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DEPARTMENT OF COMMUNICATIONS

Government of Canada
Department of Communications

Gouvernement du Canada
Ministère des Communications

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(submitted under the provisions
of the Department of Communications Act)

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Cat. No. 1-1980

ISBN 0-662-51324-X

To:
His Excellency the Right Honourable
Edward Schreyer, P.C., C.C., C.M.M.,
C.D., Governor General and
Commander-in-Chief of Canada.

Sir:
I have the honour to present the
Annual Report of the Department of
Communications for the fiscal year
ending March 1980.

I remain, Sir,
Your Excellency's obedient servant,

Francis Fox,
Minister of Communications.

1 INTRODUCTION

Two federal elections took place during the period covered by this report, each followed by a change in government, and three different ministers held the communications portfolio. Despite these changes, the commitment all three ministers shared to meeting the challenge of the information revolution gave a certain continuity to the work of the department.

In Canada, as in many other countries, the production of information is becoming an increasingly important factor in the economy. According to some estimates, half our labour force is already engaged in information-related activities, and this proportion is expected to rise in the coming decades.

But this shift to an information-based economy will not be problem-free. If Canadian industry does not participate in this expansion, the economic consequences could be serious indeed. The concern is far more than economic, however. Canada's very survival as a nation is at stake. Data banks and information systems developed by foreign multinationals could dominate Canadian consumer and business markets. Extensive information on Canada and Canadians could be controlled by other nations. A deluge of foreign television and radio broadcasting could overwhelm the Canadian perspective and Canadian identity. In short, Canadian sovereignty could become a meaningless concept.

These concerns lay behind the minister's 1978 decision to appoint a consultative committee on the implications of telecommunications for Canadian sovereignty. Under the chairmanship of former B.C. Supreme Court Justice J. V. Clyne, the independent committee was asked to advise on a strategy for restructuring Canada's telecommunications system to make the best contribution to the country's economic strength, as well as its industrial, political and cultural sovereignty.

Released in April 1979, the Clyne report stressed the degree to which both Canada's future as an industrial nation and her sovereignty depend on having a strong, competitive telecommunications and electronics industry. Other areas covered by the report's 26 recommendations were the scope, regulation and competitive status of cable television and pay TV; the use of satellites and other new technologies; and the need for co-ordinated policies in the burgeoning field of computer communications. The underlying theme of the report was that Canada must, through vigorous and immediate action, maintain her role as a leader in telecommunications — or fall behind as an industrial nation.

The social, cultural and political implications of the information revolution are far-reaching, and the need for public awareness has never been greater. Articles and speaking engagements by the ministers and the deputy ministers drew attention to the issues. The department also contributed to public awareness of the information society through its magazine, *In Search*, through an extensive exhibits program, and by supporting TVOntario's Fast Forward series. Media coverage of telecommunications increased noticeably during the year, and the number of general enquiries received by the department each month nearly doubled.

In April, the minister announced a four-year, $9 million program to support Telidon, the two-way TV system developed in the department's research laboratories and widely acknowledged to be technically superior to other videotex systems. The government is now collaborating with industry in a number of field trials to test the marketability of Telidon, and encouraging the development of industrial strength in this new area by transferring the technology developed in the department's research laboratories. A major objective of the Telidon program is to ensure its credibility in other countries as well as in Canada. A promotional blitz was undertaken for this reason early in 1980, with the emphasis on the United States. Both trials and sales were expected to result from these efforts.

Departmental research in fibre optics is also moving out of the laboratory and into the marketplace. In this promising transmission technology, communications signals travel in the form of light along hair-thin glass waveguides. The department is co-operating with industry in field tests of fibre optics in Elie, Manitoba. Other experimental or operational systems are in place in British Columbia, Alberta and Ontario, while the world's largest fibre optic system is under construction in Saskatchewan.

These and other advances in technology offer new possibilities that may strain traditional regulatory concepts. Broadcasting, for example, has long been regulated as a scarce resource, but the abundant capacity of new systems now poised for implementation may well require a new approach. It also raises the question of what institutional framework will be required. Would plant integration be advantageous? Should monopoly or competitive services be the rule? Should there be a separation of content and carriage, so that communications networks function as public utilities, equally accessible to all? The department is addressing these and other issues in continuing policy studies.

At the same time, the department is working to extend radio and television service to the three million Canadians who have limited choice, substandard reception or no TV reception at all, and to encourage broadcasters to offer a better choice of Canadian programming to both mass and specialized audiences. The lack of Canadian programming has been a paramount concern in light of the rapidly expanding capacity of the program delivery system. Both governments that came to power during the year recognized the close association between communications technology and communications content by naming one minister as both Secretary of State and Minister of Communications. Measures to stimulate the domestic production industry were under study as the year ended.

In the space program, a long-standing objective of the department was achieved during the year, when a Canadian firm received the prime contract to supply Telesat's two Anik D satellites. In the

complementary area of earth stations, Canadian industry is gathering strength following the new earth station ownership policy announced last year. Canadian carriers and cable TV systems have made it possible for Canadian manufacturers to bid competitively by pooling their orders for earth stations. The government's investment in expanding the David Florida Laboratory to handle testing and assembly of complete satellites has also contributed to the development of Canada's space industry. The international market potential in space systems in the rest of this century is expected to be many billions of dollars. Through continued co-operation with industry, the government intends to ensure a strong Canadian presence in both domestic and international markets.

On the international level, the regulations governing the orderly world use of radio communications were revised for the first time in 20 years. The World Administrative Radio Conference concluded in December 1979 after 10 weeks of difficult negotiations, having satisfied the reasonable expectations of both developing and developed nations.

The year ended with the release of the 1979 report of the Communications Research Advisory Board. The board warned that Canada is entering a decade of dangers and opportunities, and must have a focal point in government for the policy decisions and research support so urgently required in face of the information revolution. It is crucial, the board said, for policy makers at all levels of government to come to grips with such questions as optimum industry structure, consumer interest, vulnerability, employment, energy, and industrial as well as cultural sovereignty.

This report would not be complete without a tribute to the father of Canada's space program, Dr. John Chapman, who died in September 1979. Dr. Chapman was the driving force behind this country's satellite programs for the last 20 years. He guided Canada's entry into space by way of the Alouette and ISIS satellites, then chaired a government task force on satellite communications whose recommendations led to the establishment of Telesat Canada. He was also a prime mover behind the experimental Hermes program, which pioneered direct broadcasting by satellite. At the time of his death, Dr. Chapman was assistant deputy minister, space program.

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FEDERAL-PROVINCIAL RELATIONS

Bilateral meetings
In August and September, following the change in government, the new minister held a series of meetings with provincial ministers responsible for communications to become better acquainted with provincial viewpoints and interests.

Federal-provincial conference
These meetings were followed by a federal-provincial conference of communications ministers, which took place in October 1979.

Among the subjects discussed were satellite distribution of TV programming and the introduction of pay TV in Canada. As agreed at the conference, the federal Minister of Communications subsequently forwarded a final set of objectives and guidelines to the Canadian Radio-television and Telecommunications Commission to assist the commission in establishing terms of reference for its two-phased public review on extension of service to northern and remote communities.

The ministers approved, as a basis for further discussion, principles on the provision of telecommunications services in the public interest set forth in the report of the working group on competition and industry structure. They instructed the group to go on to define a basic package of telecommunications services and to develop proposals on interjurisdictional impacts, vertical integration in the telecommunications industry and the boundary between monopoly and competitive services. They also asked the group to monitor the impact of interconnection.

The ministers established two other federal-provincial working groups.

