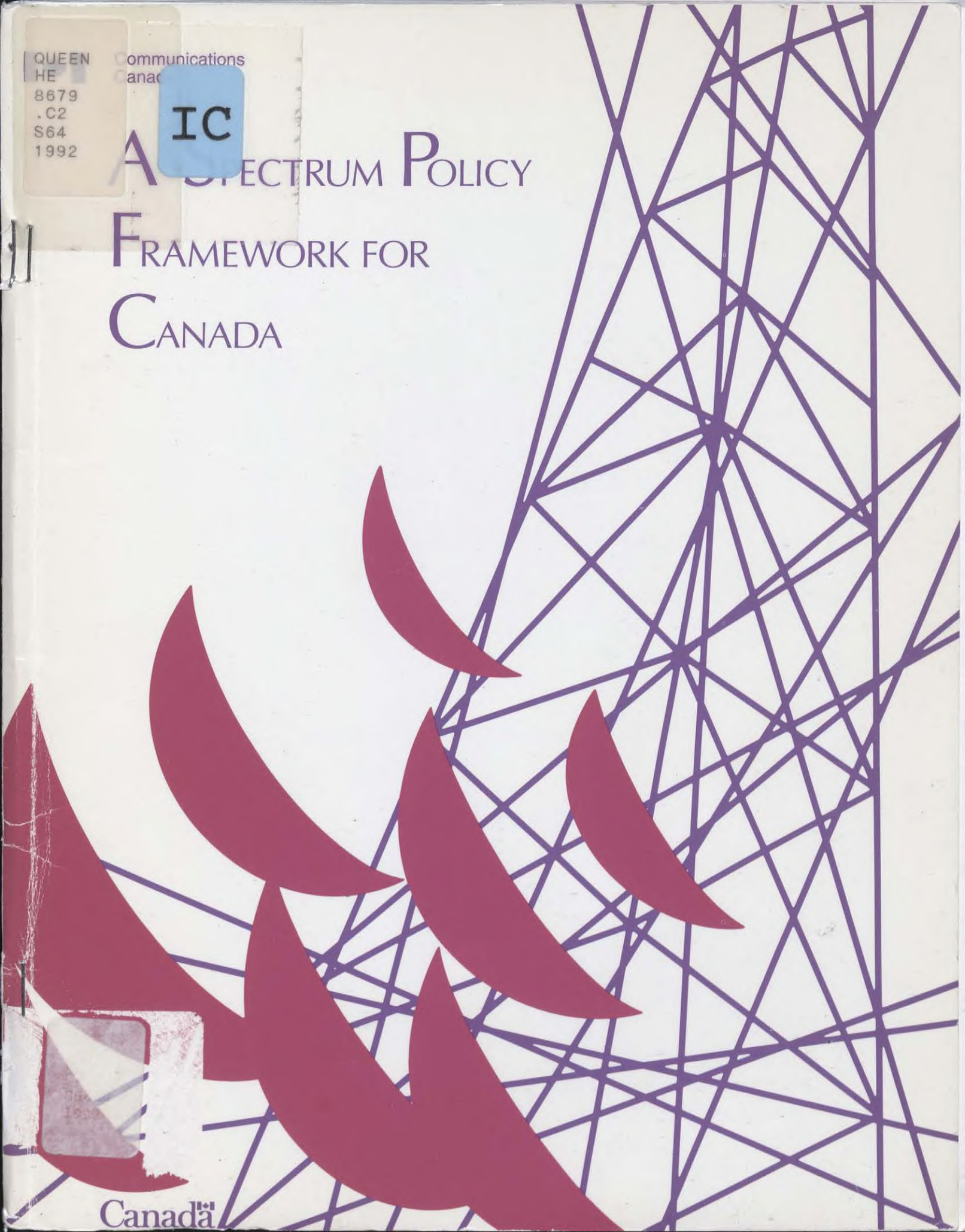
A Spectrum Policy Framework for Canada



Canada

A SPECTRUM POLICY FRAMEWORK FOR CANADA

Department of Communications

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Preface

The radio spectrum resource has been a fundamental element in the development of the Canadian telecommunications and broadcasting infrastructure. Canada's geography and diversity have historically promoted the development of advanced communications systems to link the country.

The need to build an efficient telecommunications infrastructure to link the country from coast to coast and to bring northern communities into the Canadian and international infrastructures has been significantly advanced by the trans-Canada microwave systems of the 1950's and the satellite networks of the 1970's. In the 1980's, the technological evolution has resulted in the establishment of a cross-Canada fibre optic network increasing the protection and capacity of the extensive regional and inter-provincial transmission networks in Canada.

Radiocommunications exert a profound influence on Canada's growth and continuing prosperity. Canada is vitally dependent upon the judicious use of the radio spectrum resource for advancing national policies, achieving telecommunications, broadcasting and cultural goals, ensuring the security and welfare of the nation and conducting its domestic and foreign affairs.

This reassessment of spectrum policy is therefore considered as an integral part of the modernization of the Canadian infrastructure as well as providing the policy guidance for the future utilization of the radio spectrum resource.

As Canada moves toward the 21st century, this Spectrum Policy Framework will ensure our ability to respond to new requirements, by establishing the necessary flexibility to implement emerging technologies, and the adaptability to meet the regulatory and industry changes taking place.

This Spectrum Policy Framework will be used by the Department in a co-operative spirit with industry to ensure the continuing orderly development of communications in Canada.

I Introduction

Background

The Department of Communications initiated public consultation on the development of a Spectrum Policy Framework with the September 1990 call for comments on the discussion paper *Towards a Spectrum Policy Framework for the Twenty-First Century*, which dealt with a wide range of spectrum issues and principles.

This strategic policy initiative was first announced by the Minister of Communications at the Spectrum 20/20 Symposium in Montreal in November 1989. A reassessment of the core spectrum policy principles was considered essential to ensure that an effective framework was in place to meet evolving radiocommunication services, challenges and developments in the 1990's.

This reassessment was primarily addressed to the users of the radio spectrum, service providers, manufacturers and associations, and those concerned about the future course of spectrum policy.

Respondents to the first phase of public consultation expressed general satisfaction with the current approaches by the Department to developing spectrum allocation and utilization policies, radio licensing policies and the overall planning and management of the radio frequency spectrum.

The overall objective of this initiative was to develop a Spectrum Policy Framework for Canada which will establish guiding principles for the spectrum resource responsive to the public interest and will foster the utilization of this resource for the benefit of all Canadians.

The Department further released a Policy Proposals Paper in November 1991 which confirmed a set of core policy objectives which have and would continue to form the foundation for a strategic Spectrum Policy Framework for Canada. In addition, policy guideline proposals were made in areas related to spectrum allocation and utilization policies, radio system licensing, standards, research and development, planning, public consultation and new approaches to spectrum resource management.

