

RADIO SPECTRUM MANAGEMENT - - A PROCEDURE IN PERMANENT EVOLUTION

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Abstract

Main aspects of Radio Spectrum Management are presented. A general description of electromagnetic waves, their parameters and the way radio waves can apply to communications and broadcasting are shown. Concepts of radio service allocations, assignments and their presentation in a band plan, and radio interference are also explained. Radio spectrum and main elements for its management are described. Generally employed national spectrum management procedures, and its international coordination are covered. Spectrum monitoring and spectrum management interaction is explained. Administrator's tasks in different world regions and international spectrum organizations are succinctly explained. New technologies impact on spectrum management is analyzed.

1. Summary

An electromagnetic wave is a combination of electric and magnetic fields that propagates through space. It is characterized by certain parameters such as its frequency and power. Radio waves, which are part of the electromagnetic spectrum, can be used to send and or receive information. To perform these tasks, radio waves must be modulated, which can be performed analogically or digitally by different methods.

According to the purpose and nature of the information to be sent, received or interchanged, radio emissions can be classified into radio services. An important factor to consider in obtaining the useful employment of radio waves is interference. Interference can be classified as harmful or not harmful, and also according to its frequency relative to an interfered station, and if interference is intentional or not.

Electromagnetic spectrum is the set of all possible frequencies of the electromagnetic waves. The radio spectrum is arbitrarily defined internationally, by treaty, as the part of the latter below 3 000 GHz. It is divided into frequency bands. The radio spectrum can be mapped by allocating a certain or certain bands to each type of radio service. This is called a band plan, which can also contain allocations to specific radio services. Each nation has its own band plan, which should be more or less compatible with the ones of other countries. Then, each station can only be assigned a frequency belonging to its service and corresponding allocation.

Spectrum management is the way the radio spectrum is administered so as to ensure that it is available for users as much as possible without interfering with each other, and is available in the most effective way. The mentioned management involves engineering and administrative procedures. Engineering procedures distribute the frequencies according to their technical specifications so as to maximize their performance and assure the coexistence between all users through assignment of frequencies and technical specifications for each station, and then coordinate them with stations in other countries and agree standards for achieving the mentioned tasks. Administrative procedures deal with the maintenance of the radio station databases, station authorizations, and payment of appropriate station fees.

Besides providing input for law enforcement, spectrum monitoring is an important complement of spectrum management. Monitoring can be made routinely at a spectrum manager's request by measuring a sample of the radio stations managed, or monitoring may be triggered by complaints. In either case, it provides a useful feedback for the spectrum manager.

Each country has an entity responsible for spectrum management, which is called its Administration, and which reports either directly or indirectly to the government. In some countries, Administrations delegate certain tasks (e.g., assignments, authorizations) to other entities, which may be private, or not. The Argentina Spectrum Administration is the Secretaría de Comunicaciones, which delegates certain administrative tasks and certain authorizations to the Comisión Nacional de Comunicaciones and to the Comité Federal de Radiodifusión.

A country's spectrum Administration is linked to decisions and or recommendations of the International Telecommunications Union (ITU) or to regional Committees such as CITELE in the Americas, CEPT in Europe, and APT in Asia, among others.

The traditional way of administering a radio spectrum with services that have a certain frequency and certain bandwidth is now changing. The reason for the latter is that certain new radio communications systems, such as Ultra Wide Bandwidth, which occupy a great spectrum part, or technologies such as Software Defined Radio or Cognitive Radio, which provide great flexibility to radio communications, will change many spectrum management concepts.