- The new working group on the industrial impacts of communications policies was asked to examine a number of issues identified in a report on industrial strategy for telecommunications prepared by Canada and Ontario, and to report on Canada's capability in such key technological areas as space, fibre optics, microelectronics and interactive services.
- The second new group was asked to develop specific proposals on means of delegating authority over cable to the provinces following passage of the proposed new legislation, in a manner that would satisfy federal and provincial concerns as well as those of the industry.

Atlantic Consultative Committee
The Atlantic Consultative Committee on Communications met twice during the year to discuss matters of mutual interest to that region and the federal government. Topics included earth station ownership policy, electronic transfer of funds and transborder data flow, terminal attachment and new post office legislation.

The committee is a permanent and formal mechanism for federal-provincial consultation and co-operation. Frequent contacts by personnel of the department's Atlantic regional office promote co-operation at the working level.

Regulatory clearing house
The formal proposal of the Canadian Law Information Council to establish a clearing house and repository for regulatory decisions was sent to all provinces on March 6, 1980. The department committed itself to a financial contribution of $50,000 a year for three years, and solicited supplementary financial support from the provinces. The project is to be self-supporting after three years. The concept grew out of a study carried out by the department at the request of the 1978 federal-provincial conference of communications ministers.

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MANAGING THE RADIO FREQUENCY SPECTRUM

In Canada, responsibility for management of the spectrum is assigned to the Minister of Communications, under the authority of the Radio Act.

Spectrum policy
This entails developing national policies for spectrum utilization and formulating plans for allocating frequency bands to various classes of radio services, through an extensive process of public consultation.

Within this context, the department published a discussion paper in August 1979 reviewing usage of all bands in the 1-10 GHz range, and inviting public comment. The main users of the frequency range are telecommunications carriers, broadcasters, electrical power utilities, cable TV operators and government agencies. A similar review of the 406-960 MHz band was completed last year. The major change resulting from this review was the allocation of the 806-890 MHz band to land mobile service. During 1979/80, the department began developing plans for licensing in this band.

In August, the department also initiated a formal consultation process on the desirability of making additional spectrum available in the 890-960 MHz band for personal radio communications. This work is being co-ordinated with the United States and certain European countries.

Use of broadcasting spectrum for point-to-point relay of broadcasting programming into remote areas was also a matter of policy concern during the year. This non-standard use of broadcast spectrum could hamper the future development of the Canadian broadcasting system and delay the extension of high quality microwave telecommunications services. In December 1979, the department therefore released a discussion paper proposing a policy under which such systems would be authorized in future.

Licensing
For the first time since 1952, the number of radio licenses in force decreased. The 1979/80 total was 1,300,572 — down eight per cent from the previous year.

Contributing to the overall decrease was a 13 per cent drop in the number of General Radio Service (GRS) licenses in force, marking the end of the phenomenal growth of this service over the past five years. Licenses for GRS (also called Citizen's Band or CB radio) accounted for 63 per cent of the total.

In other license categories, there was an 11 per cent increase in new licenses. The number of earth station applications doubled, and 109 stations were authorized, compared to 50 in 1978/79, bringing the total number of earth station licences in force to 292. The increase can be attributed to the department's liberalized policy for licensing earth stations, announced in February 1979.

Certificates of registration issued to United States licensees decreased a dramatic 53 per cent to 23,473 in 1979/80, as a result of a new Canada/U.S. agreement that allows U.S. amateurs to operate their equipment in Canada without a Canadian certificate. Canadian amateurs operating in the U.S. enjoy a similar privilege.

Spectrum management system
Following tests of a computer-based spectrum management system in the land mobile service in the Montreal area, the department decided to install this system in 17 of its field offices across Canada. The system, which will eventually cover the majority of radio services licensed by the department, was implemented first for land mobile, as this service accounts for 80 per cent of non-GRS licenses. The new system will allow the department to make more efficient use of the spectrum, especially in urban areas where spectrum congestion is high.

A separate computerized licensing system for GRS was introduced in February 1980, following a one-year trial in the Pacific region.

Regional activities
A large part of the day-to-day spectrum management function of the department is the responsibility of offices in five administrative regions: Pacific, Central, Ontario, Quebec and Atlantic. The 44 district offices and associated spectrum surveillance centres located across Canada carry out such activities as licensing, inspection and enforcement, making service accessible to the general public throughout the country.

Consumer electronic equipment immunity
As a result of complaints about the malfunctioning of TV sets, stereos and other

consumer electronic equipment in the presence of strong radio signals, the department sought the co-operation of manufacturers in taking corrective measures. The industry is now reviewing its electromagnetic compatibility standards through the Canadian Standards Association.

For its part, the department
- established a small-scale immunity testing facility;
- funded contracts for evaluating anechoic materials for indoor testing facilities and developing objective measurements of TV picture degradation;
- participated in meetings of the International Special Committee on Radio Interference and the American National Standards Institute regarding international solutions to the immunity problem; and
- prepared for the construction of a shielded, absorber-lined chamber for developing immunity testing techniques.

Broadcast engineering
The department conducts technical and engineering evaluations of all applications made to the CRTC for broadcasting and cable TV licences. During 1979/80, the department studied 870 applications for cable TV, 162 for TV, 80 for FM and 66 for AM. In accordance with international agreements, it also processed 2,053 broadcast proposals from other countries, primarily the United States, to ensure that proposed foreign stations would not interfere with existing or planned Canadian broadcasting stations.

In light of increasing demand for FM, the department did extensive work towards a complete revision of FM allotment plans for Canada, to allow for the creation of more stations. This involved public consultation with interested parties in Canada, and co-ordination with American authorities to avoid interference between systems in border areas.

In February, the department published formal notice of the proposed deregulation of small cable TV systems. Providing they carry no more than 12 channels, systems with fewer than 500 potential subscribers would be eligible for exemption from proof of peformance and other technical requirements. Some 100 cable TV systems are affected.

Radio type approvals
New radio equipment must receive type-approval from the department. A total of 724 models of radio equipment received type-approval in 1979/80. Required testing may be performed privately or in the department's laboratory. Subsequent audits ensure that new units of approved equipment continue to meet established standards. During the year, the department tested 48 transceivers for type-approval, and carried out post audits on 30 transceivers.

The department also tested 10 television receivers for radio noise and 25 vehicles for spark ignition radio noise under the Radio Interference Regulations.

New regulations for technical assessment and type-approval of radio equipment went into effect in August, replacing regulations in effect since 1962. The new regulations permit the department to offer a broader range of laboratory services to the public, at rates comparable to those established in the private sector.

GOVERNMENT TELECOMMUNICATIONS

Through the Government Telecommunications Agency, the department co-ordinates planning of telecommunications services and facilities by federal departments and agencies, advises them on the introduction and application of new telecommunications technologies, and provides assistance in the selection and use of telecommunications facilities and services.

Through the agency, the department also provides shared telecommunications for use on a government-wide basis, leasing the services required from telecommunications carriers, and allocating costs to departments according to usage.

Shared networks
The agency manages consolidated telephone systems in 20 cities in Canada and two in the United States, as well as an intercity network which connects federal government offices across the country. During 1979/80, average working-day traffic was 98,000 calls, including operator-handled calls.

The agency also manages a low-speed, computer-controlled message switching system that moves information to points across Canada. Traffic on this network was up four per cent in 1979/80 to 4.8 million messages. These consolidated systems and facilities ensure maximum savings for the government as a whole.

During the year, the agency implemented a new national teleconference system, and undertook a preliminary study for a new government shared data network.

Directories
In co-operation with the Task Force on Service to the Public, the agency developed improved listings for federal programs and services which appeared in a blue section in the Ottawa/Hull and Toronto telephone directories. This format is to be adopted for all public telephone directories across Canada.