Respondents to the second phase of public consultation greatly assisted in the refinement of the core objectives as well as specific policy guidelines in this document.

Reference to public comments received from these two papers will be henceforth termed "the public review".

This overall Spectrum Policy Framework is intended to ensure that Canada will be able to meet its existing and future public objectives in radiocommunications.

Structure and Scope of this Document

This document is a compilation of issues and principles covered in the public review. The first three chapters provide an overview of the radio frequency spectrum, the changing environment and the core objectives of spectrum policy. Each of the sections in the "Policy Guidelines" chapter comprises a preamble, a summary of comments from the public review and the policy guideline being adopted by the Department.

II The Radio Frequency Spectrum

The Spectrum Resource

Canada depends upon the radio spectrum to maintain its sovereignty and security, to safeguard individual citizens, to conduct the nation's business at home and abroad, to maintain and enhance prosperity, and to make Canadian culture available domestically and around the world. Spectrum-based services are essential to the protection of the nation, important for the national transportation safety system and vital for search and rescue. The spectrum also supports a wide range of industrial, scientific, medical, research, telecommunications and cultural activities, private and public, including popular amateur services.

The radio frequency spectrum influences the daily lives of every Canadian. In Canada, because of immense distances and sparse population, radio services are an essential catalyst to nation building, prosperity and well-being.

The spectrum resource supports a multi-billion dollar industry. Satellite and microwave radio relay systems are a considerable part of the intermediate to long-haul transmission capacity of the Canadian telecommunications system and are a dominant part of the radio industry. Capital investments in radar, radionavigation and other radio systems are equally large. Public and private mobile radio, cellular radio and other radiocommunication systems are growing rapidly.

With the rapid evolution and application of new radio technologies, the spectrum is becoming an increasingly congested and limited resource, particularly in light of increasing and competing demands for new services.

Spectrum Policy and Management

Government Mandate -- The Minister of Communications, through the *Department of Communications Act* and the *Radiocommunication Act*, is responsible for developing national policies and goals for spectrum resource use, facilitating efficient development of radiocommunication in the public interest, ensuring effective management of the radio frequency spectrum and fostering the orderly development and operation of communications in the domestic and international spheres.

Policies and spectrum resource decisions must also reflect the central role which the federal Department of Communications is mandated to play in nation building through communciations and culture.

The Department has historically provided general guidance to users of the spectrum resource, ensuring that developments in Canada are in accord with overall social, economic and cultural policy objectives.

Canada is recognized as a world leader in spectrum management systems and the application of radio technology.

Spectrum Policy – Canada is keenly aware of the international dimension of its economic and social activities. As the radio frequency spectrum is a common global resource with no national boundaries, spectrum policy and management can only meaningfully take place through bilateral agreements and co-operation with neighbouring countries and multilateral arenas such as the International Telecommunication Union (ITU).

Each country has certain flexibility to decide on a particular service allocation to meet its domestic needs, provided that it does not interfere with adjacent countries. From time to time, the Department allocates specific frequency bands to services in order to satisfy domestic communications requirements. The radio frequency spectrum is allocated to services whose needs are best tailored to specific parts of the spectrum. The Canadian Table of Frequency Allocations describes the full range of spectrum allocations for specific radio services. While its primary purpose is to accommodate domestic needs, it is generally consistent with the International Table of the ITU.

Within the Canadian environment, use of the radio frequency spectrum is contingent on an efficient and effective set of spectrum and licensing policies, radio regulations, radio system standards, rules, procedures and practices designed to accommodate as many users as possible, and to promote equitable sharing among the users in an environment free from harmful interference.

Policies are developed to achieve optimum utilization of the radio frequency spectrum to meet the immediate and long-term needs of users. As well, administrative tools to monitor and manage the spectrum resource are developed.

Policies are also consistent with an overall policy objective aimed at fostering the efficient development of radiocommunication and to ensuring effective management of the radio frequency spectrum.

The Department, in order to develop its spectrum policy, engages in an extensive public consultation process and a disciplined approach to address specific spectrum allocations and international negotiations and co-ordination.

III The Changing Environment

The Challenges

The rapid growth of emerging radiocommunication technologies and networks may in the future outpace the Department's ability to respond in a timely manner to meet spectrum needs. The challenge, to the Department is how to enhance an existing spectrum policy regime, one that has worked well in the past, to meet new and complex demands.

Several major developments -- emerging technologies and networks, the growth in the use of spectrum resources and services, international globalization, legislative and regulatory developments and the restructuring of the role of the public sector in the Canadian economy -- have highlighted the need for a reassessment of current Canadian spectrum policy.

As the radio frequency spectrum is a limited and strategic resource supporting the social, economic and cultural infrastructure, it is recognized that new approaches and innovative deployments may be needed because of rapid advances in technology and increases in service demands.

Specific attention needs to be focused on the following trends and pressures.

- The pace of technology development has accelerated and the time from equipment design to market is becoming very short for new products and services.

- Digital technologies are markedly increasing the transmission capacity and efficiency of distribution networks.

- An explosive growth is developing in mobile, personal and wireless communications and networks.

- Pressures are anticipated for additional frequencies for existing and emerging new services. The decisions of the 1992 World Administrative Radio Conference (WARC) have allocated spectrum on an international basis for a wide range of new services, such as new mobile services, digital sound broadcasting, mobile satellite and high-definition television (HDTV).

- The rapidity and complexity of technological change have also compelled the ITU to alter its structure and mode of operation. This will certainly have an impact on Canada's dealings in spectrum matters. The High Level Committee reassessed the ITU's functioning and structure. Also, the Voluntary Group of Experts is examining in greater detail the streamlining of allocation matters including the definition of radio service, the structure and method of establishing international frequency allocations and simplification of the ITU Radio Regulations.

- The new *Radiocommunication Act* and the new *Broadcasting Act* allow the Department considerable flexibility to deal with a changing service environment and technological change and to be responsive in dealing with innovations and new services.

- Due to reduced government budgets, there has been a continuing restructuring of the role and contribution of the public sector in the financing, research and development of new and innovative spectrum-based technologies.

Need for Spectrum Policy Framework

This reassessment of Canada's spectrum policies is an integral part of the modernization of its communications infrastructure. Overall policy directions must be developed for radiocommunication as it is being done for broadcasting, cultural development and telecommunications.

The volume and acceleration of technological and regulatory change have created significant pressures for Canada to validate its approaches to spectrum policy. Canada has reached a point where a complete reassessment of the principles governing the spectrum resource and its utilization is necessary to ensure effective management of its own development of radiocommunication and its technological future.

Participants in the public review expressed general satisfaction with the performance of the Department in enabling responsible and effective utilization of the spectrum resource and in fostering an orderly approach to spectrum policy development, radio system licensing and spectrum management in Canada. The responses also indicated that while the Department is providing a high level of service appropriate for the times, new and innovative approaches will have to be embraced given the rapid emergence of radio technologies and service demands in an environment of increasingly congested radio frequency spectrum. This overall policy review of key principles was welcomed as a first step towards enhancing Canada's ability to plan for and meet future challenges.

