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Canadian Telecommunications:
an overview of the Canadian
telecommunications carriage industry

COMMUNICATIONS

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Department of Communications

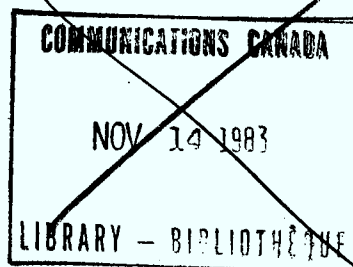
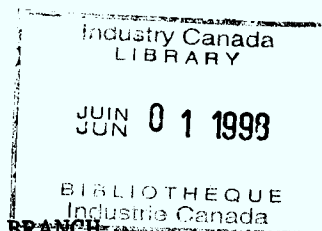
Gouvernement du Canada
Ministère des Communications

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1./ CANADIAN TELECOMMUNICATIONS:

AN OVERVIEW OF THE CANADIAN TELECOMMUNICATIONS CARRIAGE INDUSTRY

PREPARED BY
NATIONAL TELECOMMUNICATIONS BRANCH
DEPARTMENT OF COMMUNICATIONS
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INTRODUCTION

The structure of both the Canadian telecommunications industry and the associated governmental regulation differ significantly from the situation one finds in many other countries. Canada presents a complex mixture of federal and provincial legislation, policies and regulation; unlike the practice in the many countries where there is a state-controlled Post, Telephone and Telegraph (PTT) organization, the Canadian telecommunications carriage industry consists of a mixture of private, governmental and joint private-governmental corporations and organizations. These are generally regulated by a single federal or provincial regulatory agency.

This complex industry and regulatory structure is described in this booklet. Section 2 outlines the industry structure and is followed, in Section 3, by a description of the principal categories and characteristics of telecommunications services. Section 4 describes the telecommunications regulatory structure, and Section 5 outlines recent policy developments.

INDUSTRY STRUCTURE

Historical Development

Telegraph Companies

In 1846 the first telegram in Canada was sent from Toronto City Hall by the mayor to his counterpart in Hamilton. The formation and incorporation of telegraph companies took place rapidly in Canada after this event, following the pattern of many fledgling industries: companies were started to serve small areas and, as districts began to overlap, amalgamations occurred. The first large scale commercial telegraph company was the Montreal Telegraph Company. Incorporated in 1847, it had before the end of the year completed a line from Toronto to Montreal and east to Quebec City. In 1868 the Dominion Telegraph Company was formed and soon had lines to all important points between Detroit and Quebec. It became the chief competitor of the Montreal

company and by 1880 had approximately 14 000 km of wire. In 1881 the two companies merged to form the Great North Western Telegraph Company of Canada, a subsidiary of the U.S.- based Western Union, connecting important points between Toronto, Detroit, Buffalo, Quebec and the Maritimes.

Another major telegraph company was Canadian Pacific Railway Telegraphs, officially formed in 1886, though it had been partially operational for the previous five years. Upon completion of the company's transcontinental railway system in 1885, the first all-Canadian telegraph service was established from the Atlantic to the Pacific oceans. Until that time, all telegrams between eastern Canada and British Columbia had been transmitted through the United States.

By 1915 there were three main telegraph companies operating in Canada: Canadian Northern (which had acquired control of the Great North Western), Grand Trunk Pacific and Canadian Pacific. At the end of the First World War the various railway companies that controlled the main telegraph services in Canada found themselves in serious financial difficulties. In 1920 the federal government took over the Canadian Northern and the Grand Trunk Pacific railways. Thus, on January 1, 1921 Canadian National Telegraphs was born and charged with providing all necessary railway communication required by the newly formed Canadian National Railway system as well as a public telegraph service. In 1928 the Grand Trunk Pacific Telegraph Company (previously operated independently) merged with Canadian National and, the following year, the federal government acquired control over the complete land mileage of the Western Union in the maritime provinces. Thus, as Canada entered the 1930s it was principally served by two telegraph systems, operated by Canadian National and Canadian Pacific.

Gradually, Canada's telegraph companies began to provide specialized telecommunications services in addition to telegram service. The first coast-to-coast transmission of a commercial radio broadcast was made over Canadian National lines in 1925. On July 1, 1927 Canadian Pacific provided more than 2900 km of transmission circuits for the Jubilee of Confederation broadcast. In 1932 Canadian National and Canadian Pacific jointly secured the National Network Contract of the Canadian Radio Commission. This network was the beginning of what is now the Canadian Broadcasting Corporation system.

By 1937 Canadian Pacific was providing network facilities and equipment for the dissemination of weather information in western Canada. This network was later joined to facilities provided by Canadian National in the East, so that by 1939 the first nationwide weather gathering and dissemination service was being provided for the federal government over the facilities of Canadian National and Canadian Pacific. Three years later the railway companies were asked by the government to provide a Canada-wide voice communications systems for air traffic control.

At the end of the Second World War, the Department of Transport acquired the 2700 km Northwest Communications System, a major trunk line that connected the Alberta Government Telephones network with Alaska; it had been constructed by the U.S. government in 1943 as part of a defence system for North America. In 1946 the Department of Transport, on behalf of the Canadian Government, entrusted this system to Canadian National to maintain, operate and, if necessary, expand. From this beginning of its activities in the North, Canadian National expanded its operations to the point where, through its subsidiary NorthwTel, it now provides a full range of modern telephone and other telecommunications services in Canada's Northwest, including northern British Columbia, the Yukon and the western portion of the Northwest Territories.

When Newfoundland became Canada's tenth province in 1949, the federal government entrusted Canadian National with the operation of communications services previously provided by the Newfoundland Post and Telegraphs. This included not only telegram service but also public telephone service in much of rural Newfoundland. Telephone and other telecommunications services are still provided today in much of Newfoundland by Canadian National's subsidiary Terra Nova Telecommunications.

In 1947 Canadian National Telegraphs and Canadian Pacific Telegraphs began joint operations in the provision of private wire services. This was a first step towards formation of today's CNCP Telecommunications, a partnership of the telecommunications divisions of Canadian National Railways and Canadian Pacific Ltd. Increasingly after 1947 the associated Canadian National/Canadian Pacific Telegraphs pooled their resources in developing business communications services: in 1956 CNCP introduced Telex to North America; in 1964 it completed its microwave network across Canada. Today CNCP provides a wide range of business communications services that incorporate advanced telecommunications technology.

Telephone Companies

Canada's telephone networks originated with the work of both Alexander Graham Bell, inventor of the telephone, and Guglielmo Marconi, the inventor of radio. Bell invented the telephone near Brantford, Ontario, in 1874. Two years later the world's first "long-distance call" was made from Brantford to Paris, Ontario, over 16 km of telegraph company lines. In 1901 Marconi received the first transatlantic radio signal, which was transmitted from England and received at Signal Hill in St. John's, Newfoundland.

The Bell Telephone Company of Canada was founded in 1880. Although the company was chartered to provide telephone service to the whole of Canada, geographic problems proved too difficult at that time for the newly formed company. From the beginning, separate companies served British Columbia. Furthermore, during the 1880s local interests purchased the Bell facilities in Prince Edward Island, Nova Scotia and New Brunswick. In the Prairie provinces, populist movements led in the 1900s to the establishment of provincial government telephone systems in Manitoba, Saskatchewan and Alberta. Since the Bell company did not want to compete with government, it sold its facilities and withdrew from the West.

Because of the harsh climate, small and scattered population, vast distances and difficult terrain, interconnection between the various independent telephone systems in Canada posed many problems. In 1921 the Telephone Association of Canada was organized, and its technical committees began to explore the problems of developing a national telephone system. At that time many long-distance calls between Canadian cities were routed through the more advanced American telephone systems at various border crossing points because of the lack of trans-Canadian long-distance circuits.