Consulting
While departments have primary responsibility for determining and satisfying their telecommunications needs, the agency provides consulting services on

request. During 1979/80, for example, the agency assisted Correctional Services Canada by drawing up technical specifications for a dedicated facsimile network.

Systems development
During the year, the agency developed specifications for a variety of equipment, including facsimile terminals, to guide government purchases under the national master standing offer. Standardization in the federal market – the largest in Canada – means significant benefits for Canadian industry and technology.

Planning
To identify the telecommunications resources needed to support government programs, the agency produces an annual long-range plan, and prepares an annual review of telecommunications in the Government of Canada. The second annual review, covering 1977/78, appeared in May 1979. The 1978/79 review was published in January 1980. The review contains an analysis of resource expenditures and a summary of information on government telecommunications systems. A long-range planning framework was included for the first time in the 1978/79 review, to facilitate and improve the quality of government telecommunications planning.

Day-to-day guidance on telecommunications management is provided to departments through circular letters drafted by the agency and issued by Treasury Board. One such circular drafted during 1979/80 dealt with teleconference services.

The department attached a high priority during the year to the development of several interrelated policies for Canadian television that would take full advantage of new technologies of distribution and also create a positive environment for growth within Canada's program production industry.

Until very recently, the major debates over Canadian broadcasting have been couched in terms unsuited to the distribution technologies of the late 1970s and early 1980s. Recent technological developments have begun to erode the concept of off-air broadcasting, due to the greatly expanded carriage and coverage capacity of new technologies including cable, fixed and direct broadcast satellites, and fibre optics. In combination with traditional broadcasting media, these new technologies offer significantly expanded possibilities for the nation-wide distribution of varied and comprehensive programming. Since, however, there is a serious gap between the rapidly expanding distribution capability of our delivery systems and the availability of programming from domestic producers, the department judged it essential to encourage the development of additional Canadian television productions of a quality that will make viewers both at home and abroad watch them regularly and eagerly.

Significant progress was achieved in several major broadcasting policy initiatives. Among these, policies concerning the extension of services throughout Canada, the growth of satellite television services and the introduction of pay television merit special consideration below.

Extension of services
It is an important objective of the federal government to extend services to those Canadians living in rural and remote communities who do not have access to the number and variety of broadcast services widely available in more populated areas of the country. This objective is best achieved with the active co-operation of the provinces. The Anik B pilot projects, in which several provinces participated, and the cable television studies in the Atlantic provinces provide good examples of federal-provincial collaboration in this area.

Satellite television services
Satellite distribution of television programming provides an unprecedented opportunity to extend services to inadequately served areas, and to maximize equitable access to broadcasting services among regions. Additionally, it creates an immense potential to increase the diversity of program choice throughout the country. In November 1979, federal and provincial ministers responsible for communications agreed on a set of objectives and policy guidelines for the introduction of satellite television services in Canada. These national objectives and guidelines were forwarded to the CRTC in November for consideration along with a comparable set addressing pay TV.

Pay television
In the context of the rapid growth in the development of pay TV in the United States and the technical availability of American pay TV signals throughout much of Canada, the department completed background studies on the various options and conditions for the introduction of Canadian pay television services. In particular, work was completed on pay-per-program and pay-per-channel models incorporating several possible financial and marketing scenarios. Moreover, federal-provincial discussions in November produced a general consensus on objectives and guidelines concerning pay TV, thereby helping to lay the foundations for the CRTC's consideration of pay TV applications expected to be heard in 1981.

CRTC hearings
In order that these issues be given full consideration in a public forum, the Minister of Communications asked the CRTC to hold a two-phased public review

of satellite distribution of television programming and pay television in Canada. The first phase would consist of a hearing calling for proposals or submissions of intent from industry interests as well as public comment on the issues involved. In the second phase, it was envisaged that the commission would call for licence applications.

A two-phase set of hearings on the extension of services and the introduction of satellite television services and of pay television was announced by the Minister of Communications and the CRTC in November 1979. In January, the first phase commenced with the establishment of the Committee on Extension of Service to Northern and Remote Communities. The committee, comprised of nine members drawn from across Canada, was to hold public hearings, receive submissions and issue its report during the course of 1980. The public review process was intended to formulate an appropriate policy and regulatory framework for the introduction of these new programming services. The second phase, dedicated to hearings on licence applications, was to take place in 1981.

Educational use of satellites
A federal-provincial task force on the use of satellites in education was established in October 1979 to examine questions of costs and technology in the delivery of educational services via satellite. Among the specific matters under consideration were extension of the lease for the 12/14 GHz portion of Anik B and the allocation of channels on Anik C.

Border broadcasting
A study carried out for the department concluded that the 1976 amendment to the Income Tax Act had succeeded in redirecting Canadian advertising expenditures to Canadian broadcasters and proven particularly beneficial to newly licensed TV stations. The study found that the annual flow of Canadian advertising funds to U.S. border stations had been reduced from $21.5 million (U.S.) in 1975 to $6.5 million in 1978.

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TELECOMMUNICATIONS SYSTEMS AND SERVICES

One of the department's major objectives is to ensure that Canada's telecommunications systems evolve efficiently and economically in response to the demands of Canadians and advances in technology.

Packet switching technologies now in general use have greatly increased the efficiency of existing telecommunications networks, and fibre optic systems, experimental or operational, are in place in several provinces. In Saskatchewan, construction is beginning on the largest fibre optic system in the world, 3,200 km in length, which will carry voice, data and video signals between major communities in the province. Many of the policy issues raised by these and other developments in communications technology are being addressed in the working groups set up by the federal and provincial communications ministers, and by the department, through its continuing analyses of structures and intercorporate relationships in the industry.

Interconnection
In May, the CRTC granted CNCP the network interconnection privileges it had sought with Bell Canada. Bell Canada and the eight other telephone company members of the TransCanada Telephone System, supported by several provinces, petitioned the Governor in Council to delay implementation of the decision. The department assessed the policy implications of the decision from the perspectives of cost and revenue relationships, cross-subsidy, intercarrier competition and compensation. On July 27, the petitions were turned down by Cabinet which took the view that the effect of opening up the telephone system to greater competition in business services would create significant benefits for the economy in general, and would not be reflected in the average Canadian's phone bill.

The decision to allow interconnection of the Prince Rupert and British Columbia telephone companies was evaluated from the same perspectives.

Terminal attachment
In conjunction with the federally regulated carriers, affected provinces and equipment suppliers, the department develops technical standards for the attachment of customer-owned terminal equipment to the carriers' facilities, and certifies devices that meet the established standards. During the year, 73 items of terminal equipment were tested for certification.

The department developed definitions, certification standards and test methods for additional types of equipment brought into the terminal attachment program during the year, and began work on interface standards for radio paging control terminals. The department also instituted an audit procedure to test current production units of equipment already certified, to ensure continued compliance with certification standards. In addition, it established a task force to draw up technical standards for the attachment of devices which can dial into the network.

Public message service
The department continued to be involved in activities associated with the closure of certain CNCP telegraph offices, and

undertook to ensure that users in areas where offices were closed were provided with suitable alternative arrangements.

Open systems integration of data networks
For many years, the department has recognized the desirability of Canadian computer users being able to interoperate through the different national and international telecommunications networks and between computer equipment or software acquired from different suppliers. Departmental research and policy planning were initiated during the year to develop a framework for standards that would permit and facilitate this interoperability.

These initiatives complemented extensive Canadian participation in parallel international activity. Canada contributed to decisions on standards taken by the Telegraph and Telephone International Consultative Committee and by the International Standards Organization and consulted with the United Kingdom and France on the possibility of co-operation in this area.