The need for a Spectrum Policy Framework to further Canada's public policy objectives and priorities was identified by many of the respondents, who considered it the Department's role to:

- ensure the widest possible access by all Canadians to the spectrum;
- encourage spectrum conservation measures, non-spectrum alternatives and the development and deployment of new, spectrum efficient technologies;
- support and encourage the development of national standards;
- be more flexible in responding to innovative communications technologies by encouraging market trials and experimental systems;
- be more responsive to the existing and future regional requirements and applications;
- define more precisely spectrum resource needs, developments and spectrum demands;
- identify the radiocommunication development challenges facing Canada;
- consult with and continue to be responsive to Canadians directly affected by existing and future radiocommunication services; and
- identify options and alternatives for dealing with spectrum demands and issues.

IV Core Objectives of the Spectrum Policy Framework

The core objectives of the Spectrum Policy Framework, which relate to allocation, planning, utilization and management, provide a foundation for approaches that will ensure the judicious planning and management of the radio spectrum resource.

As the radio frequency spectrum is recognized as a strategic **national public resource**, under the legislative responsibility of the Minister of Communications, the Department confirmed a set of **core objectives** in the public review.

There was strong support for these objectives. Additions and revisions were suggested in areas related to sovereignty and security, legislation and public policy, rewards for research and development, enhancing international markets and other international obligations.

The core objectives, which are central to a well-balanced Spectrum Policy Framework, are hereby adopted by the Department as follows:

- **To promote and support the orderly development and efficient operation of radiocommunication systems and services to meet Canada's sovereignty and security needs as well as to yield economic, cultural and social benefits for Canadians.**

- **To plan and manage the utilization of the spectrum resource in accordance with legislative and public policy objectives and international agreements through continuing review and improvement of the spectrum management process.**

- **To further improve efficient and optimum use of the spectrum resource through adoption of advanced spectrum allocation and management techniques based on operational requirements and technical and economic viability.**

- **To ensure flexibility and adaptability and ease of access to the spectrum resource in response to technological advances, economic, social and market factors.**

- **To ensure Canadian interests are protected when harmonizing and co-ordinating Canada's spectrum policies and utilization with other countries, regional and international organizations and with treaty obligations, including those of the International Telecommunication Union (ITU).**

- **To support and promote innovation, research and development in new radiocommunication techniques and spectrum-based services and applications.**

– **To co-ordinate and establish well-balanced national spectrum and radiocommunication policies and plans by widely consulting with all interested parties and the general public.**

V Policy Guidelines for a Spectrum Policy Framework

In the public review, the Department reaffirmed existing policy objectives, and advanced policy guideline proposals for consideration in developing a Spectrum Policy Framework for Canada.

Each section comprises a compilation of the background material from the public review, a summary of comments and the Policy Guideline adopted by the Department as a result of these comments.

This public review also raised a number of issues which the Department intends to monitor carefully; further public consultation may be initiated at an opportune time in the future.

Allocation and Priorities of the Spectrum Resource

Allocation and Priorities

Radiocommunication is an integral part of the delivery systems of a wide variety of communication services to the general public, private organizations and individuals. As spectrum allocation policies are important to support the objectives of legislation as well as advancement of economic and cultural goals, Canadian public policy objectives must be viewed in terms of priorities in utilization of the spectrum resource.

Specific spectrum policies are developed to achieve optimum allocation and efficient utilization of the radio frequency spectrum to meet the immediate and long-term needs of all radio spectrum users. Spectrum policies are also critical to the fulfilment of legislative objectives and are necessary to sustain and improve industrial competitiveness and to continue to meet the cultural, social and economic goals of Canadians.

Exploitation of the spectrum resource is contingent on an efficient and effective body of policies, rules, procedures and practices designed to accommodate as many users and service applications as possible and to promote equitable sharing among the services and users in an environment free from harmful interference.

In allocating spectrum resources, the Department must maintain a balance among the requirements of the users.

Respondents during the public review generally indicated support for the orderly approach taken by the Department to spectrum resource policy development and management. As an essential public resource, nationally managed to ensure effective and efficient use, the prime consideration expressed by respondents was the public benefit to be derived from its guardianship by the Department as well as public interest obligations in its use. Any public interest principles must incorporate value judgment factors which weigh firstly in favour of the public need, then secondly to those of private interests.

While agreeing that "public interest" should remain as a fundamental objective for spectrum allocaiton and utilization, respondents wanted assurances that it would not be "rigidly defined". In view of these comments, it is apparent that any "public interest" criteria would necessarily be general in nature and in line with public policy objectives and legislation.

Radiocommunication also adds culture, entertainment, education, diversity and economic benefits to Canadian life. Respondents indicated that there should be an appropriate and equitable balance between public and private needs.

In general, they called for flexibility and adaptability in the spectrum allocation and utilization process to satisfy changing priorities, objectives and other future requirements of Canadians.

Based on the public review, the Department adopts the following policy guideline:

Policy Guideline 1 - Spectrum Resource Allocation

The radio frequency spectrum, as a national public resource, will be allocated and planned to advance public policy objectives, while ensuring a balance between public and private radiocommunication use to benefit the Canadian public. The allocation of and access to the spectrum resource will be adapted to meet changing user requirements, to provide spectrum that best meets the needs of the user and to facilitate new and innovative services.

Priorities

Services involving the security and sovereignty of the country and safety of life and property assume primary importance, compared to services established for industrial or business communications purposes. As well, telecommunications common carriers, broadcasting undertakings, public utilities, highway and transportation systems etc., which directly serve the general public, are given a higher priority than those established for private radiocommunication links for individuals.

In the responses to the public review, unequivocal support was shown for the spectrum resource to serve the existing and evolving Canadian telecommunications and broadcasting infrastructures as these provide the national bearer facilities for Canadian development. Maintaining sovereignty, national security and safety were expressed also as primary goals to be served by public spectrum resources. Some made suggestions to include their own primary interests or to take geographic factors into account.

Based on the public review, the Department adopts the following policy guideline:

Policy Guideline 2 - Priority Support Areas

Radiocommunication systems vital to sovereignty and national security, national defence, public security, safety and emergency will be granted high priority and support in the access and use of the radio spectrum. Also, essential government operations, and other agencies providing critical services to the general public, will have high priority in use of the spectrum.

Spectrum Resource Principles

The Department over the years has used balanced spectrum resource principles to meet public needs, to encourage orderly and efficient development and use of radiocommunication and to ensure effective planning and management of the radio frequency spectrum.

Some of these principles include the following.