During the late 1920s the Telephone Association of Canada decided to construct an all-Canadian network from coast to coast. An all-Canadian line linking Montreal and Winnipeg was completed in 1928, and in 1931 the TransCanada Telephone System (TCTS) was formed to develop and maintain a Canadian transcontinental long-distance telephone network. The network was completed before the end of 1931 and inaugurated in January 1932.

The original members of TCTS were: Maritime Telegraph and Telephone Company Limited; The New Brunswick Telephone Company Limited; The Bell Telephone Company of Canada (later Bell Canada); Manitoba Government Telephones (later Manitoba Telephone System); Saskatchewan Government

Telephones (later Saskatchewan Telecommunications); Alberta Government Telephones; and British Columbia Telephone Company. Since 1931, three other companies have become members of TCTS: Avalon Telephone Company (later Newfoundland Telephone Company Limited) in 1957; The Island Telephone Company Limited of Prince Edward Island in 1975; and Telesat Canada in 1977.

After the Second World War the Canadian economy prospered and telecommunications technology progressed at an unprecedented rate. Until the 1950s microwave radio had been used experimentally for short distances but had not been tested over the long haul. Then, in 1958, TCTS inaugurated a 139-station trans-Canada microwave route. At the time the world's longest, it extended from Sydney, Nova Scotia to Victoria, British Columbia -- a distance of approximately 5400 km. Today this system is the backbone of the TCTS network.

During the 1950s Bell Canada also completed the first tropospheric scatter system in the world, to serve parts of the eastern Arctic. Such systems bounce radio signals off the troposphere over distances of up to 300 km and still form part of the NorthwesterTel network. However, the Bell Canada eastern Arctic system was taken out of service in 1972, when it was replaced by satellite communications.

The next important step was introduction of communications satellite technology. Operating like microwave towers in the sky, satellites transmit telephone, teletype, data, radio and television signals across the country and are especially suitable for providing telecommunications services to remote settlements. In order to introduce satellite technology into the domestic telecommunications system, Telesat Canada, the national satellite carrier, was incorporated in 1969. Jointly owned by the federal government and the major telecommunications carriers, Telesat became a member of TCTS in 1977. The company's satellites and earth stations now form a significant part of the national telecommunications system.

International

International telecommunications services to and from Canada can be divided into (a) continental and (b) overseas services. Connections to U.S. points have been provided since the early days of telephony by means of interconnection agreements between Canadian telephone companies and their U.S. counterparts. However, the development of overseas telecommunications services have involved a greater degree of planning.

Telephone service between Canada and the United Kingdom was inaugurated in 1927 by a conversation between Prime Minister Stanley Baldwin in London and Prime Minister Mackenzie King in Ottawa. This service was routed through New York, but by 1933 a direct channel between Montreal and London provided service to Europe, Asia, Africa and Australia. Service to and from ships at sea had been inaugurated in 1929. A regular radiotelephone service was established between the Canadian mainland and Newfoundland in 1938, and in 1945 the Canada-Barbados service was inaugurated. In 1953, negotiations were completed for installation of the first transatlantic cable under the sponsorship of the Canadian Overseas Telecommunications Corporation (now Teleglobe Canada), the American Telephone and Telegraph Company and the British Post Office. Several other undersea cables were laid later. Spanning the Atlantic and Pacific oceans, they provided an international network of channels, so that by the late 1960s it was possible for a Canadian caller to telephone virtually any other country in the world.

Teleglobe Canada, known until 1975 as the Canadian Overseas Telecommunications Corporation, was formed in 1949 to comply with the 1948 Commonwealth Telegraphs Agreement, whereby each signatory government agreed that external telecommunications operations would be acquired by a government department or a public corporation representing its government as the "National Body" at meetings of the Commonwealth Telecommunications Board.

Carriers

In Canada, there are two national telecommunications systems, the TransCanada Telephone System (TCTS)* and CNCP Telecommunications (CNCP). Together, they account for approximately 91% of the \$8-billion telecommunications carriage market. Other selected statistics on the telecommunications carriage market are shown in Appendix A.

TCTS is an unincorporated association of the largest telephone company operating in each province plus Telesat Canada, the domestic satellite carrier. Thus, the member companies of TCTS are:

- British Columbia Telephone Co.
- Alberta Government Telephones
- Saskatchewan Telecommunications
- Manitoba Telephone System
- Bell Canada
- New Brunswick Telephone Co. Ltd.
- Maritime Telegraph and Telephone Co.
- Island Telephone Co. Ltd.
- Newfoundland Telephone Co. Ltd.
- Telesat Canada.

Almost all Canadian telecommunications carriers are majority owned by Canadian investors or governments. Each of the principal telephone companies in the Prairie provinces (Alberta Government Telephones, Saskatchewan Telecommunications and the Manitoba Telephone System) is owned by the respective provincial governments. All other members of TCTS, except Telesat, are privately owned. Bell Canada, which operates in Ontario and Quebec, is the largest member of TCTS, with 58% of the telephones in Canada. It is a wholly owned subsidiary of Bell Canada Enterprises Inc. (BCE) which, in turn, is owned by a large number of mainly Canadian shareholders. BCE has significant direct and indirect equity interests in the principal telephone companies in each of the Atlantic provinces -- New Brunswick, Nova Scotia, Prince Edward Island

*In September 1983, TCTS changed its name to Telecom Canada.

and Newfoundland. The British Columbia Telephone Company (BC Tel), the second largest telephone company in the country, with approximately 11% of the telephones, is indirectly owned and controlled by the U.S.-based GTE Corporation. Telesat Canada is jointly owned by the federal government and the major common carriers.

In addition to the TCTS member companies, there are over 150 other, generally smaller, telephone systems. The largest of the non-TCTS companies are: 'edmonton telephones' and the Thunder Bay Telephone System, both municipally owned; Télébec Ltée, a subsidiary of Bell Canada; Québec Téléphone, indirectly owned and controlled by the GTE Corporation; and NorthwTel and Terra Nova Telecommunications, both owned by Canadian National Railways, a corporation owned by the federal government.

CNCP Telecommunications is a partnership of the telecommunications divisions of the major Canadian railways, Canadian National railways and privately owned Canadian Pacific Ltd.

Overseas telecommunications services are provided by Teleglobe Canada, a corporation owned by the federal government. It provides facilities or otherwise arranges for telecommunications services between Canada and overseas points, including the provision of private switched networks and leased circuits. Teleglobe is Canada's representative in the Commonwealth Telecommunications Organization, the International Telecommunications Satellite Organization (INTELSAT) and the International Maritime Satellite Organization (INMARSAT).

In addition to the foregoing telecommunications common carriers, there are more than 200 radio common carriers in Canada, which have combined annual revenues of about \$75 million. They provide various mobile radio and radio-paging services across the country, primarily in urban areas, in competition with telephone companies. Although market entry and rates are not regulated, interconnection of radio common

carrier services with telephone networks falls under the jurisdiction of the respective telephone company regulatory agencies. Generally, up to the present time, interconnection has been permitted for one-way paging systems but not for two-way mobile radio.

Cable television systems operate extensively in Canada: cable service is available to approximately 80% of the country's households and about 57% of households are subscribers. The approximately 500 cable systems had operating revenues of \$472 million in 1982. Although the main business of these companies is the distribution of television and radio programming, they are also beginning to compete with telecommunications carriers, to a very limited extent, in the provision of special services, such as monitoring of fire and burglar alarms.

The Canadian telecommunications carriage industry has close links with a strong domestic telecommunications manufacturing and research capability. The Bell Canada group of companies includes Northern Telecom Ltd., a major telecommunications equipment manufacturer, and Bell-Northern Research, the largest private industrial R&D organization in Canada. Similarly, BC Tel is affiliated with AEL Microtel Ltd. and Microtel Pacific Research. Although most telecommunications research in Canada is undertaken by the private sector, the federal Department of Communications operates the Communications Research Centre, an internationally renowned centre of telecommunications research excellence, based at Shirley Bay near Ottawa.

