency bands [7].

One of the first practical implementations of flexible radio spectrum property rights was initiated in Europe in 2005 under the name 'Wireless Access Policy for Electronic Communication Services (WAPECS)'. WAPECS aimed to introduce more flexibility into the European spectrum management framework by allowing technology and service neutrality. Internationally, the European Conference of Postal and Telecommunications Administrations (CEPT) have been keen to introduce more flexibility into the international service allocation framework [8].

In fact WAPECS is understood as a system on shared technology, but it may not match the theme of the report. However, the background of WAPECS's emphasis on the necessity of rapid and flexible frequency use due to the change in the paradigm of the future communication market, and the premise of technology neutrality and service neutrality. It is judged to be worth considering when discussing measures for opening the unlicensed band as stating that it will start using the frequency flexibly.

### **3.3. United Kingdom**

September 2004 Ofcom presents reasons, mechanisms, restrictions, etc. of frequency liberalization via document "Spectrum liberalization". According to this document, efficient use of frequency, improvement of economic benefits, innovation of technology and services and revitalization of competition, minimal regulations etc. are the reasons for liberalization. And liberalization was operated to be limited only by the provisions of international treaties and EU law.

Also, they decided to introduce technology and service neutrality in allocating commercial frequencies via November 2004 "Reflected Radio Management System (SFR)" and to gradually introduce the flexibility of frequency utilization by introducing the neutrality of the service. This document presents the direction in the macroscopic dimension about the approach to decide whether to use license-unnecessary frequency or not, based on criteria such as frequency, danger of frequencies confusion, quality of service, Ofcom's legal obligation, economic value starting from the dimension of international obligation.

Ofcom announced the License-Exemption Framework Review (LEFR) incorporating a mid- to long-term operation plan of unlicensed frequency on April 12, 2007 as a concrete follow-up measure related to license-unnecessary frequency operation. LEFR provides very useful information to understand the outline of the UK unlicensed frequency management policy over the next 20 years.

#### **4. Conclusion**

Early frequency management regimes restricted by commands and control schemes have been diversified with market-based methods or network opening methods, supported by market needs for efficiency and new service technologies. From the viewpoint of the market-based method, the greatest problem of command and control method is seen as inefficiency of government regulation, and on the network sharing method, the licensing award system is pointed out as a problem. In other words, it means that the licensing system creates frequency policies in a very rigid regime, and it creates a harmful effect of privatizing and monopolizing public frequency [9].

As explained above, since each strength and disadvantage of each frequency management method coexists, the frequency management method implemented in a specific country (market) at a specific time, reflecting the market specificity. Then it deforms little by little in the default form or takes on a form in which one or more methods are negotiated. The frequency management policy of major countries described above can also be known to have such a form. Therefore, taking into consideration the domestic radio wave policy and law at the present level of technology, the structure of market competition, economic efficiency, market environment, etc., the regulator should establish and harmonize the command and control method, market-based method and frequency release method.

#### **References**

- [1] E.J. Kim, J.H. Choi and S.J. Lee, *International Telecommunications Policy Review*, Vol. 21, No. 4, (2010).
- [2] E.M. Noam, *Journal of Law and Economics*, Vol. 56, No. 2, (1998).
- [3] FCC, *Spectrum Policy Task Force Report*, (2002).
- [4] I.K. Lee, "A study on Radio spectrum management in Korea", National Radio Research Agency, (2011).
- [5] EC, "Directive 2002/21/EC of the European Parliament and of the Council on a Common Regulatory Framework for Electronic Communications Networks and Services (Framework Directive)," *Official Journal of the European Communities*, (2002).
- [6] <https://ec.europa.eu/digital-single-market/en/radio-spectrum-committee-rsc>, (2016).
- [7] <http://www.telecomabc.com/w/wapecs.html>, (2016).
- [8] M. El-Moghazi, J. Whalley and J. Irvine, *Telecommunications Policy*, Vol. 40, No. 8, (2016).
- [9] M.C. Faulhaber, *Information Economics Policy*, Vol. 18, No. 3, (2006).

***This page is empty by intention.***