

Study on pre-post Regulation of Radio Wave Management in Major Developed Countries

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Abstract. There propagate use management paradigm in developed countries is changing as Command & Control ⇒ Market Based ⇒ Open Access ⇒ Manage By Technology & Technical Analysis, that the policy response to environmental changes, such as a variety of new technologies. The emergence of service, the proliferation of propagation users It is to activate the market. However, the basic principles of radio management such that the change of paradigm be used to spread in a range that does not affect the interference, such as the horn is to be observed. Around the world in order to prevent the propagation and utilization Horn interference enacted regulations for managing the radio station, and also discipline.

Keywords: Radio Regulations, radio control, radio station, also permit system, reporting system, inspection system.

1 Introduction

In the International Telecommunication Union (ITU) Radio Regulation, electromagnetic waves are defined as frequencies below 3000 GHz that spread into space without artificial induction, and Korea follows international definitions. Propagation is an electromagnetic wave that propagates in space without artificial induction and has a frequency within the range defined by ITU. The frequency of the dual service is up to 300GHz. Of the distributed frequencies, more than 90% of the daily frequency band we contact daily is less than 3GHz. Anyone can generate radio waves by transmitting equipment, but it can occur indefinitely without depletion. However, if frequency propagation is used in the same time and space, horn interference occurs and radio wave resources become unavailable. Due to the physical limitations of such use, Korea has enacted radio control laws for the first time in 1961 to allow the state to manage radio resources and to use radio waves only when granted rights.

2 ITU(International Telecommunication Union) RR Regulation

2.1 Radio Resource Management

Radio station licenses stipulate that not all radio stations can operate without the license issued by the competent administration or government entrusted authority, and they include the obligation to inspect radio waves for efficient management of radio resources.

Inspection 1 of a radio station shall observe the technical characteristics of a radio station specified in the Radio Regulations, including the frequency tolerance of radio waves used in a radio station, spurious emission power, and allowable power level, in order to ensure efficient use of frequency.

Table 1. Test items of measuring equipment

Measuring Equipment	Measuring parameters
Spectrum analyzer / measurement receiver	Frequency, bandwidth, jeonge intensity, harmonics, intermodulation enemy, Spurious
Signal analyzers, antennas	Frequency bandwidth, power, harmonics, intermodulation enemy, spurious, modulation
Frequency meter	Frequency and frequency deviation
Meter, directional coupler, load resistance	The transmitter output (echoes)
Calibrated antenna / field strength meter	Field strength
The power flux density meter	Electrical, magnetic and electromagnetic field strength
Modulation Analysis	Mediated modulation of a specific signal type variables, and additional signals
Remote meter and odometer, tape measures	Antenna height and distance
Compass	Antenna azimuth
GPS	A station location

Radio station check 2 shall take measures to eliminate interference by minimizing power copying, distress and interference with safety frequencies, occupied bandwidth and spurious emissions from all stations of all stations. Inspection of aircraft and ship stations shall be conducted by each country to check the adequacy of the radio facilities and radio installations of aircraft stations and ship stations.

2.2 Interference Prevention Management

Propagation uses the same frequency band at the same time and space and has a physical characteristic (3 million km of free space propagation per second) that determines the range of the space according to the transmitter output. Due to these characteristics, if there are effects such as inter-country propagation menstrual period and horn interference, it may cause communication disorder and other accidents. The use management paradigm is changing from Command & Control ⇒ Market Based ⇒ OpenAccess ⇒ Manage By Technology & Technical Analysis for the policy response and market revitalization of environment change such as the emergence of various new technologies and services, to be.

3 Domestic Radio Management System

3.1 Pre-post regulation of radio stations

Domestic stations are allowed to enter the frequency assignment method among the three frequency assignment methods (assignment, assignment, and approval) of the radio management system. The frequency designation means that the policy authority designates a specific frequency to be used by a radio station established by permission or notification(Article 2, Item 4 of the Radio Law), and permits the future creation science minister to use a specific frequency for each radio station(Article 21, Item 2 of the Radio Law).

Table 2. Dictionary of the country. Post Regulation

Country	Pre-regulation	Post Regulation
Korea	<ul style="list-style-type: none"> • Completion of inspection (in the case of the light station sampling inspection) • Change tests 	<ul style="list-style-type: none"> • Periodic Inspection (1-5 years), the electromagnetic strength measurements, radio monitoring / inspection, and temporary inspection
USA	<ul style="list-style-type: none"> • Stations construction permit (Act 319 trillion) environmental impact assessment (Environment Assessment) • (General Stations) coordination duties • (For operators) User Community inter-regional coordination obligation of the installation permit, etc. 	<ul style="list-style-type: none"> • FCC monitoring / interference Survey / Inspection • (Biennial conducted in private ABP (Alternate Broadcast Inspection Program)) • Periodic inspection stations

Japan	<ul style="list-style-type: none"> • Completion of inspection (proof of appropriate technical standards for radio equipment received is completed in checks omitted) • Change tests 	<ul style="list-style-type: none"> • Periodic Inspection (1-5 years), radio monitoring / inspection, temporary inspection
Australia	<ul style="list-style-type: none"> • Radio stations established by private operators (Accredited Persons) • Compliance with the Australian Communications Industry Forum installation rules (ACID) • Install the permission of local councils 	<ul style="list-style-type: none"> • ACMA monitoring / interference investigation • Random Inspection
England	<ul style="list-style-type: none"> • For general-purpose stations or Site Clearance Coordination conduct • LPA on the providers after prior approval for installation work 	<ul style="list-style-type: none"> • Ofcom monitoring / interference Survey / Inspection • Entrusted to private agencies