Allocation of Bands to Radio Services - Bands of spectrum are allocated to particular radio services to accommodate similar radiocommunication systems, serving the largest number of users possible.

Designation to Usage - To promote efficient and optimal utilization, spectrum is designated on the basis of use, rather than type of user to allow sharing among the largest number of users.

Interference-Free Operation - The effects of interference are minimized or managed to acceptable limits.

Conformance to Standards and Plans - Common standards and frequency plans are required to ensure orderly development, to avoid harmful interference and to facilitate operational compatibility of radio systems.

Use Must be Justified - The need as well as the appropriateness of use of the spectrum must be demonstrated to ensure maximum utilization of resources.

Orderly Growth of Radiocommunications - The proposed usage of the spectrum must be in harmony with the overall core objectives of spectrum usage in Canada. Spectrum may be held in reserve based on system growth plans, accommodation of national providers or new services.

Fostering of New Technologies - The use of emerging technologies which would result in increased traffic-carrying capabilities or the development of new and efficient systems is encouraged.

These principles ensure that spectrum policies and management foster the orderly and efficient development of radiocommunication and that conditions prevail for the economic and technical development of radio systems. Such principles also encourage productivity and innovation as well as the introduction of new services to meet the needs of Canadians.

The public review indicated that these principles have served as overall guidelines for spectrum allocation and utilization policies, and that these should be applied to all users of the spectrum. No major changes were suggested. However, there was solid support for implementing these principles in a flexible manner in order to adapt to specific situations (for example, adaptability in spectrum policies could account for regional needs). Public consultation was suggested if any changes to the spectrum resource principles were contemplated.

Based on the public review, the Department adopts the following policy guideline:

Policy Guideline 3 - Spectrum Resource Principles

The Department will continue to apply the existing basic spectrum resource principles as an overall guidance for good planning and management of the radio spectrum.

These principles will be adapted as necessary to meet the requirements of evolving national, regional and international radiocommunication needs.

Socio-Economic Factors

Socio-economic factors are a key determinant of the public interest and benefits and the spectrum allocation and utilization process. In order to adequately assess various spectrum allocation or utilization trade offs, socio-economic factors as well as the overall public interest need to be taken into account.

The Department has employed socio-economic factors to a limited extent in the assessment of applications for microwave systems and other national systems, such as cellular radio and paging. These factors could include considerations of the public to be served, overall markets, the industry structure, economic viability and social interest. A key objective is to assure maximum social benefits and a minimum of wasteful duplication of investment, where resources are both scarce and essential.

There was general agreement in the public review that social and economic factors are important in making judicious spectrum resource decisions, due to the diversity of geographic and systems application needs in Canada. Nevertheless, there was some concern that socio-economic criteria could be restrictive to systems development and service implementation. Some parties expressed the desire that the term "socio-economic" be defined, that socio-economic criteria were related to service, public interest objectives or existing legislation. Some of the factors suggested by respondents included the investment already made by existing users, social value and need, user benefits, industrial/commercial competitiveness, economic and technical viability, coverage, service quality, total delivered costs, government objectives, etc.

Undoubtedly, there will be a greater reliance on socio-economic factors in the future to ensure rational, equitable and orderly development of systems requiring use of the spectrum. Consideration will have to be given to a priority of services to support security, sovereignty, cultural and economic growth and prosperity to a suitable level of flexibility, convenience and benefit to the greatest number of Canadians.

Based on the public review, the Department adopts the following policy guideline:

Policy Guideline 4 - Socio-Economic Factors

Socio-economic factors will continue to be important in all aspects of spectrum policy and management to meet the growing needs of Canadians.

Non-Spectrum Alternatives

Applicants for radio systems are encouraged by the Department to seek non-radio alternatives, especially in areas where spectrum is heavily utilized or where alternatives can be reasonably deployed.

New requirements in communications are increasingly creating the demand for mobility, extension or availability of a wide range of services where the only cost-effective distribution system is radio-based (such as personal communications and wireless systems). As well, opportunities are increasing to use non-radio transmission facilities such as optical fibre and coaxial cable for the distribution of services. Of importance is the extensive deployment of optical fibre systems by the telecommunications carrier industry in all of their public networks.

Respondents to the public review indicated that there should be a more thorough assessment and promotion of the technological alternatives to radio facilities, particularly with the introduction of optical fibre distribution systems. This could include a review or denial of radio licensing where services can be offered without the use of spectrum or where space and/or terrestrial delivery systems, which provide a technically suitable alternative, could be the prime bearer of "consumer" communications information services. In addition, specific factors, such as financial incentives or capital cost allowances, could be established to encourage voluntary use of non-radio options.

As well, respondents suggested that consideration should be given to redundancy, costs, viability, spectrum congestion, service area and quality. Some suggested this as a requirement for existing and new services.

Based on the public review, the Department adopts the following policy guideline:

Policy Guideline 5 - Non-Spectrum Alternatives

The Department will, where appropriate, require the assessment of the availability of non-spectrum alternatives to spectrum-based services in spectrum congested areas of the country and will promote the use of alternative non-spectrum technologies.

Spectrum Conservation and Efficiency

Efficient and optimum spectrum utilization continue to be crucial considerations in allocation and utilization policy decisions.

Generally, spectrum conservation can provide and extend similar services to the greatest number of users and the greatest re-use of frequencies in an area, and provide the greatest transmission of information per unit of spectrum. Radiocommunication applications based on spectrum efficient techniques are generally given preference, particularly in the areas of moderate to intensive use.

The Department may also adopt spectrum policies or system application measures to conserve the spectrum.

Respondents to the public review suggested the delegation of spectrum to user groups, use of financial incentives/disincentives, reservation of specific portions of spectrum for advanced technology use, and the promotion of research and development activities in the area of spectrum efficient technologies and applications. Respondents also indicated that priorities should be accorded to the user of particular facilities or technologies (trunking, digital systems, etc.) and that licensees regularly report on progress toward increasing spectrum efficiency, such as system utilization.

Also, it was considered necessary to hold spectrum in reserve in order to have resources available for new and innovative radio services when such opportunities emerge. It is important to retain unused spectrum so that the capacity exists to rearrange existing systems for more efficiency, to permit expansion of major public systems or to address urgent needs.

There are also network and industry-related policy issues which affect efficient spectrum utilization and conservation e.g. the existing dual microwave networks operated by cellular service providers and telecommunications carriers. Objectives could be proposed to promote the development of joint-use systems, sharing of underutilized bands, site and infrastructure sharing or use of an adjacent carrier facilities for "emergency restoration". This could significantly advance a solution to network duplication, service reliability and spectrum utilization.

Furthermore, as advanced fibre transmission systems are being developed, an important consideration is that sufficient self-restoral capability be deployed, so that facilities rely less on spectrum-based radio systems.