Carrier Facilities and Networks

The members of TCTS provide a range of facilities for the transmission and switching of local and interexchange traffic, including two coast-to-coast microwave relay routes. Long-distance traffic is also carried on coaxial cable and via Telesat Canada's satellites and earth stations. Overseas traffic is carried through

the facilities of Teleglobe Canada via its international gateway switches, transoceanic cable or earth stations accessing INTELSAT satellites. CNCP operates its own national microwave relay system and switching centres but generally leases local loops from local telephone companies. Furthermore, CNCP has been granted interconnection to the local exchange facilities of Bell Canada and the British Columbia Telephone Co., permitting CNCP customers dial access through the public telephone network to certain CNCP competitive data and voice services. Major Canadian telecommunications arteries are shown on Chart 1. Telesat Canada's satellite earth stations are shown on Chart 2.

SERVICES

Overview

An overview of the types of services provided by the different Canadian carrier groups is shown in Table 1. The telephone companies have a

TABLE 1

OVERVIEW OF TELECOMMUNICATIONS SERVICES AND CARRIERS

<u>Service Category</u>		<u>Carrier Category</u>
1. Voice telephony	Public switched	TCTS and other telephone companies
	Leased circuits (private lines)	TCTS, other telephone companies and CNCP
2. Public message (telegram)		CNCP
3. Switched Teleprinter and other Text		CNCP (Telex) and TCTS (TWX)
4. Data	Public switched	TCTS and CNCP
	Leased circuits (private lines)	TCTS and CNCP
5. Program Transmission	Audio	TCTS and CNCP
	Video	

**CHART 1
MAJOR CANADIAN
TELECOMMUNICATIONS ARTERIES**

—— TCTS MAJOR ROUTES
 ---- CNCP MAJOR ROUTES
 TELEGLOBE CANADA

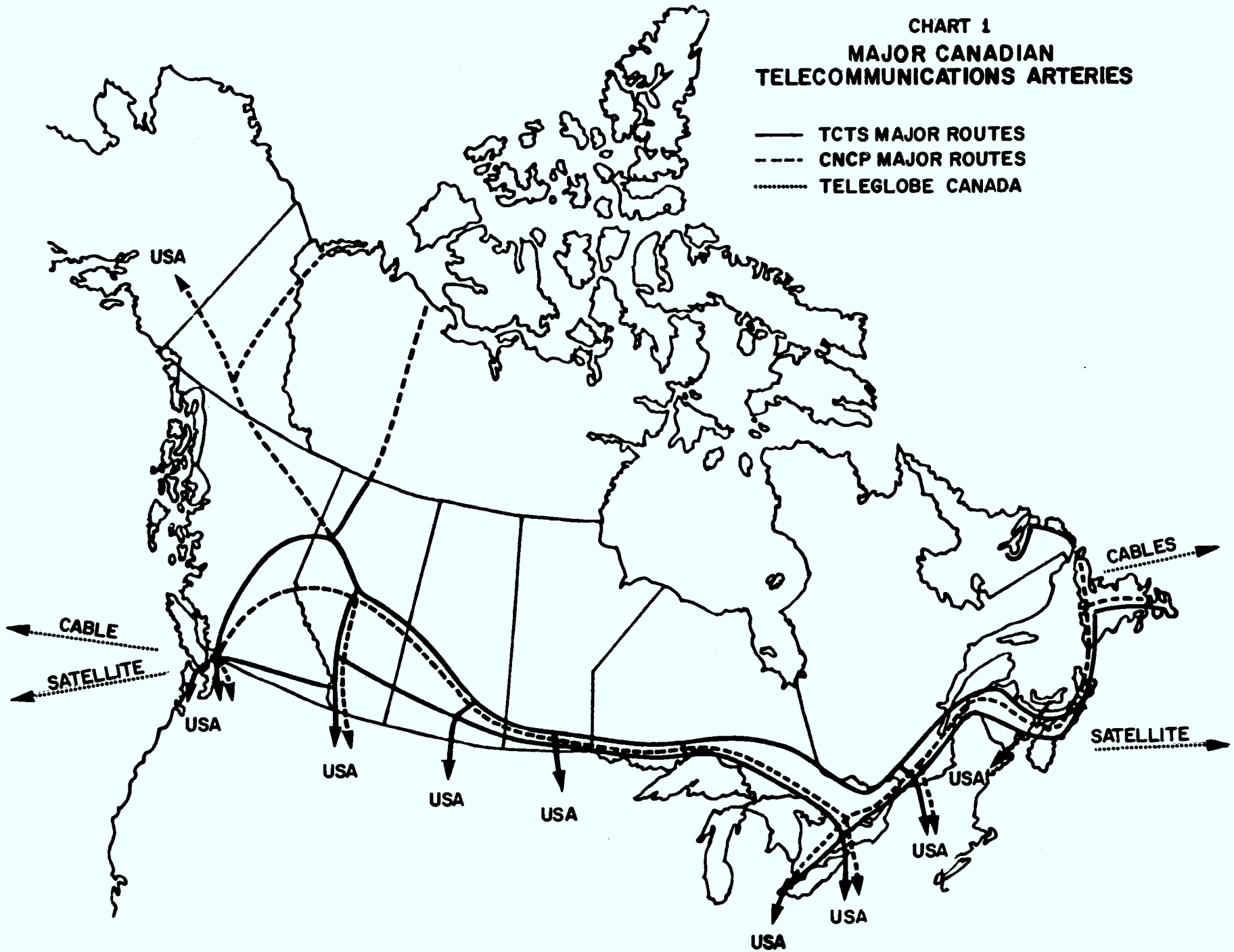
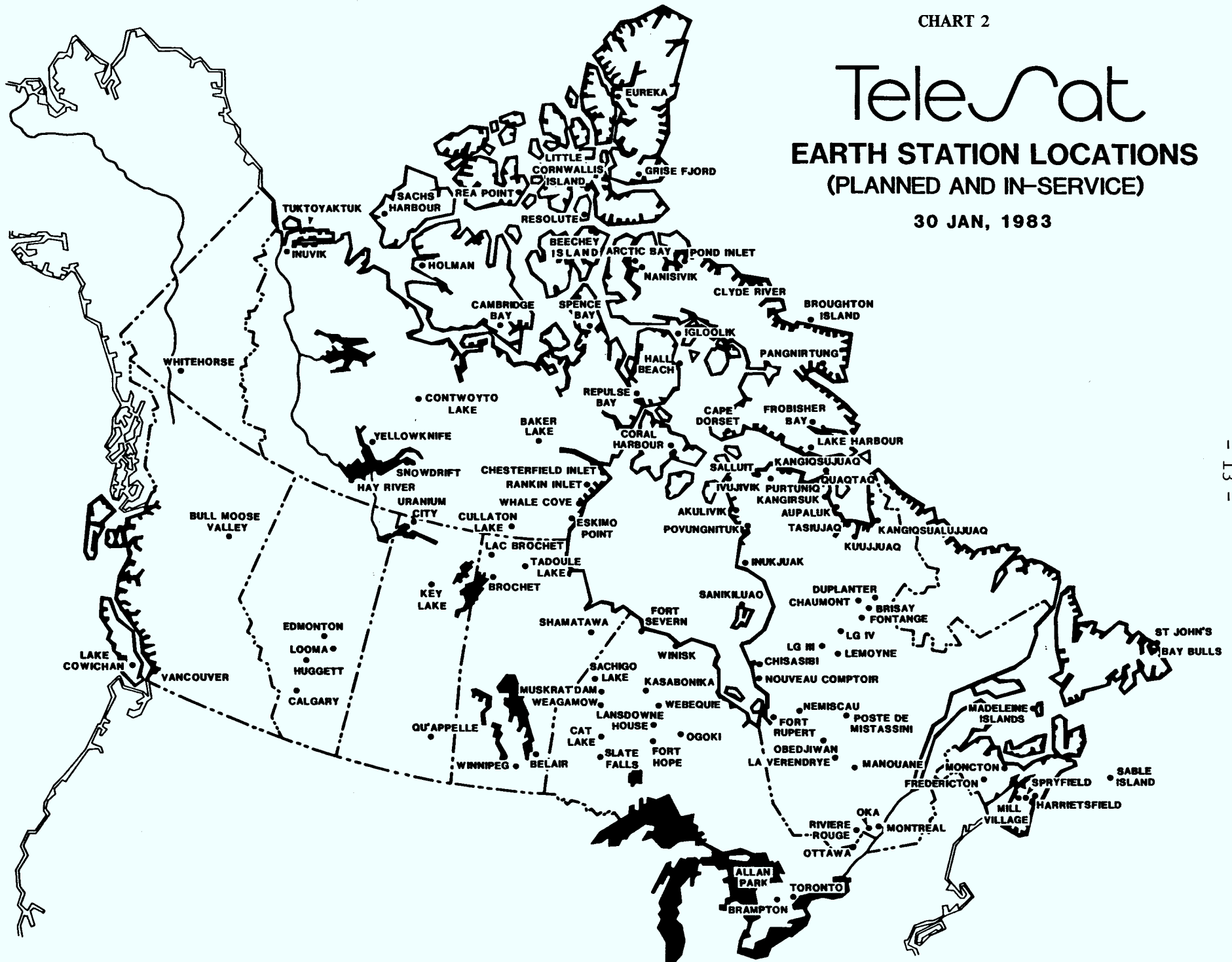