Transborder satellite communications
During the year, the department consulted with the Canadian telecommunication carriers regarding the factors and issues related to transborder telecommunications via satellite. Their views were analysed for national implications and work began on development of a Canadian policy for use of Canadian and American domestic satellites for transborder services.

Northern communications
Under the Northern Communications Assistance Program, the federal government has been making financial contributions since 1978 towards the capital cost of communications facilities required to bring basic local and long-distance telephone service to 19 communities in the Northwest Territories.

In November 1979, due to the amount of time required to put the facilities in place in such remote communities, the government decided to spread the five-year program over a further two years. Federal contributions over the period are expected to amount to $7.6 million.

The first three of a series of agreements were signed with Northwest Tel Inc. a subsidiary of Canadian National Telecommunications, over the first three years of the program. Three were also signed with Bell Canada in the same period – the third and final one in January 1980 covering the last two communities in their area.

Communications economics
Economic and econometric studies were initiated into the impact of information technologies on the Canadian economy generally, and on the manufacturing sector and communications industries in particular. Much of the work was devoted to identifying and assessing trends and issues relating to the introduction and use of new information technologies, and was closely related to efforts within the OECD dealing with information, computer and communications policies. Issues such as the impact on employment and working conditions, the availability of skilled manpower and vulnerability were addressed.

The department's program of economic research included the following:
- a two-year study to forecast the demand for videotex (specifically Telidon) consumer services in Canada over the next 10 years;
- a study in co-operation with the Institute for Research on Public Policy on the impacts of computer communications on employment in Canada;
- a pilot study on the economic impacts of microprocessor technology;
- a study to identify the main economic policy issues arising from the information revolution, to establish the direction and scope of future research and to outline the broad policy options for coping with the issues; and
- a report on the impacts of computer communications on employment in Canada, based on a review of the experience of the U.S.A., Japan, the United Kingdom, the Federal Republic of Germany, Sweden and Brazil.

During the year, the department completed the second phase of a study on productivity, employment and technical change in the telecommunications sector, following earlier work which covered these factors for Bell Canada alone. This was then integrated in a joint productivity project between the department and the Canadian Telecommunications Carriers Association. Nine member carriers are participating, namely Alberta Government Telephones, British Columbia Telephone Company, Bell Canada, Manitoba Telephone System, New Brunswick Telephone Company, Québec Tel, Teleglobe, Telesat and Saskatchewan Telephones. A memorandum of understanding was signed by the deputy minister and the president of the carriers association with the objectives of constructing economic accounts of the firms, to develop productivity measures and to establish their use as management, policy, and regulatory tools.

The department also developed price indices for residential and business services offered by Bell Canada and analysed the effect of rate-of-return regulation on the efficiency of the company.

In addition, the department investigated 40 applications to the Foreign Investment Review Agency which involved establishment of new communications businesses or acquisition of existing communications businesses by foreigners, and made recommendations to the agency regarding conflicts with departmental policy.

Telecommunications statistics
In collaboration with the Canadian Telecommunications Carriers Association, the department produced and published a review of expenditures on telecommunications equipment by the carriers in the period 1973-1977, and a forecast of outlays for 1978-1982.

A handbook of Financial Statistics on Canadian Telecommunications Carriers was published in December. This publication covers all major telecommunications companies in Canada, and sets out statistical time series and cross-sectional comparisons for the industry.

A limited exchange of statistical information is under way with other nations, particularly in western Europe. Statistical reports to the International Telecommunication Union (ITU) now form a regular contribution to such publications as the ITU Yearbook of Common Carrier Telecommunications Statistics.

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TELIDON

In April 1979, the government announced a $9 million, four-year program to help industry set up field trials and to further technical refinement of Telidon, the two-way television technology developed by the department.

Known generically as videotex, this type of system allows home users to call up written or graphic information for display on their TV screens. The Canadian Telidon is considered technically superior to other videotex systems, providing sharper images and using a more flexible method of coding information.

Field trials
A number of cable TV operators, telephone companies, broadcasters and information suppliers will be participating in field trials in 1980 and 1981 to test both technology and applications before commercial services are launched.

- The Ontario Educational Communications Authority began a one-year trial in January 1980, to explore educational applications of broadcast and interactive Telidon.
- The New Brunswick Telephone Company started a field trial in early 1980 involving about 75 homes, a few businesses, a large shopping mall and a public library.
- Bell Canada has incorporated Telidon technology in its $10 million 'Vista' videotex trial. The federal government is contributing $2.5 million towards the cost of this trial, the largest to date.
- The Manitoba Telephone System is testing specialized business services as well as mass market services for home users.
- The B.C. Telephone Company field trial will address the business/office market and will include 150 Telidon terminals.
- Télécâble-Vidéotron, a Montreal cable company, plans to test Telidon as part of a complete information distribution system. Among the many information providers will be La Presse and l'université du Québec.

Field trials across Canada are being coordinated by the Canadian Videotex Consultative Committee, set up to advise the deputy minister on the evolution of videotex in Canada. Its 30 members include representatives of the common carriers, the cable TV industry, broadcasters, manufacturers, information providers, public interest groups and government.

Technical improvements
During the year, the department successfully tested Telidon over 12 GHz satellite links in both the broadcast and interactive mode, opening the possibility of service to remote areas of the country. Information provider terminals and hardware were developed, and research was undertaken into the use of customized microchips as a way of reducing the cost of subscriber terminals.

New computer software was created with a capacity of some 60,000 pages, accessible by up to 32 terminals at a time. Capacity can be expanded later to allow simultaneous access to a data base by 200 terminals. A variety of organizations expressed interest in obtaining the rights to this software.

Behavioural research was conducted into Telidon's visual display characteristics, and recommendations were made about character and line spacing to improve legibility. Behavioural researchers also studied the reactions of users to the hierarchical procedure for finding information.

Information providers
Already some 200 corporations and individuals have come forward as potential Telidon information providers. Many of these organizations are banded together within a national group called the Videotex Information Service Provider Association of Canada.

Transfer of technology
A major objective of the Telidon program has been to encourage the transfer of technology to private industry as quickly as possible so that it can develop its own systems in response to the market. Norpak Ltd. of Pakenham, Ontario, was the first company licensed to use the technology developed by the department. Norpak and several other Canadian firms are now manufacturing Telidon terminals and related hardware.

Telidon awareness campaign
In 1980, the department launched an international program to promote awareness of Telidon and to encourage field trials by cable and telephone companies. A government-industry team visited San Francisco and New York to meet with senior executives of American telephone companies, newspaper chains and cable companies.

Demonstrations of Telidon were given at trade and computer shows across Canada. Telidon was also demonstrated at Telecom 79 in Geneva; at the June meeting of the European Economic Community; at Viewdata 80 in London, England; and in Australia.

Regional staff of the department were heavily involved in the Telidon program, keeping the public informed by demonstrating the new technology and handing out printed material. They also maintained liaison with participants in the various field trials of Telidon.

Standards
Canadian officials worked to have the Telidon alpha-geometric standards accepted internationally. As a result of their efforts, Telidon was recognized as one of the standards in the draft CCITT standards document which is proceeding towards final debate in 1980.

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COMMUNICATIONS RESEARCH AND DEVELOPMENT

In its research program, the department placed increasing emphasis on developing new technology, demonstrating it through field trials, and encouraging Canadian industry to develop commercial applications. The research program continued to support the department's policy and regulatory responsibilities, and to contribute to better use of the radio spectrum and existing communications networks.

The department performs communications research in house, mainly at its Communications Research Centre near Ottawa, as well as through contracts with industry and universities. In addition to research to meet its own requirements, the department undertakes research in support of other government departments. Most of this research is for the Department of National Defence in the areas of radar and military communications systems.