However, with increasingly limited spectrum resources, there continues to be a requirement to place greater emphasis on making more efficient use of the existing usable frequency spectrum or developing higher frequency bands through a series of technological advances and methodologies or better equipment designs (such as better television receivers). Many of these will require a significant level of research and development commitments.

Some of the spectrum-efficient techniques include dynamic frequency assignment, coding and compression, emission characterization, dynamic partitioning and spatial separation.

Respondents also suggested that spectrum conservation and efficiency should apply to all users and frequency bands, that licence fees could be used as an incentive, that improved receivers are needed and that national standards would assist in spectrum conservation and efficiency.

Based on the public review, the Department adopts the following policy guideline:

Policy Guideline 6 - Spectrum Conservation and Efficiency

To conserve spectrum in critical frequency bands, the Department may encourage appropriate radio systems to be developed in alternate frequency bands and the use of existing networks to their maximum capacity.

Emphasis also will continue to be placed on efficient spectrum utilization and conservation techniques, if viable, as a requirement for existing and new services. Priority will be considered for technologies and systems which are more spectrum efficient.

Spectrum Sharing

Spectrum sharing among services in particular allocations and locations where there is congestion will increase. With the number of radio services seeking particular premium frequency bands, the level of sharing required continues to increase and reasonable constraints are being imposed on all users.

The sharing of spectrum is different in different geographic areas. Any sharing poses questions of timing, technology impacts and amortization of equipment.

Designating spectrum by type of use has proved effective in satisfying the public demand for radio services in various areas of Canada.

Many of the respondents to the public review agreed to consider spectrum sharing among services under certain terms and conditions associated with rights and time frames (such as minimum disruption of primary services and interference considerations). It was acknowledged that where safety of life or service levels or the public interest may be significantly compromised, the requirement to share spectrum would not apply.

Other respondents expressed the view that consideration should be given to allocating spectrum to specific user groups on the condition that they optimize its use. Concerns were voiced regarding the criteria that could be used as well as the conditions of implementation and effects on service.

Based on the public review, the Department adopts the following policy guideline:

Policy Guideline 7 - Spectrum Sharing

Spectrum sharing among various services and users based on appropriately defined criteria and conditions will be increasingly required in order to satisfy the growing needs for radio spectrum resources. The Department will continue to promote spectrum sharing while considering the impact on spectrum efficiency and operational requirements of the services.

Displacement of Services

Spectrum users currently need to take into account that use connotes no permanent assignment rights, and that future reassignment or service displacement may be necessary. For example, there are increasing pressures for the gradual movement of fixed services into higher frequency bands to make way for new services needing mobility and broad general coverage.

Also, one must consider that spectrum is allocated for future services which may require many years of evolution before technological or economical situations render them viable.

Respondents to the public review indicated that they would be amenable to displacement under certain conditions. These included fair treatment, adequate notice and financial compensation. It was acknowledged that, in some cases, displaced users may have to bear an economic burden as well as sustaining potential degradation of service.

The majority of respondents also signified that displacement may be necessary without compensation from the Department or the government. Many indicated that consideration should be given to budget planning timetables, reasonable and sufficient notice, rights of users, public consultation and possible compensation of incumbents by new entrants.

Based on the public review, the Department adopts the following policy guideline:

Policy Guideline 8 - Systems or Services Displacement

As a radio licence does not confer ownership nor a continued right to a particular radio frequency, the Department will continue to provide reasonable notice to inform users of any conditions or circumstances which could result in displacement of services or systems to other bands.

There is no liability or responsibility or intent by the Department to financially compensate spectrum users being displaced.

Radio System Licensing

Radio Licensing

The traditional means of radiocommunication development in Canada has been to allocate and designate bands of spectrum to particular radio services and applications and then to subsequently license applicants within each service category.

Processing and assigning of frequencies for radio applications is accomplished by an integrated spectrum management system according to existing spectrum utilization policies, licensing policies, general radio regulations and radio system standards.

Radio licensing policies are constantly adapting to changes in radiocommunication in order to effectively respond to the evolving competitive environment and user needs. In general, the assignment of radio frequencies and the licensing of radio systems in a particular band are conducted on a "first-come-first-served" basis, according to well-established departmental application procedures, and take into consideration the growth plans and the economic viability of existing radio systems. The Department, through its licensing process and renewal of licences, may ensure that radio systems are implemented expeditiously and that radio frequencies are used efficiently according to the intent.

This is considered a most effective process for authorizing radiocommunication systems. Licensing policies also encourage co-ordination and sharing of spectrum to mitigate cases of harmful interference to existing users.

The Department has established clear licensing policies for specific radio systems such as microwave radio relay systems, mobile radio systems and earth stations, where a licensing policy is determined necessary for achieving broader government objectives. For other systems, licensing policies are based on spectrum availability, the level of service or competition desired and the orderly and efficient development of radiocommunication services.

Within the context of the spectrum utilization, licensing policies ensure the achievement of a number of goals:

- meeting underlying telecommunications, broadcasting, industrial and social objectives;
- fairness of treatment and consistency of policy application for licencees in all regions of Canada;
- accommodation of as many users as possible without harmful interference;
- administrative efficiency in dealing with applications; and
- imposition of the minimum regulatory requirements on the user.

In the public review, respondents called for the streamlining of licensing policy development so that new service requirements could be met by emerging technologies unhampered by unreasonable delays in service requirements could be met by emerging technologies unhampered by unreasonable delays in service implementation resulting in denial of service to users. They also spoke in favour of a standing licensing policy for rapid access to limited spectrum for government and commercial research and development and stressed the need to accommodate applications at a regional level, to investigate the electronic submission of applications and to allow a greater role for the private sector in frequency co-ordination and technical analysis.

Respondents to the the public review also suggested that future requirements and public consultation must be taken into account, response times needed to be improved, and "use it or lose it" requirements for frequency assignments should be implemented.

Based on the public review, the Department adopts the following policy guideline:

Policy Guideline 9 - Radio Licensing

In general, the radio licensing policies for assigning radio frequencies and authorizing radio systems will continue to be on a "first-come, first-served" basis and will continue to ensure responsiveness to new service demands and public policy objectives.

The Department will continue to ensure the necessary general policies are in place to effectively respond to evolving public policy objectives in telecommunications, including broadcasting, and to protect existing users and services from harmful interference. Furthermore, the Department will continue to authorize radiocommunication system trials and new technology experiments.

As well, once radio systems have been authorized, the Department may ensure that these systems are implemented within a reasonable time and radio frequencies are efficiently utilized. In order to ensure that the radio system is implemented in a timely fashion, the Department may establish as terms and conditions of licence a reasonable period for radio station installation to take place and service to begin.

Licence Fees and Revenues

Holders of radio licences are required to pay licence fees which, *inter alia,* cover the overall planning and management of the spectrum.