CHART 2

Telesat

EARTH STATION LOCATIONS (PLANNED AND IN-SERVICE)

30 JAN, 1983



monopoly on switched public voice telephony in their respective operating territories. CNCP has a monopoly in the provision of public message (telegram) services. In all other service categories, there are varying degrees of competition between TCTS and CNCP. All overseas telecommunications services are provided through Teleglobe Canada.

Table 2 summarizes the principal data networks and services.

TABLE 2
DATA NETWORKS AND SERVICES

Service	Switched or Non-switched	Speed Range	Major Carriers
Direct Distance Dialing Network ¹	Cct ² switched	up to 1200 bps async up to 2400 bps sync	TCTS ³
Telex	Cct switched	50 baud	CNCP
TWX	Cct switched	up to 110 baud	TCTS
Data Telex	Cct switched	up to 180 baud	CNCP
International Telex (including TWX)	Cct switched	50 baud	Teleglobe Canada
Multicom 1	Cct switched	up to 1200 bps async up to 2400 bps sync	TCTS
Multicom 2	Cct switched	up to 4800 bps	TCTS
Multicom 3	Cct switched	up to 50 kbps	TCTS
Broadband Exchange	Cct switched	up to 56 kbps	CNCP
International Datel 600	Cct switched	600 bps	Teleglobe Canada
Globedat	Packet or cct switched	2400/4800/9600 bps sync	Teleglobe Canada
Telenet	Message switched	(4)	CNCP
Private Switched Message Service (Autocom II)	Message switched	up to 300 baud	Teleglobe Canada

TABLE 2 (CONTD.): DATA NETWORKS AND SERVICES

Service	Switched or Non-switched	Speed Range	Major Carriers
Infodat	Non-switched digital	up to 56 kbps	CNCP
Dataroute	Non-switched digital	up to 56 kbps	TCTS
Dataroute 5 International	Non-switched digital	up to 56 kbps	TCTS
Datalink	Cct switched digital	9600 bps sync	TCTS
Teletex	Cct switched	2400 bps	TCTS
Infotex	Cct switched	1200 baud async (2400 baud planned)	CNCP
Globetex	Cct switched	up to 9600 bps	Teleglobe Canada
Datapac	Packet switched	up to 9600 bps	TCTS
Infoswitch	Cct switched, Virtual connection, Packet switched	(4)	CNCP
Alta-Net	Non-switched	up to 2400 bps sync	AGT
Computer Message Switching Service (CMSS)	Message switched	(4)	CNCP
Envoy 100	Packet switched	110 to 1200 bps async	TCTS

1. Although intended as a public switched voice network, the direct-distance-dialling network is also used extensively for transmission of data.
2. "Cct" means "Circuit".
3. Carriage provided by TCTS members.
4. A full range of speeds available
5. A Canada-U.S. service.

Public Network Services

Telephone

Domestic local and long distance public voice telephone services are provided by the TCTS member companies and by other telephone companies and co-operatives. Most of the TCTS companies have border-crossing points and intercarrier agreements with U.S. carriers for the carriage of transborder (Canada-U.S.) traffic. Furthermore, Telesat Canada has entered into discussions with U.S. satellite carriers concerning arrangements for transborder satellite traffic and has so far reached an agreement with one of them. Traffic to other countries is handled by the international public telephone switches of Teleglobe Canada.

Most telephone companies in Canada follow similar pricing principles and have adopted comparable rate structures. Thus, local, residential and local business telephone services are offered on a flat-rate basis, whereas rates for long-distance service vary with usage, i.e., distance, duration and time of day.

Key principles and factors that are taken into account in rate-setting are company-wide rate averaging, value of service, costs and usage. Rate averaging means that all customers pay the same price for the same class of service. The value-of-service principle reflects the economic fact that a prospective buyer will pay a price that is reasonably related to the value derived from the service: thus, basic local flat-rate charges are higher at locations where there is a larger number of subscribers in the local calling area, and business telephone rates are higher than those for residential subscribers. Costs are taken into account by charging more for higher-cost services. Thus, operator-assisted long-distance telephone calls are priced higher than direct-dialed calls. Usage is a rating factor that can be associated

with both value and cost considerations. With respect to value, subscribers attach value to "use" and are willing to pay more for more use. With respect to costs, increased use of a service may cause increased costs. Reduced charges for Sunday, weekend or night service reflect the principle of cost-recognition in that these discounts can assist increased network utilization at a low incremental cost to the system and help reduce peak traffic demands.

Switched Teleprinter and Other Text

CNCP and TCTS compete in the provision of switched teleprinter services. Telex, provided by CNCP has more than 50,000 Canadian subscribers. The comparable TCTS services, Teletypewriter Exchange (TWX) service, has fewer Canadian subscribers. Both services allow access to over one million telex or telex-type installations around the world. Both TCTS and CNCP provide facsimile communications services which allow for the transmission of text or graphics over their respective networks. Teleglobe provides connections to overseas destinations on its Globefax facsimile service. New electronic message, mail and text services are described under New Services below.

Data Services

CNCP, TCTS and Teleglobe Canada (for overseas service) each provide public switched data network services. Two of the major competitive service offerings are Infoswitch and Datapac.

Infoswitch, provided by CNCP, is a nationwide digital switched data communications network which offers both circuit and packet switching facilities to users. Charges for use of the Infoswitch network consist of access and transmission components. Access charges are fixed monthly amounts which are directly related to terminal transmission speed. Transmission charges vary with volume more than with distance.

Datapac, provided by TCTS, is a nationwide packet switched public data network. Datapac rates are volume and distance sensitive. Excluding charges for installation and optional features, each service has two main rating elements: an access charge that varies with each Datapac service offering, and a network usage charge based on the number of packets transmitted.

Both Infoswitch and Datapac can be connected to numerous other countries through Teleglobe Canada's Globedat international data gateway, which routes both packet and circuit switched traffic and provides low-to-medium speed data transmission. The service is accessible from the Canadian domestic networks of Datapac and Infoswitch. Other access arrangements may be provided if required. Charges are volume oriented and consist of two basic components applied at the call-originating end: national network access charges; and international network usage charges, which are based on volumes (measured in kilocharacters or kilosegments) and call duration (measured in minutes).

There are few restrictions on the use of the public data networks as long as technical criteria are met. Thus, terminal attachment policies for public data networks have been considerably more liberal than those for voice; the primary concern has been to prevent damage to the networks. The use of coupling devices leased from or approved by the carrier is required by some carriers.