Spectrum research
During the year, the department pursued propagation studies in the VHF/UHF frequency bands used by Canadian broadcast and mobile services, continuing long-term measurements at Ottawa and London, Ontario. These studies form the basis of propagation models used for predicting coverage and mutual interference in these services.

In the area of microwave, study topics during 1979/80 included:
- multigraph propagation on digital systems at 8 and 37 GHz;
- rain attenuation and depolarization at 11, 17 and 74 GHz; and
- characteristics of the 15 GHz very high capacity microwave band now used for short-haul transmission of CATV and digital information. This work is particularly significant in light of the potential of the 15 and 18 GHz bands to provide a wide range of communications services in urban areas.

The department's researchers also studied earth-space microwave propagation. Attenuation and depolarization caused by ice precipitation and cloud were measured on 12 GHz circularly-polarized signals at several locations using the Hermes satellite. These measurements are being extended to linear polarization using Anik B. At 28 GHz, researchers detected several instances of high altitude ice particles causing significant depolarization of the wave yet little corresponding attenuation, an important finding for the future use of 20 and 30 GHz bands in satellite communications.

Noise and signal environment studies
Quantitative studies of the electromagnetic environment continued in the broad frequency range of 150 kHz to 10 GHz, in the areas of deliberate transmissions (signals) and noise. In particular, the department carried out initial measurements in the land mobile bands and co-operated with the Ministry of Transport in measuring power-line noise near airports which affects landing and other aeronautical communications.

Re-radiation problems in AM broadcasting
Reflection of radio signals from tall buildings, power lines and other structures can alter the coverage pattern of AM radio stations. During the year, the department's researchers made significant progress in determining the effects of re-radiation through model measurement, in predicting distortion, and in developing ways of reducing or eliminating it. The objective of this work is to develop predictive techniques and guidelines for the mutual protection of power utilities and broadcasters.

Radio systems
For several years, the department has been working to develop a data communication system for mobile units that could be manufactured by Canadian suppliers. A pilot mobile radio data system went into service in the Vancouver police department in January 1979. The city of Vancouver subsequently had the system refurbished using Canadian terminals developed by a British Columbia company under a contract from the Department of Communications. With the transfer of the technology to Canadian industry through Canadian Patents and Development Limited in 1979, the project met its objective and came to an end.

An automated high frequency radio telephone developed by the department's engineers was successfully tested in local trials at Ottawa, Halifax and Low, Quebec. The new system improves chances of making radio contact, increases the reliability of equipment, and eliminates the need for an operator. Full-scale field trials are scheduled to take place in B.C. during 1980, with interconnection to the TransCanada Telephone System.

Evaluation continued of the trial radio system installed in an Inuit community in Northern Quebec. Contracts were awarded to industry for development of a frequency control module as well as technology to provide automatic connection for long-distance phone calls.

Optical communications program
The department pursued research on its broadband and high-isolation opto-electronic switch, awarding a contract to a Canadian firm to develop an analogue cross-point matrix array switch module for VHF based on this concept. This type of switch could be used for switching video signals in TV distribution systems.

Another contract was let to Canadian industry to develop very high speed photo detectors of electromagnetic radiation for short and long wavelength spectral regions of interest for fibre optics transmission. Such detectors should prove useful in link diagnostic equipment, optical communications source evaluation and high speed optical signal stream detection.

The department's scientists developed a method for constructing fibre optic

reflection star couplers and hybrid reflection-transmission star couplers. These new devices together with the optical T-coupler and power-combiner technology developed by the department will make it possible to design various shapes of local area fibre optic network.

In London, Ontario, the department and the cable television industry are testing fibre optic technology in a broadband supertrunk linking the antenna and the head-end of a cable TV system. The project identified previously unknown sources of spurious noise that can be particularly troublesome in multi-mode high-speed systems. It also demonstrated that only one repeater was required to span the 8 km path, although two repeaters had been specified in the systems design. The project was intended to give the cable television industry first-hand experience in using fibre optics for trunk operations.

Elie fibre optics field trial
Under the joint sponsorship of the department and the Canadian Telecommunications Carriers Association, in co-operation with the Manitoba Telephone System, an integrated fibre optic system is to undergo field trials in Elie, Manitoba. The objectives of the project are to promote the development in Canada of optical fibre technology and to determine if fibre optics can reduce the economic burden of providing improved telecommunications and broadcasting services to rural areas. During the year, basic design work was completed for the system, which will deliver single-party telephone, cable TV and FM stereo service to 150 homes.

Rural communications
Two projects were continued during the year to improve rural telephone service. In co-operation with Alberta Government Telephones, the department funded development by Canadian industry of an interface device using a microchip. The device will provide selective ringing and conversation privacy on rural party lines. The second project involves industrial development of a digital subscriber carrier system, using time-division multiplexing to reduce the number of wire pairs needed to connect rural subscribers to central telephone offices.

A feasibility study on the extension of cable television services to rural parts of Newfoundland and Labrador was completed in October 1979. The study concluded that while few communities could support a cable television operation if microwave systems were used to deliver foreign network program signals to the communities, approximately 70 per cent of the households involved could support cable TV at reasonable monthly costs if signals were provided by a satellite delivery system. The study was undertaken co-operatively by the federal and provincial governments.

Another study looked at the possibility of providing rural clusters of homes with two, three or four TV channels, using a low-power station to rebroadcast within a radius of 6 km. Both technical and economic aspects were studied, and the cost of rebroadcasting was compared to the cost of cable distribution.

Office communications
A profound transformation is taking place in office automation in the developed world, stimulated by advances in information processing and communications technologies. Automation will soon provide alternatives to present methods of mail transmission, filing, information retrieval, and records keeping.

During the year, the department reviewed available data on office automation, analysed the market for automatic office equipment and services in Canada, and assessed the economic impact of new information technology on the office environment.

A comprehensive plan for behavioural research was prepared based on available information about office communications systems. Research planned for next year will assist with terminal design and implementation of new office systems, as well as the analysis of tasks and measurement of performance in offices. During 1979/80, the department started an attitudinal study to identify reactions of potential users toward the technology.

An office communications systems study was jointly undertaken and financed by the department and CNCP Telecommunications. The purpose of the project was to study the requirements of the office of the future based on concepts developed by the department, and to work out market projections.

At year end, the department was developing basic plans for a new program to establish a Canadian industrial presence in this area.

Communications Research Advisory Board
In April 1979, the board's annual report to the department was made public for the first time, in the interest of promoting greater public understanding of the issues involved. The 1978 report focussed primarily on technological transfer and industrial development, but also commented on the need for closer integration of socioeconomic and technical research.

In its 1979 report, released in March 1980, the board urged the department to place greater emphasis on developing appropriate policies related to the communications revolution.

The board is a volunteer panel of qualified and distinguished Canadians.

University research program
During 1979/80, 50 contracts were awarded for applied communications research in Canadian universities, 24 of them to French-language institutions. The program complements in-house research and promotes competence in various areas of communications, helping to develop individuals who can make substantial contributions in industry, government or universities. To qualify for support, projects must be in line with federal responsibilities, objectives and priorities in the social, economic, regulatory and technological aspects of telecommunications. Any Canadian university research that corresponds to the activities of the department is eligible for consideration under the program.

Inventions
Ten patent applications were submitted by the department in 1979/80. Concepts of commercial interest developed by the department's researchers are made available to the private sector through licensing by Canadian Patents and Development Limited.

Pilot Industrial Laboratory Program
Responsibility for the Pilot Industrial Laboratory Program was transferred to the department from the National Research Council in April 1979. The program was created in 1978 to help the government transfer technology from its research laboratories to Canadian industry. To receive funding, proposals must respond to an important Canadian need or opportunity, give evidence of the intent to commercialize the resulting products or services, and either derive from the department's research or be in an area where the department's staff and facilities can make a major contribution.