The public review advanced the view that, in an environment of increasingly limited spectrum, it might be timely to consider new approaches to fees more appropriate to the use of the spectrum. It was also stated that the level of fees should not impair the ability to provide essential services to the public nor impair accessibility by the public to those services. A further consideration was that fees should be equitable and should not hinder the development of innovative and competitive services.

Responses to the public review indicated that the current structure of assessing licence fees provides little incentive for the efficient and effective use of the spectrum, nor does it take into consideration the economic value of the spectrum to the user.

As well, most agreed that fees should cover the costs of administration, planning, international negotiations, spectrum-related R&D and policy development for spectrum resources. Some indicated that the setting of fees should be a more "open" process, with greater opportunity for comment. There was, however, opposition to the collection of fees to provide general government revenues for unrelated programs. Licence fees were also considered an appropriate means for promoting spectrum conservation or adopting spectrum efficient technologies. Some methods proposed include the adoption of a fee per unit bandwidth of spectrum in certain specified bands or in specific locations, and correspondingly reduced fees for use of higher frequency bands or as an incentive for more efficient use of the spectrum, particularly in congested frequency bands or certain market areas. There was no support for leasing fees or enhanced services fees.

However, some respondents indicated that a portion of the fees could be channelled into research and development for more efficient use of the spectrum. A portion of the fees could be placed in a fund used to support spectrum-related R&D in government laboratories, universities and industry laboratories.

Most respondents generally agreed that fees should cover costs. Some suggested that consideration be given to review of excessive fees, to new services development and competitiveness, to incentives to spectrum efficiency and to those fees already paid to the CRTC. There was some concern with inequities in the fees and some said that the Department should be more accountable for the level of fees. Most indicated that spectrum-related R&D conducted by the Department was desirable.

Based on the public review, the Department adopts the following policy guideline:

Policy Guideline 10 - Licence Fees and Revenues

Licence fees are expected to be sufficient to at least cover the costs of all spectrum-related activities for good spectrum policy, management, planning, and R&D.

Market-Based Considerations

Competitive licensing procedures have been employed in Canada for a range of public mobile services where the available spectrum was limited and a predetermined number of service providers was deemed to be necessary. An administrative comparative process has been used so far to deal with competitive licensing. In the public review, the potential application of market-based approaches was raised for the provisioning of public radio services where it could be deemed in the public interest to proceed with lotteries, auctions or other licensing approaches where the economic value of the spectrum resource is considered.

With the increasing demands for spectrum, there will be a requirement to decide among competing services and applicants for services. From a Canadian perspective, it may be better to be flexible in adopting any specific technique according to the circumstances that arise and the objectives to be obtained, whether these be to enhance government revenues, to support social, economic or political goals or reduce the complexity of decision-making required.

Responses to the public review indicated opposition to the lottery or auction approaches based primarily on the need to consider the best radio application in terms of public interest elements and technical merits in any licensing decision. There was also agreement that services associated with safety of life and security be excluded from such a process. As well, respondents expressed a desire to ensure that regional, social and cultural concerns be accommodated, that service development not be restricted, that accessibility to the spectrum not be limited and that user costs not be escalated. Satisfaction with the existing administrative comparative process was the general view.

The most suitable strategy proposed was to enhance the present competitive licensing process and allow future flexibility to adopt other procedures as circumstances require.

Strong opposition was voiced over the use of auctions and lotteries in the allocation or licensing of spectrum. Most considered the administrative comparison approach as effective and in the public interest. Some suggested that further studies of lotteries and auctions should be terminated.

Based on the public review, the Department adopts the following policy guideline:

Policy Guideline 11 - Market-Based Approaches

For competitive licensing, where the available spectrum is inadequate to satisfy all demands or where it is necessary to limit the number of new entrants, the Department will continue to refine its current approach -- the administrative comparative process, which is used to select licensees from a number of qualified applicants.

If other market-based approaches are deemed to be in the public interest and applicable to specific services or frequency bands, they will be implemented only after full public consultation.

Radiocommunication Research and Development (R&D)

Radiocommunication technology has been recognized as a strategic component of communications systems. It is a key to maintaining the competitiveness of our industries -- natural resources, manufacturing, services -- and for ensuring prosperity for Canadians. The Department has had a prime role in the research and development of the satellite communications industry in Canada as well as other spectrum-based technology developments.

In order to ensure positioning of Canadian industry in the global marketplace, it is imperative that we keep pace with our international competitors, and this will occur only if we place a greater emphasis on research and development.

Funding of R&D is considered a prime mechanism to foster growth of the radiocommunication industry through the development of new technologies, products and services to meet the needs of both the domestic and international radio marketplaces. This is especially important with the increasing demand for mobile and portable radiocommunication services of all varieties.

Commitments to R&D should advance radiocommunication technologies and foster a more efficient utilization of the spectrum resource to better serve Canadians and encourage a stronger, more prosperous economy.

Increasing the levels of R&D funding was strongly supported by the public review, but the majority of respondents agreed that it should be done at the sole discretion of industry or through general tax policies, not as a condition of licensing. Access to spectrum for temporary or experimental R&D purposes was deemed necessary as well. The Department indicated, however, that to make a significant increase in funding in this area there will have to be a strong commitment by industry, or licensing conditions for R&D support will have to be introduced. Accordingly, economic beneficiaries of spectrum use should be expected to spend a portion of their revenues on R&D. Suggestions were made to review alternatives and other co-operative arrangements with industry that might be more appropriate. Some were concerned with inequitable funding and the effects on competitiveness.

The Department is engaging in a consultative process with the industry and the user community aimed at developing a policy on a reasonable level of R&D expenditures and on ways to maximize the relevance and effectiveness of the research effort. (In some radio licensing applications, the Department has considered R&D to be a significant element of public socio-economic interest. Agreements on specific R&D commitments have already been made with several public service providers.)

Based on the public review, the Department adopts the following policy guideline:

Policy Guideline 12 - Research and Development

The Department recognizes that the level of funding and the targeting of R&D dollars is a major Canadian concern which government and industry share. R&D is vital and necessary for the maintenance and development of the radiocommunication infrastructure in Canada and a strong Canadian industry. The Department will continue to establish radiocommunication R&D requirements whenever appropriate. These requirements will be developed in consultation with industry prior to licensing. These may include a financial commitment to R&D on the part of certain radiocommunication public service providers as a condition of licensing or as a portion of the licence fee.

Radiocommunication Standards

Radiocommunication standards and frequency plans are national in scope. Conformance to standards promotes radiocommunication use without harmful interference, ensures compatibility among different users, permits maximum sharing among different services, ensures international co-ordination and facilitates effective and good spectrum management. Standards are the single most important means of enabling good spectrum management and efficient spectrum utilization.

Associated policies also are necessary to control electromagnetic pollution from the myriad of non-radio noise sources in the environment. Standards and plans can also enhance the prosperity and competitiveness of Canadian industry and provide the technical base for product and service development.