Leased Circuits

In most regions in Canada, leased circuits (including those for transmission of audio and video signals) are readily available on a competitive basis from telephone companies and CNCP. The terms and conditions governing the provision and use of leased circuits are normally incorporated in a carrier's tariffs or in a contract between

a carrier and a user, either of which usually requires the approval of the appropriate regulatory agency, subject to any governing legislation. As a result of competitive and regulatory influences, telephone company and CNCP charges for leased circuits are comparable. Customers are able to choose between public network offerings and leased facilities according to their needs. However, the sharing and resale of leased circuits is not generally permitted. In the case of international leased circuits, relevant recommendations of the International Telecommunication Union/International Telegraph and Telephone Consultative Committee are applied by Teleglobe Canada.

Interconnection of leased circuits to the public switched voice or data networks is permitted at the customer's switching equipment and also, in certain cases, within the telephone network. The attachment of customer-supplied terminal equipment to leased circuits is generally permitted, subject to compliance with technical criteria.

New Services

Both the carriers and the federal government are significantly involved in the development and introduction of new telecommunications technology. For example, the federal government is sponsoring a number of field trials of Telidon, the videotex technology developed by the Canadian Department of Communications. To encourage the development of new Telidon services, the government instituted the Telidon Industry Investment Stimulation Program (IISP) in 1981. Under this program, the Government will arrange to have 6,000 Telidon terminals built by Canadian firms and will make them available for use in new Telidon systems operated by the private sector. Fifty Telidon projects, including several submitted by telephone companies, have qualified to receive a total of \$9.5 million in IISP funds.

Particularly noteworthy is the Manitoba Telephone System's pioneering Grassroots project. Oriented towards the information needs of farmers, it was the first commercial Telidon system in the world.

In February 1983 the federal government announced that it had allocated \$23 million to extend its Telidon program for two years. The funds will be applied principally to research and development, international marketing, content development and government applications.

The federal government has also allocated funds to support field testing of Canadian technology for the office of the future. A total of \$13 million will be spent under the Office Communications System (OCS) Program to help Canadian companies develop the capability to compete in growing national and international markets for integrated electronic office products and services.

The OCS program focuses on the rapidly merging technologies of microelectronics, high-speed communications, and information-management systems that are transforming the modern office. In the office of the future, intelligent, multifunctional workstations linked by telephone, coaxial cable, or optical fibre networks will provide access to voice, video, data, and graphics services. Each workstation will allow the office worker to perform a wide range of tasks: word processing; teleconferencing; storage, retrieval and sorting of information in local and remote data bases; electronic messaging and mailbox services; and the processing and communication of data, text, voice, and video materials.

The program also addresses social and economic issues by studying the human implications of information technology. It will examine alternative methods of implementing the technology and training or retraining office workers to ensure that the benefits of the electronic office are equitably distributed and achieved at minimal social cost.

In addition to government initiatives in the introduction of new services, the carriers have been actively developing new service offerings. Among electronic message and mail services introduced in recent years are Telepost, Globefax, Intelpost, Envoy 100, Envoy Post, Teletex and Infotex.

Telepost, provided jointly by CNCP and the Canada Post Corporation, is a service in which messages submitted by Telex, telephone or computer tape are transmitted electronically to a specially equipped post office close to their destination, where they are printed and sent out by the next mail delivery. Telepost messages can be sent anywhere in Canada or the continental United States.

Since 1979 Teleglobe's Globefax has provided two-way public high-speed digital facsimile service between Montreal and several countries. In June 1980 Teleglobe Canada and Canada Post inaugurated Intelpost as an experimental facsimile/electronic mail service between Halifax, Montreal, Ottawa, Winnipeg, Calgary, Edmonton and Vancouver through interconnection with the CNCP/Canada Post domestic facsimile network. Internationally, the service has been extended to New York, Washington, Amsterdam and Berne. The integration of the Globefax and Intelpost services has been proposed.

Envoy 100 is a national store-and-forward messaging service offered by TCTS. It is accessed by standard terminals through the regular telephone network, Datapac or TWX, or, in the United States, through the Telenet or Tymnet packet switched networks. Envoy Post, an Envoy 100 option, is an electronic mail service offered co-operatively by TCTS and Canada Post. The service, using Canada Post's new electronic mail-printing and delivery service, allows Envoy 100 subscribers to access the national mail stream to send Envoy 100 messages to nonsubscribers.

TCTS and CNCP have recently announced competing services which would allow word processors made by different manufacturers to communicate with each other, thereby effectively providing a new generation of Telex/switched-teleprinter services. The TCTS offering, known as Teletex, conforms to international standards developed by the International Telegraph and Telephone Consultative Committee (CCITT). Similarly, the CNCP offering, Infotex, is compatible with CCITT standards. Both services will enable users to communicate nationally and internationally and can form the basis of a wide variety of communications applications, including electronic mail for users who have text-preparation equipment. The overseas connections will be provided by Teleglobe, under the name Globetex.

Moreover, the two domestic carrier systems are now considering new communications services utilizing communications satellites and time division multiplexers. Users would be able to subscribe to specific voice, data or video services that could be extended to other locations by linking them to existing terrestrial networks.

Finally, a particularly significant development was the inauguration in Saskatchewan, early in 1982, of the world's first commercial fibre-optics telecommunications system to carry cable TV signals. The occasion marked the completion of the first section of a planned 3200 km fibre-optics network. When completed the new network will connect all Saskatchewan cities and 40 of the province's largest towns.

REGULATORY STRUCTURE

Telecommunications regulatory jurisdictions in Canada have evolved to the present structure whereby carriers are regulated on their entire operations by either the federal agency, the Canadian Radio-television and Telecommunications Commission (CRTC), a provincial government public utility board or, in some cases, a municipal council. Table 3 lists major Canadian telecommunications carriers and their respective regulatory agencies.

TABLE 3

MAJOR CANADIAN TELECOMMUNICATIONS CARRIERS
AND THEIR REGULATORY AGENCIES

CARRIER	REGULATORY AGENCY
Bell Canada)	
British Columbia Telephone Co.)	Canadian Radio-television and
CNCP Telecommunications)	Telecommunications Commission
Telesat Canada)	(CRTC)
Northwestel)	
Terra Nova Telecommunications)	
Alberta Government Telephones	Alberta Public Utilities Board
Saskatchewan Telecommunications	Saskatchewan Public Utilities Review Commission
Manitoba Telephone System	Manitoba Public Utilities Board
New Brunswick Telephone Co. Ltd.	New Brunswick Public Utilities Board
Maritime Telegraph and Telephone Co.	Nova Scotia Public Utilities Board
Island Telephone Co. Ltd.	Prince Edward Island Public Utilities Commission
Newfoundland Telephone Co. Ltd.	Newfoundland Public Utilities Board
'edmonton telephones'	City of Edmonton
Northern Telephone Limited	Ontario Telephone Service Commission
Québec Téléphone	Régie des services publics du Québec
Télébec Ltée	Régie des services publics du Québec
Teleglobe Canada	See Note
Thunder Bay Telephone System	Ontario Telephone Service Commission

Note : Teleglobe Canada is not regulated by an independent agency but is owned and subject to control by the federal government.

Generally speaking, federal and provincial governments determine telecommunications policy within their respective jurisdictions. Usually a carrier must apply to its regulatory agency for approval of the terms and conditions on which service is provided.

Originally the primary purpose of telecommunications regulation was to protect subscribers against monopoly providers of telecommunications services. However, the role of the regulatory agencies has evolved into a broader oversight of telecommunications carriers, which are generally regulated by the approval or disapproval of carrier applications, according to the provisions of governing legislation. Occasionally, regulatory agency decisions on significant issues, such as system interconnection or terminal attachment, have policy implications. However, the federal Cabinet has the power to vary or rescind any CRTC telecommunications decision, a power exercised sparingly and only when significant or broad public policy issues are involved.

