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**TELECOMMUNICATION  
DEVELOPMENT BUREAU**  
**ITU-D STUDY GROUPS**

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SECOND MEETING OF STUDY GROUP 2: GENEVA, 6 - 10 SEPTEMBER 1999

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*FOR INFORMATION*

Question 9/2: Identify study group Questions in the ITU-T and ITU-R Sectors which are of particular interest to developing countries and systematically, by way of annual progress reports, inform them of the progress of work on the Questions to facilitate their contributions to the work on those Questions as well as, ultimately, to benefit from their outputs in a timely manner

## **STUDY GROUP 2**

**SOURCE:** AGRA SPECTROCAN (CANADA)

**TITLE:** RADIO STATION LICENSING, ADMINISTRATIVE AND ECONOMIC  
BENEFITS OF COMPUTER ASSISTED RADIO SPECTRUM MANAGEMENT

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**Abstract:** The document exposes the advantages of a computer assisted Radio Station Licencing in order to have an automated and effective Radio Spectrum Management.

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## **Executive Summary**

One of the fundamental principles of managing the radio frequency spectrum is licensing radio stations correctly and in accordance with the established radio regulatory process.

A radio station licensing program should be self funding. In fact, an entire program of radio spectrum management within any country can be funded within a reasonable amount of time on the basis of conscientious and consistent application of established rules.

Many developing countries have been slow to establish an effective program of radio station licensing because there is a general lack of appropriate knowledge, essential tools, and other necessary resources.

As has been pointed out<sup>1</sup> Canada is in a unique position where radio spectrum management has been developed into a nearly exact science and has operated with considerable success for many years, both technically and economically. It is through these successes that Canada is positioned to assist developing nations through technology transfer policies and through the assistance of the International Telecommunication Union.

## **Radio Spectrum Management Defined**

Radio spectrum management is the process of administering the radio frequency spectrum under a framework of law, radio communication policy, and associated operational procedures. Spectrum management is international in scope regulated internationally by the International Telecommunications Union (ITU) and domestically by government bodies typically described as spectrum management administrations.

The purpose of radio spectrum management is to ensure equitable distribution of radio frequencies to radio services so that, when taking wavelength propagation, geography, and technical characteristics of individual stations into consideration, they can operate in harmony with existing radio stations in the same geographical or wavelength environment.

Radio communication technology is progressing at a rate that has, in recent years, put considerable strain on existing radio spectrum allotments and has forced significant adjustments and direction of radio communication policy and planning. An example of this is that in most metropolitan centers the radio spectrum is in such high demand that radio frequencies, in the land mobile service in particular, must be assigned on a shared basis to compatible types of operation in the same geographical areas. Another example is Trunked Radio for dispatch operations and Cellular radio for radio telephone operations that require scarce frequency allotments exclusive to these types of operation. And radio communication in the space service has opened a whole new industry in personal, business, and military operations that will continue to grow well into the future.

Radio communication is vital to the cultural and economic development of any nation. Effective management of the radio spectrum assures efficient interference free operations, enhanced safety in land, sea, air, and space operations and protection of national cultural initiatives. The radio spectrum is a valuable resource and must be protected from inappropriate use. When the radio spectrum is administered by skilled regulators, with the proper tools, the benefits are enormous.

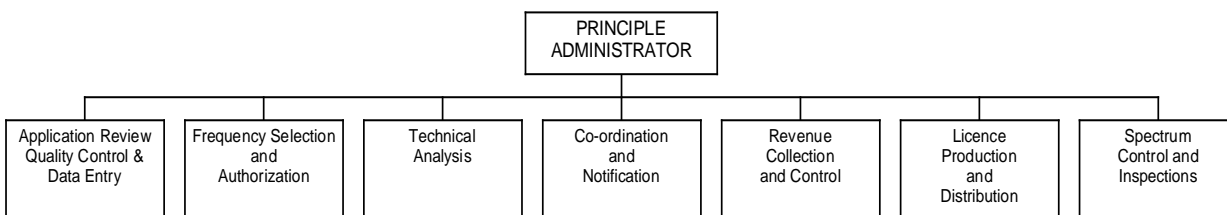
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<sup>1</sup> ITU SG-2, Aerosystems International Inc., September, 1998

## Radio Station Licensing

Every radio station must operate in accordance with the radio regulatory process<sup>2</sup>. This means that radio stations must be licensed by a competent radio spectrum management authority. Properly licensed radio stations will ensure a complete and correct database. With a complete and correct database computer-based technical analysis assures compatibility of proposed frequency assignments against existing frequency assignments.

Licensing radio stations is a means of protecting sovereignty of radio services and who may own and operate a radio station within a nation. Unlicensed radio stations mean that the database is incomplete and the owner/operators are not in compliance with the law. Properly licensed radio stations ensure a complete database and interference free operations. A typical radio station licensing administration is described in Table 1.



**Table 1 Typical Structure of a Radio Station Licensing Administration**

Radio stations are licensed on the basis of each station operating in a specific radio service at a specific geographical location. One licence may have many frequency assignments and each assignment may have different technical parameters. Each frequency is authorized on the basis of technical specifications that determines radio coverage.

A radio station licence consists of administrative, technical, and regulatory information that not only describes a station but also outlines the jurisdictional terms under which it may operate. Information on a radio station licence should be stored in a database that can be retrieved easily for reference, mitigation of harmful interference, and enforcement.

