

**SPECTRUM
MANAGEMENT
PROGRAM**

**GESTION
DU SPECTRE**



SPECTRUM MANAGEMENT IN CANADA



**Communications
Canada**

THE CANADIAN ENVIRONMENT

Canada is a country of vast distances, separating and characterizing its population by a landscape and climate that is as extreme as it is beautiful — from rugged, rocky mountain ranges, endless prairie grasslands, lush valleys interconnected by lakes and rivers, to coastal borders reaching into the Atlantic, Arctic and Pacific oceans. As a result of these geographical realities, Canadians need efficient and reliable communications.

To a large degree, Canada's communications are carried by radio services, that link together six time zones extending from the Atlantic to the Pacific and keep

remote northern communities in touch with the rest of the country. On a typical morning, we listen to our favourite radio program over breakfast while a satellite relays the latest weather information, aircraft take off and land, an ambulance rushes to an emergency, commuters beam open their garage doors, and transit authorities keep buses on schedule using their mobile radios. The intensive use of radio communications is an integral part of Canadian life.

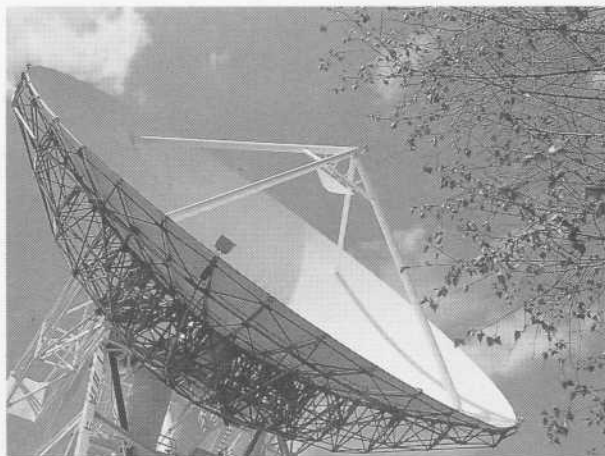
THE SPECTRUM

The spectrum can be compared to an electronic highway that carries information rather than vehicles. Like a highway, the spectrum can accommodate only so much traffic before the activities of one user interfere with those of another. It is possible, however, to enhance the spectrum's carrying capaci-

ty by improving technical characteristics and by controlling the flow of traffic.

In practical terms, this means developing regulations, effective technical standards, and the policy and procedures to apply them. Communications

Canada — through its spectrum management offices across the country — ensures the fair and adequate accommodation of an amazing array of radio services:



Spectrum Management ensures the fair and adequate accommodation of an amazing array of radio services, including satellite communications.

- radio and television broadcasting;
- mobile radio;
- long-distance telecommunications, both voice and data services such as telephone and facsimile;
- satellite communications;
- air traffic control and instrument-landing systems;
- emergency service communications, such as police and fire radio services;
- shipboard navigation and communications facilities;
- cellular radio;
- paging services;
- dispatch for couriers and taxis;

- radio linkage with computer data bases, such as those used by police retrieving information from the console in their car; and
- domestic applications, such as home security systems, cordless phones and garage door-openers.

International Co-operation

Since the spectrum recognizes no political or geographical boundaries, there is an important international dimension to spectrum management.

Communications Canada represents Canada in the International Telecommunication Union (ITU), the United Nations agency that

■ **The CN Tower, Toronto — the tallest communications tower in the world**



■ Monitoring the airwaves

co-ordinates the use of radio and telephone communications throughout the world. It is within the ITU that international radio regulations, including the allocation of frequency bands to be used for the different radio services, are negotiated.

Communications Canada is responsible for managing the domestic use of the spectrum within this international framework. To do this, the department engages in such activities as:

- spectrum planning and engineering;
- assigning frequencies to users;
- issuing radio and television broadcasting certificates;
- licensing radio stations;
- certifying radio operators (such as amateur and marine-radio operators);
- evaluating and developing new technologies, techniques or methods to improve spectrum utilization and efficiency;

■ developing standards for equipment and systems and testing and approving equipment for use in Canada;

■ monitoring the operations of Canadian users to ensure they respect their assigned frequencies in accordance with approved technical specifications and standards; and

■ establishing standards to control pollution of the spectrum by sources of radio noise.

A COLLABORATION WITH CANADIAN INDUSTRY

Not all of these activities are carried out exclusively by Communications Canada. Effective spectrum management requires the collaboration of many experts, and collaboration is a way of life in Canada's communications sector.

The close co-operation that exists between government and business is vital to Canada's spectrum management.

Communications Canada uses industry advisory boards as fora for sharing information on standards and technology. And private companies have contributed substantially to Canada's sophisticated spectrum management system as consulting engineers, designers and suppliers of computer equipment and software.