9

Hermes

The experimental Hermes, Canada's eighth satellite, ceased operations on November 24, 1979, when radio contact was lost. Launched in January 1976 with a two-year design life, Hermes performed social and technical experiments for almost four years.

The project was a joint venture by Canada and the United States. Canada designed, built and operated the spacecraft, while the U.S. provided advanced components and launching facilities. Canada and the U.S. shared equal time on the satellite for experiments.

Hermes served to advance technologies relevant to future communications satellite systems, particularly those operating in the 12/14 GHz frequency band and at high power.

Through a variety of experiments, the department demonstrated many applications of satellite communications to small, inexpensive earth terminals, including direct-to-home TV broadcasting, and assessed the capability of satellite technology for expanding and improving communications services to rural and remote areas. The program of experiments was completed in June.

In August and September, Hermes demonstrated 12 GHz satellite communications in Australia, from a new orbit slot over the mid-Pacific. Precipitation attenuation tests during the wet season were in progress when contact was lost. Commands were then sent to Hermes to disconnect as much equipment as possible so the satellite would not become a source of radio interference.

Anik B

Seventeen pilot projects to further develop the more promising of the communications services demonstrated through Hermes are being conducted using the 12/14 GHz services of Anik B, leased from Telesat for two years at a cost of $34 million. Projects cover a variety of fields including health care, education, community communications, TV program distribution and data communications.

In September, a world first was achieved when Anik B began transmitting 12 hours a day of educational TV programming direct to rural homes, community centres, small cable TV systems and low-power rebroadcasting stations in northwestern Ontario. Similar broadcasts began in December in northern British Columbia, the Yukon and the Northwest Territories.

A significant feature of the project was that 20-watt transponders proved powerful enough to provide clear TV reception through small terminals equipped with dish antennas 1.2 m or 1.8 m in diameter. These terminals were developed and built in Canada. Previously it had been assumed that a transponder of at least 200 watts power would be needed for direct-to-home satellite broadcasting.

Space industry development

For the first time, a Canadian prime contractor will construct Canadian satellites, as a result of a $20 million development program announced by the government in May 1979. Spar Aerospace Ltd. received the $78.6 million contract from Telesat to supply the two Anik D satellites. The government is paying premiums to Telesat to partially offset the non-recurring costs associated with this first Canadian prime contract.

Spar also received government contracts for the integration and partial test in Canada of one of the Anik C satellites, to provide learning experience for its role as prime contractor on the Anik D program.

Expansion of the David Florida Laboratory at the Communications Research Centre was well under way during the year and will be completed in 1980/81. When completed, the laboratory will be capable of handling environmental testing of complete satellites as well as subsystems and components. The improved facilities are designed to meet the requirements of any commercial satellite which will be flown in the 1980s or 1990s, including those designed for launch on NASA's Space Shuttle. The laboratory is unique in Canada, and ahead of any single facility in Europe as well as most U.S. facilities.

Space technology

Through an industrial contract program, the department encourages industry to develop components and subsystems expected to be required for future Canadian and export satellite programs.

About $2 million was contracted to Canadian firms during 1979/80, including contracts for:

- an SHF space technology development effort, to help Canada maintain its competitive position in 12/14 GHz satellite components and subsystems, together with an extension of this work to higher frequencies (20-30 GHz) likely to be used in the future; and
- feasibility studies and development of gallium arsenide field effect transistor amplifiers already used extensively in space communications applications, and expected to be of increasing importance in the 1980s.

In April 1979, the department and CNCP Telecommunications announced a joint $2 million project to develop an advanced, time-division multiple-access system and to test it using Anik B. This new technique is designed to share a satellite's transmission capacity more efficiently among a number of low-capacity ground stations.

Musat

Musat (multi-purpose satellite system) is a new type of satellite system that would provide two-way voice and low-rate data communications to ships, aircraft and small mobile stations used in field operations. During 1979/80, the department continued research and development projects to prove the feasibility of the concept, and to reduce technological risk in critical areas.

In July, advance notification was submitted to the International Frequency Registration Board, indicating a planned operational date of 1984. However, a decision at the 1979 World Administrative Radio Conference to allocate frequencies in the 806-890 MHz band for

public mobile satellite systems in the Americas opened up a new range of possibilities. The department is studying the implications of this decision on plans for Musat, as well as exploring the possibility of undertaking a co-operative mobile-satellite (M-Sat) program with NASA.

Symphonie satellite
The co-operative experimental program utilizing the Franco-German Symphonie satellite continued during the year. Experiments included a two-way video and audio connection between Ottawa and Paris during a UNESCO conference and a comparison of time standards in Ottawa and Paris.

European Space Agency agreement
Under an agreement with the European Space Agency (ESA) that came into effect in January 1979, Canada participates in the general studies of the agency and may choose to participate in other agency programs.

Following a well-attended ESA briefing for Canadian industry in January 1979, several companies registered to receive requests for proposals in general studies and technological research. Contracts awarded to Canadian firms in 1979 total around $1 million.

ESA approval was received in early 1980 for Canadian participation in the definition phase of the agency's large satellite (L-Sat) communications satellite program and its remote sensing preparatory program.

Support to other departments
The Department of Communications provides specialist expertise to support space applications programs sponsored by other departments and agencies, including military satellite communications, aeronautical and marine navigation, search and rescue, remote sensing, and weather forecasting.

Interdepartmental Committee on Space
The department continued to provide a permanent secretariat to the Interdepartmental Committee on Space, as it has done since 1976. The committee advises on policy and planning for Canadian space activities, and ensures the co-ordinated development of government, university and industrial activities as well as international co-operation.

Five-year plan
A discussion paper proposing a five-year plan for Canada's space program to 1985 was presented to Cabinet in January 1980 by the Minister of Communications, as the minister responsible for space. The document was released to the public in February, in keeping with the government's policy of encouraging public awareness of such documents.

The Canadian Space Program: Five-Year Plan (80/81-84/85) presents an analysis by the Interdepartmental Committee on Space of proposals made by several federal departments on space research and development programs for Canada.

10 INTERNATIONAL TELECOMMUNICATIONS

International Telecommunication Union
Canada continued to be an active member of the International Telecommunication Union (ITU), participating in Administrative Radio Conferences, the Administrative Council, the International Consultative Committees (CCIs), and the International Frequency Registration Board (IFRB).

The ITU is the United Nations specialized agency responsible for co-ordinating the international use of telecommunications and promoting efficient and interference-free use of the radio spectrum on a world scale.

1979 WARC
In December 1979, the World Administrative Radio Conference (WARC 79) concluded, following ten weeks of difficult negotiations. The first general radio conference in 20 years, it covered all aspects of telecommunications regulations governing shared use of the radio spectrum and the geostationary satellite orbit.

From the Canadian viewpoint, the conference was successful in that all of Canada's essential objectives were achieved. These related to the allocation of additional spectrum for mobile communications, AM broadcasting, international shortwave broadcasting, amateur radio and satellite communications.

During the preparations for WARC 79, Canada held several bilateral and multilateral meetings with countries of Latin America, Europe, Africa and the Far East in an effort to smooth out differences before the conference.

The final acts of the WARC are to be published by late 1980, and take effect January 1, 1982, except where a later date is specified in a resolution.

For the future, WARC 79 recommended that 11 major radio conferences be convened for services such as mobile, AM and HF shortwave broadcasting, and space services. One important theme at these future conferences and at the ITU's 1982 Plenipotentiary Conference will be how to guarantee developing countries equitable access to frequencies and orbital positions.