## Computer Assisted Radio Station Licensing

When considering the complexity and the need for accuracy and integrity in the spectrum management process the most logical approach to managing the radio spectrum is through computer assisted operations that can process vast amounts of information and can perform calculations rapidly, consistently, and accurately.

Spectrum managers are skilled administrators who may specialise in one or many areas of spectrum management such as radio communication policy, financial administration, technical analysis, and engineering. One of the most important responsibilities in the spectrum management process is

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<sup>2</sup> ITU Radio Regulations, Article 24. Individual administrations may also enforce this principle through domestic regulations.

maintaining a computer-based information system that can be relied upon to produce accurate calculations such as in licence fees, technical analysis, and spectrum planning. Skilled and dedicated staff are essential to spectrum management objectives.

A computer-based radio station licensing system should consist of all relevant technical, administrative, and financial applications applied in a radio spectrum management program.

### **Spectrum Planning**

*The Table of Frequency Allocations*<sup>3</sup> describes how the radio spectrum is divided into bands of frequencies and made available to different types of radio services.

*Channelling Plans* are developed on the basis of the Table of Frequency Allocations and describe first and last assignable frequencies (channels) within an allocation. Channelling Plans also describe channel spacing and band separation for two frequency (duplex) operations. Channelling plans are normally specified in spectrum management policy that outlines technical and administrative requirements on how channels are to be assigned.

*Sub Allocation Plans* are based on the distribution of radio channels to specific types of services. Sub Allocation Plans are critically important to the success of safety and other services such as those among police, fire, ambulance, and civil emergency operations.

### **Administrative Benefits of Automation**

When effective management techniques and computer-based applications are employed in a spectrum management administration radio station licensing efficiency is improved. Improved efficiency results in a reduction in the number of unlicensed radio stations. The immediate benefits are increased revenue and a more complete and accurate database on which to base critical decisions.

With an improved database and correctly formulated channelling plans frequency assignments can be selected with greater confidence in knowing that an assigned frequency is not likely to result in harmful interference.

As harmful interference problems are resolved or avoided the regulator benefits by being seen as more efficient, responsible, and reliable.

As radio spectrum management efficiency improves the public is more likely to be more positively responsive to the role of the regulator and will be seen as an important member of the community.

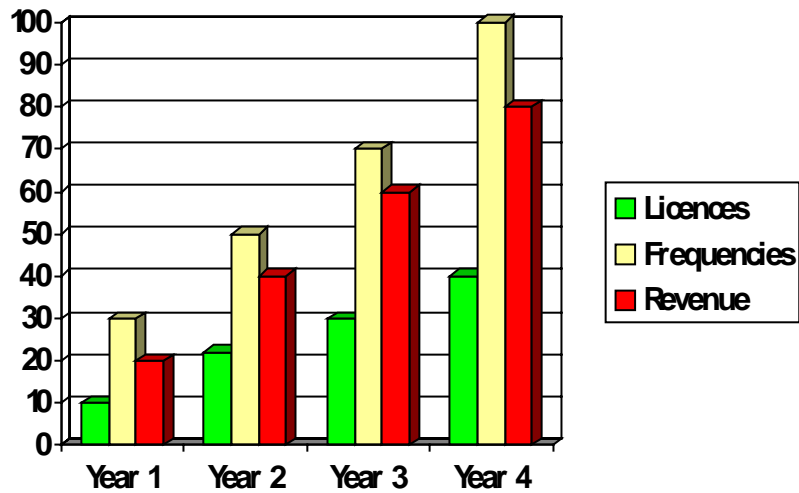
### **Economic Benefits of Automation**

A radio regulatory administration that does not apply consistent policy will not obtain proper benefits. The number of radio station licences, assigned frequencies, and collected revenue will not likely be stable enough for correct planning and forecasting.

Radio licence, frequency, infraction penalties, and spectrum service fees are based on the value of the radio spectrum and on fundamental principles of cost recovery. Revenue administration is an important and integral part of the radio spectrum management process.

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<sup>3</sup> ITU Radio Regulations, Article 8



**Table 2 Expected Revenue Growth Subsequent to a Conscientiously Applied Computer-Based Radio Licensing Program.<sup>4</sup>**

Effectively applied automated applications will be self funding well within a two year period and will permit costly upgrades as and when required without putting the burden of cost on other programs or the tax payer.

When computer-based application processing is installed and with proper training and direction it is shown that the regulatory process stabilises and revenue typically increases dramatically within a few years. Table 2 illustrates how revenue typically increases in a short period of time subsequent to the installation and conscientious application of a computer-based radio station licensing system. The figures in Table 2 are not based on actual data but are meant only to illustrate expected growth.

Computer-based operations also facilitate database control and significantly reduce the incidence of error and inconsistent application of policy.

### **Action Required**

Interested Administrations engaged in telecommunication policy, telecommunication regulators, and other interested parties, are encouraged to contact the author as noted in the covering page. Mr. Drew will be happy to discuss the benefits of automated spectrum management, Canadian accomplishments in the discipline, and willingness to support other administrations in the economic benefits of applying computer technology in the radio station licensing process.

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<sup>4</sup> The figures illustrated are not based on actual data but are meant only to illustrate expected growth.