As a result of this collaboration in developing spectrum management

technology, the Canadian spectrum management system is efficient, effective and state-of-the-art — from concept and design capability to equipment specifications and standards. This continuous exchange of information ensures that the Canadian communications system works efficiently for both public and private sector use. Access, availability and quality are the hallmarks of spectrum management in Canada.

ACCESS, AVAILABILITY AND QUALITY

Competition among nations for usable spectrum is intensifying. Advances in distribution technologies, such as satellites, call for greater international co-operation to plan the use of limited space in the geostationary satellite orbit and to

co-ordinate spectrum regulations. Communications Canada negotiates international agreements to ensure that Canada has access to its share of the usable spectrum to meet its current and anticipated needs.

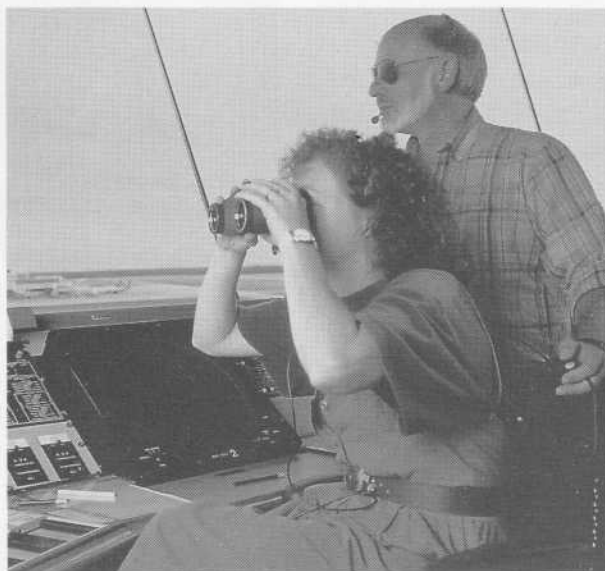
Once Canada's share of the spectrum has been negotiated, Communications Canada makes portions of that share available to Canadians by planning for the utilization of frequency bands, assigning frequencies, issuing radio station licences, and technical certificates for broadcast stations.

In recent years, technological advances have rapidly increased the demand for new radio services and equipment. This accelerated introduction of new and changing technologies into an already complex and limited spectrum environ-

ment has posed a constant challenge to efficient spectrum management.

Beyond the narrow belt of Canada's southern border, this country is vast and sparsely populated. Consequently, Canadians rely on all types of radio services to communicate. In addition, the steady growth of our urban areas has increased the demands on the available spectrum, making it more difficult for spectrum managers to give as many users as possible the access they need.

With the use of highly sophisticated and specialized computer systems, however, Communications Canada has been able to handle effectively an explosive growth in the number of licences issued. During the past 10 years the number has doubled, while the resources to handle the volume have decreased. At the



Air traffic control and instrument-landing systems



same time, the Department has managed efficiently the significant shifts in the types of services carried on the various portions of the spectrum.

Through three interrelated activities — spectrum planning and engineering, authorization and control— Communications Canada tries to ensure fair access for all service needs.

■ **Emergency service communications**

Spectrum Planning and Engineering

International regulations specify an array of possible service options for the various frequency bands in different regions around the world. Using these guidelines, Canadian spectrum managers draw up a set of frequency allocations to distribute the various radio services across the country.

To accomplish this task, spectrum engineers must accommodate the technical requirements of each radio service, such as the amount of information to be transmitted and the

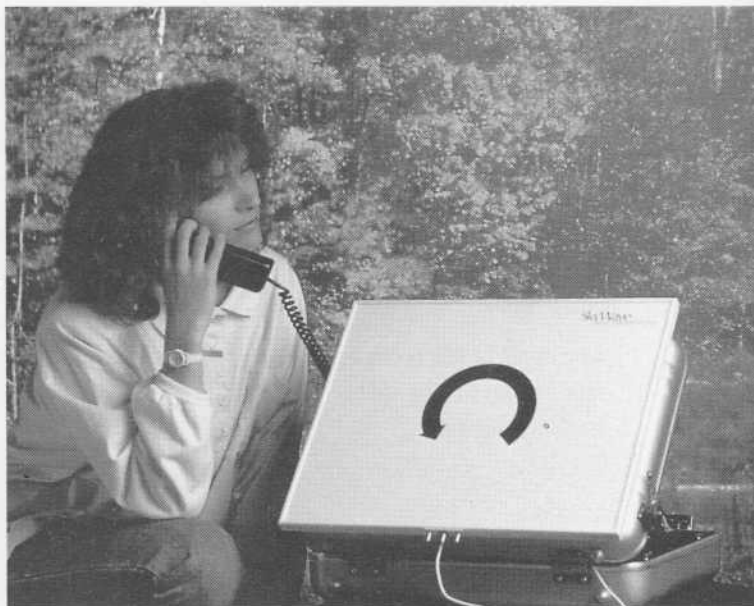
distance to be covered. In many cases, the operational characteristics of a radio system can only be determined by performing tests and measurements in research laboratories and in the field.