In particular, the permission for the establishment of a radio station prescribed in Article 21 of the Radio Law is examined in advance in the following 4 paragraphs, as follows: ① whether or not the frequency specification is possible; ② whether the radio equipment to be installed or operated is the 45th ③ whether or not the deployment plan of the radio worker is in conformity with the qualification and placement standard in accordance with Article 71 of the same Act, ④ whether or not it conforms to the opening conditions of the radio station pursuant to Article 20-2 of the same Act It is judging. Accordingly, in order to confirm whether the frequency can be designated for each radio station type, it is judged whether or not the compatibility with the frequency distribution table and the radio wave designation criterion is compatible, the suitability of the technical standard prescribed for each radio station type is judged, Review and authorize worker qualifications.

4 Pre-and post-regulation System of Radio Wave Management in Major Industrial Countries

4.1 Pre-emptive Regulatory System for Radio Control of Major Industrial Countries

Each country has a radio management system suitable for its own country in consideration of its legal, cultural and geographical characteristics for the efficient use of radio resources and the convenience of users. Commonly, it has radio control system of pre-regulation (virtuous circle structure) and post-regulation (post-circulation structure). Each country's pre- and post-regulations are as follows.

4.2 US: Construction Permits, Coordination, Environmental Impact Assessment

Establishment of a radio station, construction license, coordination, and environment assessment that are subject to pre-operation regulation.

The inspection work is carried out by the FCC's Enforcement Bureau (EB) and has four regional offices and 24 field offices. Field offices conduct regular field surveys, equipment inspections, radio equipment inspections, cable systems, antenna structures, and disaster assistance.

4.3 Australia: Authorized Authorization Agency

ACMA has a headquarters office and eight operation centers in four urban areas, and 81 employees are in charge of radio management. In addition to the ACMA, private licensees are allowed to perform all licensing and frequency license related licensing tasks with the accreditation system. Accredited Persons (APs), as of March, have 34 operators, which are related to the issuance of frequency allocation certificates (FACs) related to Apparatus Licenses on behalf of ACMA and the issuance of spectrum licenses (IICs) 4).

4.4 UK: Pre-adjustment, Site Clearance, Pre-Approval

In Ofcom, if a station is a Customized type, where there is concern about interference from other bands and frequencies, Coordination is implemented to prevent interference. In particular, the "Site Clearance or Coordination" is strictly enforced for the establishment of radio stations in public frequencies such as government and civil aviation. In the case of base stations of mobile communication operators, Pre-Approval of Regional Planning Agency (LPA)). The Regional Planning Agency will review the adverse effects of the establishment of radio stations, such as compliance with technical standards, environmental friendliness and common use, and the intensity of electromagnetic waves for 56 days, and approve the establishment of radio stations if the conditions are satisfied.

4.5 Japan: permission / inspection system

The Ministry of Internal Affairs and Communications is carrying out licensing, inspection and surveillance work in the Regional Comprehensive Communication Supervision Bureau of the Comprehensive Communication Infrastructure Bureau. (Regular, complete, and change inspections are carried out by "registered inspectors" (329 companies)). Technical conformity certification / construction design certification system is put in place, and the completion inspection is omitted and exempted for some radio stations. In Japan, more stringent regulations are applied than in Korea in order to protect human bodies and interferences. For example, in Japan, there is still a proof of cellular phone verification system deregulated in 2000

in Japan. Species define a part of the Radio Law and most of them are defined in the Enforcement Rules of the Radio Law. In Japan, there are 27 jobs and 48 stations. In particular, it should be noted that radio stations and services not specified in the current Radio Regulations are specified in the Enforcement Regulations of the Radio Regulations so that they can be specified separately.

5 Conclusion and Future Direction

(RR Article 0.6), to secure the frequency of distress and safety purposes and to protect against harmful interference (RR Article 0.7), to prevent interferences and conflicts between countries, to promote the use of limited radio resources and geostationary satellites in a rational and equal manner (RR Article 0.8), promotion of efficient and effective operation of radio communication (RR Article 0.9), and establishment and regulation of new wireless communication technology application (RR Article 0.10).

Radio license permits all radio stations to operate without a license issued by the competent administration or government entrusted authority, and includes an obligation for inspection to ensure efficient management of radio resources (RR Article 18.1).

Inspection of a radio station shall comply with the technical characteristics of the radio station specified in the Radio Regulations, such as the frequency tolerance of the radio waves used by the station, the spurious emission power, the permissible power level, etc. in order to ensure the efficient use of the frequency (RR Article 3). Each country shall take measures to eliminate interference by minimizing power duplication, distress and interference with safety frequencies, occupied bandwidth and spurious emissions of all stations (RR Article 15).

Inspection of aircraft stations and ship stations in each country shall inspect the adequacy of radio installations and arrangements of radios for aircraft and ship stations (RR Articles 39 and 49).

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