In addition to all the mechanisms for public participation in the development of public policy normally found in representational forms of government, there are in Canada various avenues for direct public participation in telecommunications policy-making. At the federal level, the Department of Communications publishes official government notices from time to time that invite comments or submissions from interested parties on subjects undergoing policy review. The federal regulatory agency, the CRTC, encourages public input, holds public hearings on important questions that come before it, and receives submissions from interested parties, including, for example, telecommunications carriers, the Consumers Association of Canada, the National Anti-Poverty Organization, the Canadian Industrial Communications Assembly and various other groups and individuals. Furthermore, the CRTC can make rulings whereby some of the costs of intervenors may be reimbursed. At the provincial level practices vary. In most jurisdictions public hearings may be held in certain instances in order to provide for input from affected groups and the public.

RECENT POLICY DEVELOPMENTS

System Interconnection

There has, naturally, been system interconnection between adjacent telephone company networks for many years. A milestone in the development of a national telecommunications network in Canada was the 1931 agreement between major regional telephone companies to set up the TransCanada Telephone System. One of its major achievements was the establishment of an all-Canadian route for long-distance telephone calls. Moreover, there is interconnection between Canadian telecommunications facilities and the U.S. continental network and, through Teleglobe Canada's facilities, with overseas networks. This permits the connection of virtually all Canadian telecommunications services with those of other countries.

A significant development was the CRTC's decision in 1979 to permit CNCP to interconnect its facilities with Bell Canada's local telephone network. This allows CNCP's customers to access its competitive data and voice services via the local Bell Canada telephone network. A similar decision by the CRTC in 1981 permitted CNCP to interconnect its facilities with those of the British Columbia Telephone Company. CNCP is pressing to obtain similar interconnection arrangements throughout Canada. The result of the system interconnection currently granted to CNCP is to increase significantly its ability to compete with TCTS in the provision of a wide range of business services.

Terminal Attachment and Procurement

The policies and regulations governing the attachment of customer owned terminal equipment vary across the country, as shown in Appendix B. Nevertheless, there is a national trend toward liberalizing terminal attachment regulations, subject to compliance with certain basic technical criteria intended to protect networks and personnel.

The attachment of network non-addressing equipment, such as computer terminals and answering machines, has been permitted for some time in several jurisdictions. A more liberal regime governing the attachment of network-addressing terminal equipment, such as telephones and PBXs, was established by the CRTC on an interim basis for Bell Canada on August 5, 1980 and for the British Columbia Telephone Company on August 22, 1981.

Following public hearings in November and December 1981 the CRTC issued a major decision (Telecom. Decision CRTC 82-14) on November 23, 1982, in which it concluded that a liberalized terminal attachment policy should be continued. The decision extended the policy to apply to CNCP Telecommunications, NorthwTel Inc. and Terra Nova Telecommunications Inc., in addition to Bell Canada and the British Columbia Telephone Company. It therefore applies to carriers serving approximately 70% of the Canadian telecommunications carriage market.

The decision provides that all equipment manufactured after September 1, 1983 must be certified as meeting the technical requirements established by the Department of Communications' Terminal Attachment Program if it is to be attached to the public switched telephone, Telex or TWX networks. Furthermore, it permits single-line residential subscribers to own all their telephone sets, including the main set, which had not previously been permitted. Although single-line residence and business subscribers are given the choice of owning or leasing their telephones, the CRTC decided that the associated inside wiring should remain the property and responsibility of the telephone companies. Multiline business customers are also given the choice of owning or leasing their terminal equipment. However, where such subscribers choose to own their terminal equipment, the associated inside wiring must also be subscriber-owned.

In addition, the CRTC concluded that carriers should be permitted both to lease and sell terminal equipment. Although the carriers are not required to conduct their terminal equipment business through separate subsidiary companies, the Commission established regulatory requirements concerning lease and sale rates to help ensure that such offerings are not subsidized by revenues from the carriers' monopoly activities. The decision will come into effect when tariffs incorporating its provisions have been approved by the CRTC.

Technical standards for terminal equipment are developed by the Terminal Attachment Program Advisory Committee (TAPAC) which is chaired by the federal Department of Communications (DOC) and includes the voluntary participation of carriers, manufacturers, suppliers, users and provincial governments. The object of the Program is to develop terminal attachment standards suitable for nationwide adoption. To be certified as meeting standards, all equipment, regardless of origin, must be tested by a DOC or DOC-approved laboratory. Standards for terminals to be attached to telephone networks have been published under the program for both network non-addressing and network-addressing devices.

Cellular Mobile Radio

In September 1981 the Department of Communications issued a discussion paper which invited public comment on several cellular mobile radio policy considerations, including the appropriate number of competing systems in a market, spectrum allocation matters and compatibility with U.S. systems.

On October 23, 1982, after a review of the comments, the Department published in the Canada Gazette a notice that called for cellular mobile licence applications, which were to be received by February 28, 1983. In establishing the licensing conditions for these systems, the

Department's purpose was to serve the public interest by providing for the implementation of a nationwide high-capacity mobile radio communications service capable of serving both local and "roaming" mobile telephone users.

The notice provides for a maximum of two systems in each service area, one to be operated by the local telephone company and the other by another service provider. The systems are to be technically and operationally compatible with each other and with systems operating in the United States to allow for wide-area roaming. The frequency bands allocated to the cellular service are 825-845 MHz (mobile transmit) and 870-890 MHz (base transmit).

Microwave Licensing Policy

The microwave radio licensing policy established in 1970 by the Department of Communications generally restricted licences for the ownership and operation of microwave radio facilities to telecommunications common carriers. Thus, in many cases, cable television system operators, broadcasters and other organizations were not licensed to own and operate microwave facilities unless they could demonstrate significant advantages in terms of cost, quality, flexibility and public convenience as compared with using the existing facilities of a telecommunications common carrier.

After an extensive review, a new policy was announced in March 1983. It permits broadcasters and cable operators to apply for licences to own and operate microwave facilities for the carriage of programming authorized for distribution by the CRTC, without obliging them to demonstrate cost and other advantages compared with the use of common carrier microwave facilities. However, all such applications

must be publicly announced in order to give potential participants and other affected parties an opportunity to express their interest. The new policy is designed to encourage the economical shared use of microwave facilities by consortia of broadcasters or cable operators, while maintaining the primary principle that the microwave spectrum should be used as efficiently as possible.

Canada/U.S. Satellite Policy

Until last year the 1972 exchange of letters between the Canadian and United States governments only provided for the use of domestic satellites for transborder telecommunications on a very limited basis. In August 1982, in an addendum to the 1972 exchange of letters, additional intergovernmental arrangements were made that allow Telesat Canada and the U.S. domestic satellite carriers to enter into transborder traffic agreements, subject to the regulatory procedures of each country.

Before commencing Canada/U.S. services on their domestic satellites, both countries were required, as parties to the INTELSAT agreement, to consult with the INTELSAT Assembly of Parties, to assure the organization that use of domestic satellites for Canada-U.S. service would not cause economic harm to INTELSAT's global system. The Assembly gave its consent to these arrangements in October 1982.

The Minister of Communications has informed Telesat that he expects the corporation to negotiate agreements with U.S. satellite carriers which, over a period of time, achieve equitable use of Canadian facilities and a proportional sharing of revenues. The first U.S. satellite carrier to reach agreement with U.S. satellite carriers with Telesat was American Satellite Company. Under the agreement, earth stations in the United States owned by American Satellite could link with earth stations in Canada owned by Telesat via the satellites of either company.