Region 2 Conference on AM Broadcasting
The first session of the Region 2 Administrative Radio Conference was held in Buenos Aires in March 1980 to establish the technical bases for a new frequency assignment plan for AM broadcasting stations in Region 2 (the Americas). Some 8,000 stations are affected.

The contentious issue of channel spacing was postponed until the second session, to be held in Buenos Aires in November 1981, and a panel of experts from eight

countries including Canada was established to study the alternatives of 9 or 10 kHz separation.

In July 1980, Canada participated in a seminar in Brasilia organized by the ITU and the Inter-American Telecommunications Conference (CITEL) in preparation for the second session of the regional conference.

CCI activities
The International Telegraph and Telephone Consultative Committee (CCITT) and the International Radio Consultative Committee (CCIR) are permanent organs of the ITU. The CCITT studies technical, operating and tariff questions relating to telegraphy and telephony, while the CCIR studies technical and operating questions relating to radio communications. Both committees issue recommendations on matters within their purview. The basis for this work is provided by a wide range of studies in which governments, private operating agencies, and industrial and scientific organizations participate.

During the year, the department was deeply involved in the formulation of Canadian positions for the interim meetings of the 1978-82 study cycle of the CCIR. This activity concentrated on the effective use of space systems for fixed, broadcasting and other services as well as sharing of frequencies between various services. All these matters relate to decisions taken at WARC 79 and are in preparation for further Regional and World Administrative Radio Conferences starting in 1982.

The CCITT activity was directed towards the VIIth Plenary Assembly of this body scheduled for November 1980 in Geneva. This international assembly approves recommendations representing international agreement on aspects of telephone, telegraph and data communications. The department has been concerned with developing and co-ordinating Canadian positions on essential agreements for world-wide ease of communication.

The 1980-84 work program signals the importance of the new information issues of the 1980s and 1990s, including questions concerning the integrated services digital network, data networks, digital signalling and switching, and the new tele-informatics services (videotex and teletext).

Canada/U.S. relations
Bilateral relations between Canada and the U.S. in the field of communications are perhaps the most complex and sophisticated between any two countries and very good rapport exists between the two administrations. With the emergence of the information society and the growing complexity of the issues involved, it is more important than ever for policy-makers on both sides of the border to be able to understand the orientation and philosophy of the other country. A start was made in this direction when, in March 1980, high level officials of the department, the CRTC and External Affairs invited their counterparts in the Federal Communications Commission, the National Telecommunications and Information Administration and the State Department to meet in an informal setting in Niagara-on-the-Lake. A fruitful exchange of views took place which set the tone for a renewed spirit of mutual understanding and co-operation.

Canada/U.S. defence production sharing
A proposal for the participation of Canadian industry in U.S. defence space programs was agreed to by the U.S. Department of Defence, and defence space communications was identified as a likely area for such participation.

In March 1980, a Canadian government-industry mission visited the USAF Space Division and several prime contractors in California to exchange information on U.S. defence space programs and the capabilities of the Canadian space industry.

INMARSAT
In May 1979, Canada signed the convention and operating agreement of the International Maritime Satellite Organization (INMARSAT). The new specialized organization officially commenced operations in July, with headquarters in London, England.

INMARSAT is to establish a maritime satellite communications system which will connect directly with international telephone and telex networks. The system will be used on the high seas by ships from all nations, providing improved maritime telecommunications, particularly in distress situations.

Australian domestic satellite system
The Australian government has shown considerable interest in the Canadian Hermes experimental satellite system and the planned Anik C program, in connection with their proposed domestic satellite system. At the invitation of Australia, the department organized a major government-industry mission in August 1979 to demonstrate Canadian satellite and earth station technology, and to participate in a bilateral technical workshop.

Videotex, co-operation with France
In October 1979, Canada and France agreed to exchange research information and technical data for the development of videotex systems and to facilitate visits by specialists.

The two countries also agreed to exchange views on proposals under consideration by international standardization authorities.

Technical assistance to Saudi Arabia
In response to a request from the Kingdom of Saudi Arabia for technical assistance in spectrum management, Canada concluded an agreement in March 1980 to provide three or four experts from the department to carry out project definition work in Saudi Arabia.

Visits
In April 1979, a delegation headed by the Vice-Minister of Posts and Telecommunications of the People's Republic of China (PRC) visited Canada. During a return visit in September by a Canadian delegation, the Chinese requested that a study group on satellite broadcasting techniques visit Canada, as they are planning to implement a domestic communications satellite system. The visit took place in April 1980. Canada and the PRC also exchanged visits of specialists in radiowave propagation.

Representatives of the Canadian government visited Italy in May 1979, to pursue discussions concerning space communications initiated in 1978. Several areas for potential co-operative space programs were identified.

A visit to Canada by the Turkish Minister of Posts and Telecommunications in July 1979 allowed the two countries to explore ways of expanding the industrial capacity of NETAS (a Turkish telecommunications manufacturing enterprise owned by Northern Telecom), particularly in the field of digital transmission technology.

The department also co-ordinated the visit of a delegation of members of France's Assemblée nationale in September 1979. The delegation's communications interests included computer communications and fibre optics experiments.

APPENDICES

Appendix I

Canadian telecommunications industry, 1979

	Telephone and others carriers*	Radio and television broadcasting	Cable television**	Total
		— in millions of dollars —		
Total operating revenues	5,563.2	918.6***	310.4	6,792.2
Net fixed assets — land, property and equipment	13,569.4	596.8	348.9	14,515.1
Total assets	15,744.5****	1,248.3	537.2	18,560.0
Value of wages and salaries paid	2,020.7	633.6	86.6	2,740.9
		— number —		
Number of employees including part-time and casuals	112,047	27,675	5,569	145,291

*Other carriers include CNCP Telecommunications, Teleglobe and Telesat.
**Includes only licensees reporting more than 1,000 subscribers.
***Excludes $540 million net cost of CBC operations as covered by Parliamentary grants.
****Does not include the assets of CNCP Telecommunications.

Source: Statistics Canada and Department of Communications

Appendix II

Trends in the Canadian telephone industry, 1949 – 1979

	1949	1959	1969	1979
Telephone companies	2,971	2,605	1,618	223*
Telephones, all types (millions)	2.7	5.4	9.3	15.8
Full-time employees	42,326	58,826	66,578	96,539
Local and long-distance calls (billions)	4.6	9.3	15.0	25.1
Calls per capita	336	530	707	1,054

*Fourteen of these companies provide 98 per cent of the services.

Source: Statistics Canada

Appendix III

Canadian households with communications services, May 1979

Type of facility or equipment	Households		Increase (Decrease) over 1978	
	Number	Per cent of total	Number	Percentage
Television*	7,388,000	97.8	267,000	3.7
Colour	5,798,000	76.7	501,000	9.5
Black and white	3,735,000	49.4	(84,000)	(2.2)
Radio (AM and FM)**	7,437,000	98.4	231,000	3.2
Telephones***	7,347,000	97.2	284,000	4.0
Cable television	3,916,000	51.8	291,000	8.0
Total Canadian households	7,558,000	100.0	238,000	3.3

*Because some households have more than one television receiver, the number of households with colour television added to the number with black and white television does not equal total households with television receivers.