There was strong support in the public review to proceed to common regional (e.g. North America) and international standards, as agreements on technical standards are vital for system implementation and an open marketplace for radio products. There was an acknowledgement of the need for national standards which could incorporate flexibility into policies to accommodate demographic differences and economic and social considerations. Some expressed the view that there should be a concerted effort by the Department to reduce the response times for the development of standards.

Some respondents expressed a desire to move to harmonized international standards to improve exports and to adopt reciprocity for type approvals of radio equipment. Others suggested more emphasis by the Department on consumer receiver standards and the adoption of digital standards.

Based on the public review, the Department adopts the following policy guideline:

Policy Guideline 13 - Radiocommunication Standards

Standards are necessary for harmonious system operation, efficient spectrum management and utilization, compatibility, competitiveness and avoidance of interference. The objective is to align Canadian standards to the greatest extent possible with international standards. Harmonization of radio system standards is an important consideration in this process.

Mandatory standards should include only those requirements which can be demonstrated to be necessary for good spectrum management.

Planning and Consultation (National and International)

Spectrum Resource Planning

Planning objectives include the need for timely information to adapt to and be more responsive to new demands being placed on the spectrum resource. The development of spectrum policy through public consultation must provide for the orderly and efficient development of radiocommunication services in a timely, equitable and predictable manner as well as being flexible and sensitive to regional needs.

Under the *Radiocommunication Act*, Section 5.(1)(*e*), the Minister of Communications is responsible for planning the allocation and use of the spectrum. The need for more and better information, including statistical, on spectrum use and efficiency and its availability in various locations will be required to allow the Department to adapt to and be more responsive to new demands being placed on the spectrum resource. New spectrum utilization plans will have to increasingly take into account new factors (demographics, changes in consumer demand, technology diffusion, etc.)

Planning and consultation are conducted with a view to addressing the entire range of needs, options, costs, benefits and impacts. The planning process allows government and industry to assess data and proposals regarding the actual and planned use of the spectrum from a wide range of sources and to arrive at logical decisions in a fair and open manner.

Respondents to the public review strongly supported the Department's lead role in improving the planning and information aspects of spectrum based on trends of spectrum use, and in resolving conflicts in spectrum demand. Respondents also expressed a desire for more open and accessible procedures and processes for the development of spectrum policy and management, and called for greater justification of spectrum needs.

There was general support and encouragement from respondents for the Department's continuing leadership role.

Based on the public review, the Department adopts the following policy guideline:

Policy Guideline 14 - Spectrum Resource Planning

Planning of spectrum resources will continue to be a prime activity of the Department with more extensive monitoring of trends and developments, and considerations for more extensive public information and consultation. The Department will continue to exercise a leadership role in planning and consultation at a national and international level to judiciously plan the spectrum resource.

Public Consultation

The Department has an ongoing need to consult the public, interested individuals and organizations, and affected parties on various policy issues regarding the development and formulation of policies, standards and procedures to realize the greatest public benefit.

The use of notices, published in the *Canada Gazette*, has been the formal instrument used by the Department to initiate comment, to apprise or inform the public, and to obtain representation on significant issues.

In order to make sound spectrum policy decisions, the Department employs a systematic review process which includes an extensive and well-established public consultation mechanism. This process addresses all aspects of radiocommunication including national and international policy, allocations and licensing, and procedures and standards. In addition, the Department promotes the use of government-industry technical committees and has established ongoing relationships with major industry associations and user groups.

Respondents to the public review indicated that the level of public consultation and the process in place to formulate spectrum policies, standards and regulations is meeting the needs of most organizations. Documentation provided by the Department was considered, in most cases, as suitable for meeting the needs of the respondents. However, some respondents supported a more open and accessible public consultation process with more regional emphasis, publication of policy and planning agendas, a distribution list for notices, administrative tribunals, alternatives to the *Canada Gazette* notices, electronic exchange of documents and more open and regional forums on spectrum matters. There was also some suggestion that both co-ordinating and advisory committees to the Department should be reviewed to avoid duplication of effort.

Based on the public review, the Department adopts the following policy guideline:

Policy Guideline 15 - Public Consultation

The Department will continue to ensure that appropriate mechanisms are in place to allow interested parties to provide input to the Department concerning all of its activities and to ensure the planning process is more responsive to technological advances and spectrum demands.

International

Through the ITU's World Administrative Radio Conferences, in which Canada actively participates, frequency bands are allocated to different radio services. Canadian spectrum policy, spectrum planning and public consultation respond not only to allocation changes made by the ITU but also to satisfy domestic requirements in radiocommunication.

We increasingly operate in a global economy. International markets and competition will have to be taken into account in the development and introduction of new services. Allocation issues will have to take international impacts into account.

There were indications in the public review of the ongoing need for government leadership in international fora, with stronger emphasis on international opportunities, competitiveness, harmonization of standards, promotion of Canadian capabilities, standards-writing activities, a prime relationship with the U.S.A. and new market opportunities. Some respondents expressed the need for the Department to continue disseminating information on international developments to Canadian industry. Constraints to success include differing spectrum allocations, timing of service introductions, standards, trade barriers and cultural differences.

From an international perspective, respondents saw a need to harness Canada's strength in radio technology and spectrum management, to expand market horizons and opportunities for industry and to make Canadian companies more aware of global markets.

Most of the respondents were supportive of the Department's role. Some suggested the role be strengthened, more information be exchanged and that there be a recognition of national security requirements in the international domain.

Based on the public review, the Department adopts the following policy guideline:

Policy Guideline 16 - International

The Department will continue to exercise leadership and commitment to Canadian involvement in regional and international spectrum matters, including those involving national security and economic/market considerations. The marketing of Canadian expertise and products will be done in concert with private industry.

New Spectrum Approaches

New initiatives and projects should be captured as part of a continuing review, although some of these were identified as part of this specific spectrum policy framework review.

These new approaches included spectrum planning methodologies (use of data bases, modelling and forecasting), spectrum auditing (assessment of usage and efficiency of spectrum) and service implementation and displacement (terms and conditions for radio systems being displaced).

There was general support in the public review for the overall principle but some concern was expressed regarding the terms "auditing" and "efficiency". There was express opposition to auditing the use of specific reserved bands. Others suggested additional information or research in the area.

Based on the public review, the Department adopts the following policy guideline:

Policy Guideline 17 - New Approaches for Spectrum Policy Development and Spectrum Management

The Department will encourage new approaches to spectrum policy development and spectrum management, and will endeavour to assess these on a continuing basis.

VI Concluding Remarks

This document adopts a set of core policy objectives which form the foundation for a strategic Spectrum Policy Framework for Canada. As well, key policy guidelines are provided in areas related to spectrum policy and management -- specifically, allocation and utilization policies, radio system licensing, research and development, standards, planning, public consultation, international areas and new approaches to spectrum resource management.