Satellite Earth Station Licensing Policy

Rapid growth in the use of telecommunications satellites and in the variety of applications of satellite technology has led to the evolution of the federal government's earth station licensing policy from one that restricted the ownership of earth stations to Telesat Canada and Teleglobe Canada to one that permits many users to own and operate earth stations in certain circumstances. A significant change in the policy was announced in March 1983 as part of the federal government's new broadcasting policy. Individuals as well as commercial establishments such as bars and taverns are now exempt from the requirement for a radio licence for a television or radio receive-only earth station for the reception of programming signals from satellites as long as the signals are not distributed to others. Furthermore, apartment buildings, condominiums, hotels and motels with master antenna television systems are also exempted from licensing requirements for television or radio receive-only earth stations where the CRTC has approved the distribution of the satellite signals on the system. Similarly, broadcasters and carriers can choose to operate under an exemption from radio licensing requirements where the CRTC has approved the distribution of the signals received from the earth station by a broadcaster. Despite these exemptions, operators of earth stations may still require permission to receive and use satellite programming signals from the signal originators.

Other elements of the policy, for service with Canadian satellites, are:

Licences for all earth stations (transmit-only, transmit/receive, and receive-only) operating with the Canadian satellite system are available to Telesat Canada.

- . Other recognized Canadian telecommunications carriers may apply for licences for transmit/receive earth stations operating at 14/12 GHz only.
- . Operators of temporary, remote, offshore exploration facilities may apply for licences for transmit/receive earth stations, subject to their entering into a connecting agreement with an appropriate carrier.
- . Broadcasters and telecommunications carriers may apply for television or radio receive-only earth station licences for the reception of signals whose distribution has been authorized by the CRTC.
- . Persons or organizations wishing to receive signals other than radio or television programming (such as news wire services, weather information, stock market information or other business services) may apply for a receive-only earth station licence.
- . Resource camps may operate television or radio receive-only earth stations under an exemption from the requirement to obtain a radio licence, if they are eligible for the corresponding CRTC exemption.
- . Provincial educational authorities may apply for earth station licences for the reception of Canadian educational signals.

For service with international or foreign satellites, Teleglobe Canada may apply for licences for operation with INTELSAT or other international satellites in the "Fixed Service," i.e., where satellites are used by the originator to deliver signals to specific customers. Applications for licences in other international satellite services, such as INMARSAT or LANDSAT, are dealt with on a case-by-case basis.

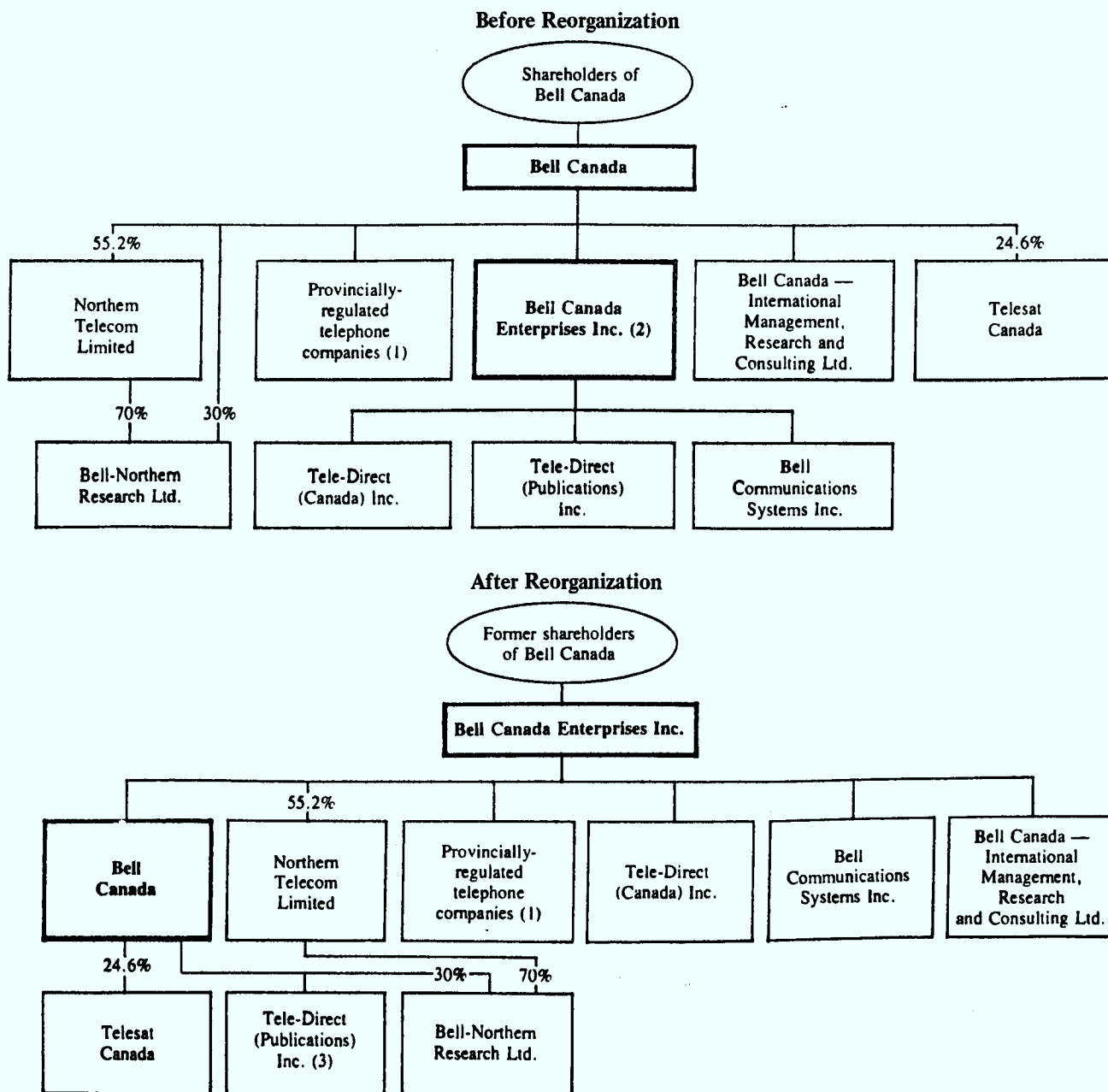
Bell Canada Reorganization

In June 1982, Bell Canada announced its intention to reorganize the Bell group of companies. In October 1982, the federal government directed the CRTC to inquire into the proposed reorganization. After public hearings, the CRTC reported in April 1983 to the federal government that, provided certain legislative safeguards were enacted, the reorganization should be allowed to proceed. The government undertook to introduce legislative amendments that may be required to ensure that the CRTC's mandate to regulate Bell Canada will not be impaired and agreed that the reorganization could proceed. The reorganized Bell corporate structure became effective at the end of April 1983.

Chart 3 shows the corporate structures of the Bell group before and after reorganization. Before the reorganization, Bell Canada was both an operating company and a holding company with investments in several other companies. The reorganization created an unregulated holding company, Bell Canada Enterprises Inc. (BCE), which holds the shares of both regulated and unregulated subsidiaries. Thus, Bell Canada is now a wholly owned subsidiary of BCE which functions mainly as an operating telecommunications company.

A major factor behind the change in corporate structure was the growing importance of Bell's unregulated activities. These largely consist of telecommunications manufacturing and telecommunications systems contract operations which presently represent approximately 25% of the company's net consolidated revenue, a proportion that is expected to increase substantially. Thus, a primary purpose of the reorganization was to achieve a greater separation between Bell's regulated and unregulated activities.

**CHART 3: BELL CANADA GROUP CORPORATE STRUCTURE
BEFORE AND AFTER REORGANIZATION**



- (1) Newfoundland Telephone Company Limited, 63.5% owned; Northern Telephone Limited, 99.8% owned; The Capital Telephone Company Limited, 100% owned; Télébec Ltée, 100% owned; Maritime Telegraph and Telephone Company, Limited, 35.4% owned; The New Brunswick Telephone Company, Limited, 35.8% owned.
- (2) Formerly named Tele-Direct Ltd. Tele-Direct Ltd., formerly a wholly-owned subsidiary of The Capital Telephone Company Limited, became a direct, wholly-owned subsidiary of Bell Canada on June 11, 1982. Tele-Direct Ltd. was renamed Bell Canada Enterprises Inc. on June 22, 1982 and a new company was created named Tele-Direct (Canada) Inc. to carry on printing, publishing and related businesses.
- (3) It is intended that as soon as practicable after the Reorganization this corporation will be transferred by BCE to Bell Canada. The description reflects this eventual transfer.