**Includes households with one receiver or more.

***Includes households with one telephone or more.

Source: Statistics Canada

Appendix IV

Canadian broadcasting stations, March 1979

Province or Territory	AM	FM	TV*	Low-power AM (unprotected)**	Total
Newfoundland	29	28	117	16	190
Prince Edward Island	3	1	3	1	8
Nova Scotia	18	13	46	21	98
New Brunswick	17	7	27	13	64
Quebec	79	87	148	52	366
Ontario	101	117	115	71	404
Manitoba	18	33	57	8	116
Saskatchewan	19	21	80	1	121
Alberta	35	40	110	25	210
British Columbia	60	59	296	102	517
Yukon Territory	2	1	18	12	33
Northwest Territories	4	13	28	16	61
Total	365	420	1,045	338	2,188
Increase (decrease) over 1978	(71)	97	112	60	218
Percentage increase (decrease)	(16.3%)	30%	12%	21.5%	11.1%

*Approximately half these are low-power unprotected stations.

**CBC stations account for 99 per cent of these.

Note: Under international regulations, low-power stations are not entitled to protection from interference caused by regular stations on allotted channels.

Source: Department of Communications.

Appendix V

Cable television in Canada by region, August 1979

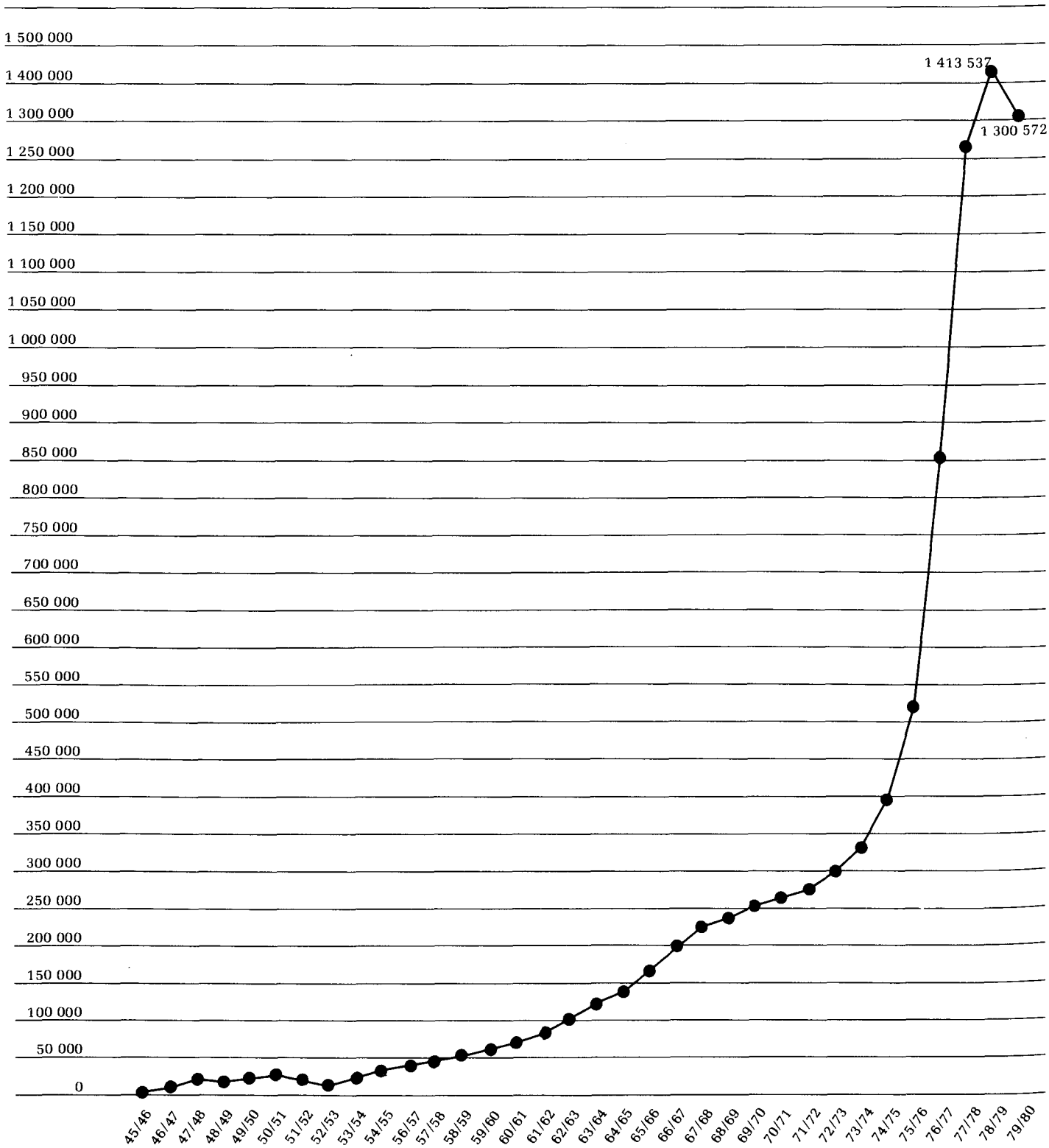
Total systems	**Pacific***	**Central**	**Ontario**	**Quebec**	**Atlantic**	**Canada**
Systems	73	46	120	145	44	428
Subscribers	732,358	592,882	1,760,904	775,492	222,562	4,084,198
Total households**	857,000	1,256,000	2,813,000	2,011,000	620,000	7,558,000
Percentage of households subscribing	85.4	47.2	62.6	38.6	35.9	54.0
Systems with more than 1,000 subscribers						
Systems	52	31	107	84	34	308
Subscribers	726,307	587,495	1,755,694	751,074	218,325	4,038,895
Households in licensed areas***	839,954	890,983	2,391,074	1,687,031	334,754	6,143,796
Penetration in licensed areas (percentage of households with access to cable)	86.5	65.9	73.4	44.5	65.2	65.7

*Includes British Columbia, the Yukon and Northwest Territories.
**Figures as of May 1978.
***Areas licensed for the distribution of cable television.

Source: Statistics Canada

Appendix VI

Radio station licences
in force 1945 – 1980
(all classes)



Source: Department of Communications

Appendix VII

Number of radio stations by service category
for 1979/80 fiscal year

Service category*	Ship	Coast	Land	Mobile
Limited maritime mobile		8		
Private maritime mobile		110		
Public commercial			2,284	14
Restricted public commercial			1,318	
Private commercial**			44,559	290,285
Provincial government			7,718	41,718
Municipal			4,263	40,703
Experimental			563	652
Amateur			20,329	
Public commercial receiving			193	1
Private commercial receiving			764	449
Public commercial automatic repeater			1,210	
Private commercial automatic repeater			3,462	
Aircraft navigational				16
Aeronautical mobile			1,858	16,392
Maritime mobile	20,504			

*Statistics shown for each service category indicate the number of stations performing that particular category of service. A licence may show more than one service category.

**Included in this category are 7,201 land and 29,357 mobile stations licensed to federal government departments.

Note: Excluded from the above are 820,952 General Radio Service stations, 292 earth stations and 7 space stations.

Source: Department of Communications

Appendix VIII

Department of Communications 1979/80
Expenditures by activity
(thousands of dollars)

	Operating	Capital	Grants and contributions	Total
Departmental administration	10,868	171	5	11,044
Telecommunications research	11,634	4,844	2	16,480
National telecommunications development	3,859		1,491	5,350
International participation	1,305		1,646	2,951
Management of the radio frequency spectrum	24,118	578	524	25,220
Space application	13,617	11,417	9,485	34,519
Contributions to employee benefit plans	4,823			4,823
	70,224	17,010	13,153	100,387
Less: receipts and revenues credited to the vote	4,176			4,176
	66,048	17,010	13,153	96,211
Less: receipts credited to revenue	17,746			17,746
Add: accommodation provided without charge by this department	2,508			2,508
accommodation provided without charge by Public Works	3,277			3,277
other services provided without charge by other departments	899			899
Total cost of program	54,986	17,010	13,153	85,149

Source: 1979-80 Public Accounts of Canada