This Spectrum Policy Framework establishes a set of policy guidelines for spectrum resources which is both responsive to the public interest and fosters the utilization of these resources for the benefit of all Canadians.

The public consultation during the development of the Spectrum Policy Framework is a prime example of the continuing co-operation and support provided by the users of the radio frequency spectrum resource.

The core policy objectives and the key policy guidelines to this Spectrum Policy Framework are listed in Annex A.

ANNEX A

A SPECTRUM POLICY FRAMEWORK FOR CANADA

Core Policy Objectives

- To promote and support the orderly development and efficient operation of radiocommunication systems and services to meet Canada's sovereignty and security needs as well as to yield economic, cultural and social benefits for Canadians.

- To plan and manage the utilization of the spectrum resource in accordance with legislative and public policy objectives and international agreements through continuing review and improvement of the spectrum management process.

- To further improve efficient and optimum use of the spectrum resource through adoption of advanced spectrum allocation and management techniques based on operational requirements and technical and economic viability.

- To ensure flexibility and adaptability and ease of access to the spectrum resource in response to technological advances, economic, social and market factors.

- To ensure Canadian interests are protected when harmonizing and co-ordinating Canada's spectrum policies and utilization with other countries, regional and international organizations and with treaty obligations, including those of the International Telecommunication Union (ITU).

- To support and promote innovation, research and development in new radiocommunication techniques and spectrum-based services and applications.

- To co-ordinate and establish well-balanced national spectrum and radiocommunication policies and plans by widely consulting with all interested parties and the general public.

Policy Guidelines

Policy Guideline 1 - Spectrum Resource Allocation

The radio frequency spectrum, as a national public resource, will be allocated and planned to advance public policy objectives while ensuring a balance between public and private radiocommunication use to benefit the Canadian public. The allocation of and access to the spectrum resource will be adapted to meet changing user requirements, to provide spectrum that best meets the needs of the user and to facilitate new and innovative services.

Policy Guideline 2 - Priority Support Areas

Radiocommunication systems vital to sovereignty and national security, national defence, public security, safety and emergency will be granted high priority and support in the access and use of the radio spectrum. Also, essential government operations, and other agencies providing critical services to the general public, will have a high priority in use of the spectrum.

Policy Guideline 3 - Spectrum Resource Principles

The Department will continue to apply the existing basic spectrum resource principles as an overall guidance for good planning and management of the radio spectrum.

These principles will be adapted as necessary to meet the requirements of evolving national, regional and international radiocommunication needs.

Policy Guideline 4 - Socio-Economic Factors

Socio-economic factors will continue to be important in all aspects of spectrum policy and management to meet the growing needs of Canadians.

Policy Guideline 5 - Non-Spectrum Alternatives

The Department will, where appropriate, require the assessment of the availability of non-spectrum alternatives to spectrum-based services in spectrum congested areas of the country and will promote the use of alternative non-spectrum technologies.

Policy Guideline 6 - Spectrum Conservation and Efficiency

To conserve spectrum in critical frequency bands, the Department may encourage appropriate radio systems to be developed in alternate frequency bands and the use of existing networks to their maximum capacity.

Emphasis also will continue to be placed on efficient spectrum utilization and conservation techniques, if viable, as a requirement for existing and new services. Priority will be considered for technologies and systems which are more spectrum efficient.

Policy Guideline 7 - Spectrum Sharing

Spectrum sharing among various services and users based on appropriately defined criteria and conditions will be increasingly required in order to satisfy the growing needs for radio spectrum resources. The Department will continue to promote spectrum sharing while considering the impact on spectrum efficiency and operational requirements of the services.

Policy Guideline 8 - Systems or Services Displacement

As a radio licence does not confer ownership nor a continued right to a particular radio frequency, the Department will continue to provide reasonable notice to inform users of any conditions or circumstances which could result in displacement of services or systems to other bands.

There is no liability or responsibility or intent by the Department to financially compensate spectrum users being displaced.

Policy Guideline 9 - Radio Licensing

In general, the radio licensing policies for assigning radio frequencies and authorizing radio systems will continue to be on a "first-come, first-served" basis and will continue to ensure responsiveness to new service demands and public policy objectives.

The Department will continue to ensure necessary general policies are in place to effectively respond to evolving public policy objectives in telecommunications, including broadcasting, and to protect existing users and services from harmful interference. Furthermore, the Department will continue to authorize radiocommunication system trials and new technology experiments.

As well, once radio systems have been authorized, the Department may ensure that these systems are implemented within a reasonable time and radio frequencies are efficiently utilized. In order to ensure that the radio system is implemented in a timely fashion, the Department may establish as terms and conditions of licence a reasonable period for radio station installation to take place and service to begin.

Policy Guideline 10 - Licence Fees and Revenues

Licence fees are expected to be sufficient to at least cover the costs of all spectrum-related activities for good spectrum policy, management, planning and R&D.

Policy Guideline 11 - Market-Based Approaches

For competitive licensing, where the available spectrum is inadequate to satisfy all demands or where it is necessary to limit the number of new entrants, the Department will continue to refine its current approach -- the administrative comparative process, which is used to select licensees from a number of qualified applicants.

If other market-based approaches are deemed to be in the public interest and applicable to specific services or frequency bands, they will be implemented only after full public consultation.

Policy Guideline 12 - Research and Development

The Department recognizes that the level of funding and the targeting of R&D dollars is a major Canadian concern which government and industry share. R&D is vital and necessary for the maintenance and development of the radiocommunication infrastructure in Canada and a strong Canadian industry. The Department will continue to establish radiocommunication R&D requirements whenever appropriate. These requirements will be developed in consultation with industry prior to licensing. These may include a financial commitment to R&D on the the part of certain radiocommunication public service providers as a condition of licensing or as a portion of the licence fee.

Policy Guideline 13 - Radiocommunication Standards

Standards are necessary for harmonious system operation, efficient spectrum management and utilization, compatibility, competitiveness and avoidance of interference. The objective is to align Canadian standards to the greatest extent possible with international standards. Harmonization of radio system standards is an important consideration in this process.

Mandatory standards should include only those requirements which can be demonstrated to be necessary for good spectrum management.

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Policy Guideline 15 - Public Consultation

The Department will continue to ensure that appropriate mechanisms are in place to allow interested parties to provide input to the Department concerning all of its activities and to ensure the planning process is more responsive to technological advances and spectrum demands.

Policy Guideline 16 - International

The Department will continue to exercise leadership and commitment to Canadian involvement in regional and international spectrum matters, including those involving national security and economic/market considerations. The marketing of Canadian expertise and products will be done in concert with private industry.

Policy Guideline 17 - New Approaches for Spectrum Policy Development and Spectrum Management

The Department will encourage new approaches to spectrum policy development and spectrum management, and will endeavour to assess these on a continuing basis.