CRTC Cost Inquiry

An important on-going regulatory initiative is the CRTC's inquiry into telecommunications carriers' costing and accounting procedures. Currently in the third phase of the inquiry, the CRTC is seeking to determine, for regulatory purposes, a costing methodology for existing services. The focus on service costing reflects concerns that carriers operating in both monopoly and competitive markets may price their competitive services below cost, to the detriment of both their monopoly subscribers and their competitors.

Previously, in Phase I, the Commission dealt with the principles and approaches related to depreciation and accounting changes, accounting procedures, treatment of deferred taxes and rate- base calculation, for federally regulated carriers. In Phase II of the inquiry the Commission considered the type of information it would require from carriers under its jurisdiction at the time of filing for new services.

CONCLUSION

In this description of telecommunications in Canada we have provided an overview of Canadian telecommunications industry structure, networks and services, regulatory structure, and policy developments. The mixture of private and governmental ownership of carriers and the mixture of federal, provincial and municipal regulation are key aspects of a complex structure which, as noted in the Introduction, differs from the situation one finds in many other countries. Nevertheless, Canada has one of the finest telecommunications systems in the world, which offers a very high level of service, and is at the forefront of technological developments in many areas, including digital switching and transmission, satellite communications, fibre optics, protocols for communicating word-processors, and the Telidon videotex technology.

APPENDIX A: SELECTED TELECOMMUNICATIONS
CARRIAGE MARKET SHARE STATISTICS

TABLE A.1

TOTAL TELECOMMUNICATIONS CARRIAGE MARKET BY GROUP, 1982

	<u>Total Operating Revenues</u> (\$ millions)	<u>Share</u> (%)
TransCanada Telephone System (TCTS)	7,356.8	87.6
Other telephone companies	490.8	5.8
CNCP Telecommunications	302.2	3.6
Teleglobe Canada	170.2	2.0
Radio common carriers	75.0	0.9
TOTAL	8,395.0	100.0

SOURCE: Annual reports and DOC estimates.

TABLE A2: 1982 TELECOMMUNICATIONS CARRIAGE MARKET BY COMPANY¹

	<u>Total Operating Revenues</u> (\$ millions)	<u>Share²</u> (%)
<hr/>		
TransCanada Telephone System		
British Columbia Tel. ³	1,009.4	12.0
Alberta Gov. Tel.	825.3	9.8
Sask. Tel.	295.7	3.5
Manitoba Tel. System	244.6	2.9
Bell Canada ³	4,359.3	51.9
New Brunswick Tel. Co.	191.5	2.3
Maritime Tel. and Tel.	235.9	2.8
Island Tel.	26.5	0.3
Newfoundland Tel.	109.6	1.3
Telesat Canada	59.0	0.7
	<hr/>	<hr/>
Subtotal	7,356.8	87.6
	<hr/>	<hr/>
CNCP Telecommunications	302.2	3.6
	<hr/>	<hr/>
Other Telephone Companies		
"edmonton telephones"	151.1	1.8
Northern Tel.	21.1	0.3
Northwestel	48.9	0.6
Québec Tél.	139.6	1.7
Télébec Ltée.	80.9	1.0
Terra Nova Tel.	33.2	0.4
Thunder Bay Tel	16.0	0.2
	<hr/>	<hr/>
Subtotal	490.8	5.8
	<hr/>	<hr/>
Teleglobe Canada	170.2	2.0
	<hr/>	<hr/>
Radio common carriers	75.0	0.9
	<hr/>	<hr/>
TOTAL	8,395.0	100.0
	<hr/>	<hr/>

SOURCE: Annual reports and DOC estimates.

NOTES: (1) Revenues for the radio common carriers are not broken down by company.

(2) Because of rounding, columns may not add up to the total indicated.

(3) Telecommunications operations only.

**APPENDIX B: TERMINAL ATTACHMENT POLICIES
ACROSS CANADA**

TABLE B1

SUMMARY OF TERMINAL ATTACHMENT IN CANADA

CARRIER	AREA SERVED	TERMINAL ATTACHMENT POLICY
Bell Canada	Parts of Ontario, Quebec and the eastern Northwest Territories	DOC-certified network-addressing and non-addressing equipment, including the main telephone sets of residential subscribers, is permitted without a coupler in accordance with CRTC Telecom Decision 82-14.
British Columbia Telephone Co.	Most of British Columbia	Same as for Bell Canada above.
Alberta Government Telephones	Most of Alberta	Network non-addressing devices are permitted. Subscribers may also choose between renting a telephone set from the telephone company or buying their own. Customer-owned equipment must be listed as approved by AGT.
Manitoba Telephone System	Manitoba	Network non-addressing devices with telephone company-provided couplers are permitted.
Saskatchewan Telecommunications	Most of Saskatchewan	Network non-addressing devices with telephone company-provided couplers are permitted. Retailers are forbidden by provincial law to advertize or offer for sale any device not authorized by the telephone company.
Maritime Telegraph and Telephone Co.	Nova Scotia	Network non-addressing devices with telephone company-provided couplers are permitted.
New Brunswick Telephone Co.	New Brunswick	Attachment of telephone company-approved single line residential extension and of network non-addressing devices with telephone company-provided couplers are permitted.
Newfoundland Telephone Co.	Most of Newfoundland and Labrador	Network non-addressing devices with telephone company-provided couplers are permitted.

TABLE B1 (Cont.)

CARRIER	AREA SERVED	TERMINAL ATTACHMENT POLICY
The Island Telephone Co. Ltd.	Prince Edward Island	Network non-addressing devices with telephone company-provided couplers are permitted. Island Tel has submitted an application to the provincial regulatory board to permit the attachment of network-addressing equipment. The application proposes that attachable equipment must conform to DOC standards.
CNCP Telecommunications	Canada	Same as for Bell Canada above.
'edmonton telephones'	City of Edmonton, Alberta	Attachment of telephone company-approved single line residential extensions and of DOC-certified network non-addressing devices is permitted.
Northern Telephone Ltd.	Parts of Northern Ontario	In a decision issued on November 18, 1982, the Ontario Telephone Service Commission authorized the interconnection of customer-provided terminal equipment, on an interim basis, subject to certain conditions: (i) it must have received certification under the DOC Terminal Attachment Program or Part 68 of the Rules and Regulations of the U.S. Federal Communications Commission; (ii) it must be appropriately equipped to interface with the telephone system; (iii) it is only for use on individual lines and not party lines; (iv) the equipment is for use on residential lines and business lines provided by a telephone system with 1500 or more main stations, or for use on residential lines only provided by telephone systems with fewer than 1500 main stations.
Northwestel	Northern British Columbia, the Yukon and western Northwest Territories	Same as for Bell Canada above.

TABLE B1 (Cont.)

CARRIER	AREA SERVED	TERMINAL ATTACHMENT POLICY
Québec Telephone	Parts of Quebec	Effective June 30, 1983 the majority of subscribers of provincially regulated telephone companies in Quebec will be able to connect certain of their own telephone equipment to the telephone company network subject to technical and other restrictions which are to be determined by the Régie des services publics du Québec. Public hearings took place in the fall of 1982 and a decision is expected in the spring of 1983.
Télébec Ltée	Parts of Québec	Same as for Québec Téléphone above.
Terra Nova Tel	Parts of Newfoundland and Labrador	Same as for Bell Canada above.
Thunder Bay Telephone System	City of Thunder Bay, Ontario	Same as for Northern Telephone Ltd. above.

Note: DOC is the Canadian Department of Communications