Based on the results of these research activities and other technical factors, new technologies that improve spectrum utilization and efficiency are evaluated and developed, and criteria are established for assigning frequencies to particular types of services. In this manner, spectrum managers plan for current and anticipated use, and

determine the standards governing equipment, systems and operating procedures.

All of these decisions are published for potential users in legislation, regulations, policies, technical standards and procedures, which are constantly revised to accommodate the rapid pace of technological change, regional and local needs, and the variety of services offered in each part of the country.

■ **The introduction of new technologies relies on effective spectrum management.**



Authorization

It is largely through its system of licensing that Communications Canada regulates spectrum use in Canada. Licences and broadcasting certificates are issued to applicants for a specified period of time in accordance with established legislation, regulations, policies and procedures, and technical standards.

Canada considers radio frequencies to be a national resource, to be allocated for the optimum good of everyone. Most radio facilities are, therefore, regulated, from the largest national broadcasting station to the smallest "ham" radio operation — including mobile radio systems, satellites, microwave relay stations, aeronautical and maritime navigation beacons, and airport instrument-landing systems. In most cases, licensing is carried out as close as possible to the applicant at regional and district offices across Canada. (A list of regional offices is included in this brochure.)



While Communications Canada manages the spectrum for the benefit of all users, licence fees help ensure that the cost of managing the radio spectrum is recoverable.

Spectrum Control

Monitoring and inspection are essential components of spectrum management, ensuring that all users are operating within the terms of their authorization without interfering with other radio users.

The periodic inspections of radio installations falls under the category of preventive monitoring. To promote operating in

■ Shipboard navigation and communications

accordance with technical standards, licensees are told of any discrepancy and are given a specified period to correct the problem. Those who do not comply may find their authorization suspended or revoked, or they may be charged under the *Radiocommunication Act*. In addition, monitoring stations and district offices across the country carry out surveillance of all bands of the spectrum,

sampling the spectrum and analysing frequency use to make sure that signals conform to established criteria.

The inspectors also investigate complaints of radio interference, often using mobile monitoring equipment or stations — vehicles specially equipped to carry out on-site investigations. Interference can result from many things — unauthorized radio signals or electrical equipment that emits radio noise, for instance. Communications



■ Investigating radio interference

Canada has recently developed and introduced the "integrated remote monitoring apparatus" increasing the ability to manage spectrum over greater distances. Monitoring stations and their associated technology are designed and built in Canada and have earned great international respect for their excellent spectrum monitoring capability.

■ A delicate balance is needed between uniform national similarities and unique regional differences.

THE CHALLENGE OF REGIONAL DIVERSITY

The heavily populated areas of Canada are concentrated along its southern border where spectrum congestion parallels population density. Standards governing spectrum use in these urban areas must be high enough to ensure the quality of services and, at the same time, allow room for future growth.

In setting such standards, however, a delicate balance is needed between uniform national similarities and unique regional differences. Tighter spectrum standards required in urban areas can

inhibit the growth of radio services in less populated rural areas, especially in Canada's North. To ensure comprehensive planning, information from regional activities is fed back to the Department's national office in Ottawa — closing the spectrum management loop by updating planning information.

Most aspects of spectrum management are more effectively handled in the district and regional offices of Communications Canada. For example, monitoring compliance with spectrum regulations has always been a field activity. As part of the Department's on-going commitment to provide a spectrum management system that addresses the needs of all Canadians, licensing activities are increasingly tied to each region's unique characteristics.

FOR MORE INFORMATION

Canada's electronic highway is one of the busiest and most advanced in the world, and our management of the spectrum is among the most sophisticated.

For more information about spectrum management in Canada, please refer to the Blue Pages of your telephone directory under "Communications Canada" in the federal government listings. Or, contact:

Spectrum Management — National Office

Communications Canada
300 Slater Street
OTTAWA, Ont.
K1A 0C8
Broadcasting Regulation
(613) 990-4820
Facsimile: (613) 954-6091
Radio Regulatory Branch
(613) 990-4817
Facsimile: (613) 993-4433
Engineering Programs
(613) 990-4799
Facsimile: (613) 952-5108

Atlantic Regional Office

Terminal Plaza Bldg., 7th Floor
1222 Main Street
P.O. Box 5090
MONCTON, N.B.
E1C 8R2
(506) 851-6525
Facsimile: (506) 851-6502

Quebec Regional Office

Suite 306
715 Peel Street
MONTREAL, Que.
H3C 4S2
(514) 283-2307
Facsimile: (514) 283-5157

Ontario Regional Office

9th Floor
55 St. Clair Avenue East
TORONTO, Ont.
M4T 1M2
(416) 973-8215
Facsimile: (416) 973-6176

Central Regional Office

Room 200
386 Broadway
WINNIPEG, Man.
R3C 3Y9
(204) 983-4391
Facsimile: (204) 983-3182

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