



Communications  
Canada



**TELECOMMUNICATIONS  
IN CANADA:**

*An Overview of the Carriage Industry*

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## CONTENTS

INTRODUCTION	5
1. HISTORICAL OVERVIEW	7
<i>Telegraph companies</i>	7
<i>From telephones to telecommunications</i>	8
<i>International telecommunications</i>	9
<i>Satellite communications</i>	9
<i>Research, development and manufacturing of telecommunications equipment</i>	9
2. TELECOMMUNICATIONS INFRASTRUCTURE, OWNERSHIP AND FACILITIES	11
<i>Industry sectors</i>	11
<i>Major telecommunications carriers</i>	11
<i>Independent telecommunications carriers</i>	15
<i>Radio common carriers</i>	15
<i>Cellular mobile radiotelephone service</i>	15
<i>Miscellaneous services</i>	16
<i>Telecommunications equipment</i>	16
<i>Government telecommunications research</i>	16
<i>Ownership of the telecommunications carriage industry</i>	17
<i>Carrier facilities</i>	18
<i>Terminal attachment and procurement</i>	19
3. OVERVIEW OF TELECOMMUNICATIONS SERVICES	21
<i>Public network services</i>	21
<i>Rate setting</i>	21
<i>Special usage rates</i>	21
<i>Network services</i>	22
<i>Leased circuits</i>	23
<i>Other services</i>	24
<i>Integrated Voice Messaging Systems</i>	25

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<b>4. THE REGULATORY FRAMEWORK</b>	<b>26</b>
<b>5. CURRENT POLICY INITIATIVES</b>	<b>29</b>
<i>A new telecommunications policy for Canada</i>	29
<i>Policy principles</i>	29
<i>Telecommunications policy framework</i>	29
<i>Federal-provincial agreements</i>	30
<i>Telecommunications legislation</i>	30
<i>Competition</i>	30
<i>Long-distance telephone service</i>	30
<i>Resale and sharing</i>	31
<i>Radio spectrum resources</i>	31
<i>Microwave licensing policy</i>	32
<i>Satellite earth station licensing policy</i>	32
<i>Establishing strategy for telecommunications standards</i>	33
<i>Public cordless telephone services</i>	33
<i>Nation-wide paging services</i>	34
<i>Air-to-ground public telephone service</i>	34
<i>Canada-U.S. satellite telecommunications policy</i>	35
<i>Mobile Satellite (MSAT)</i>	35
<i>Local network convergence</i>	36
<i>Future directions</i>	36

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## INTRODUCTION

The telecommunications carriage industry, together with the equipment-manufacturing industry, is a major source of economic activity in Canada, employing some 125,000 people and generating more than \$21 billion in revenues in 1990 (telecommunications carriage, \$15 billion; equipment-manufacturing \$6 billion). Canada's Northern Telecom is the fifth largest manufacturer of telecommunications equipment in the world, behind AT&T (U.S.), Alcatel (France), Siemens (Germany) and Ericsson (Sweden). This industry is also Canada's leading high technology industry; its R&D expenditures of \$1.4 billion in 1990 represent about 16% of Canada's total R&D effort for that year.

The telecommunications carriage industry operates Canada's telecommunications services networks. This is a significant service industry: 98 percent of Canadian households have telephone service and public surveys consistently reveal the public is very satisfied with the quality of service provided.

The telecommunications carriage industry's share of the Gross Domestic Product (GDP), at factor cost and 1986 prices, has grown steadily from 1 percent in 1970 to 1.8 percent in 1980 and 2.7 percent in 1990. In 1990, the industry achieved a growth rate (after inflation) of 8.6 percent, which compares favourably to the 0.3 percent (at factor cost and 1986 prices) attained by the national economy. This industry's 2.7 percent of GDP in 1990 surpassed the performance of Canada's traditional economic mainstays. For example:

Agriculture and related services	2.3 percent
Logging and forestry	0.6 percent
Mining	1.2 percent

Telecommunications has a unique ability to capture and disseminate information. Intelligent point-of-sale devices, automated teller machines, and other devices familiar to Canadians are networked to computers via telecommunications carriers. This application of telecommunications affects the way in which goods and services are distributed domestically and internationally. It also is contributing to a shift in job growth from the manufactured goods sector of the economy to the services sector. This trend will probably continue, fostering growth in all aspects of Canadian telecommunications.

Telecommunications permits global communications virtually at the speed of light, and, consequently, is one of the prime factors in transforming national and regional economies into one global economy. In recent years, Canada has developed new approaches to the regulation of its domestic telecommunications services. Canadian telecommunications policy and its regulatory environment are changing to improve the nation's competitive position in the global economy.

This publication is a general, non-technical, survey of the Canadian telecommunications carriage industry. Beginning with a short history, it describes the structure of the industry, the services offered, how and why the industry is regulated, and concludes with a summary of new initiatives in telecommunications policy.



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## CHAPTER 1 HISTORICAL OVERVIEW

### *Telegraph companies*

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**T**elecommunications began in Canada in 1846 when Hamilton and Toronto were linked by telegraph service. The following year, the telegraph line was extended from Toronto to Montreal and Quebec City.

Incorporated in 1847, the Montreal Telegraph Company was Canada's first large-scale telegraph company, operating lines from Trois-Rivières to Toronto. Next, in 1868, the Dominion Telegraph Company was formed and installed lines between Detroit and Quebec. By 1881, the two companies had merged to form the Great North Western Telegraph Company of Canada, a subsidiary of the U.S.-based Western Union Telegraph. This company extended its operations from parts of western Canada eastward to the maritime provinces, where local telegraph had existed since 1848. Canadian Pacific Railway Telegraphs was officially formed as a competitor in 1886.

The telegraph was the most effective means of communication of its time. It was an integral part of the construction of the railways and the completion of the Halifax to Vancouver telegraph link coincided with the completion of the transcontinental railway link in 1885.

At the end of World War I, the various railway companies that controlled the main telegraph services in Canada found themselves in serious financial difficulties. The Canadian National Telegraph Company was formed after the government merged some of the major railways into the Canadian National Railway system. By 1930, the main providers of telegraph services in Canada were Canadian National and Canadian Pacific.

Beginning in the 1920s, the telegraph companies began augmenting the telegraph with newer telecommunications. Canadian National inaugurated a radio broadcasting service in 1925. In 1932, the two railways jointly contracted to supply national network services for the Canadian Radio Broadcast Commission, forerunner of the Canadian Broadcasting Corporation (CBC). By 1939, the two railways also offered a national weather-reporting service.

After World War II, the two railways launched cooperative telecommunications ventures: in 1947, they offered private wire services; in 1956, they introduced Telex to North America; and, in 1964, completed a cross-Canada microwave network. The two companies formed CNCP Telecommunications in 1980. Canadian Pacific bought out its partner in 1988, and then renamed the company Unitel Communications Inc. after selling a 40 percent interest to Rogers Communications Inc. Unitel offers a wide range of competitive business services throughout the country.

The federal government acquired a major trunk line from the U.S. government after World War II; this line connected the Alberta Government Telephones network with Alaska. Canadian National was entrusted with this trunk line, which eventually expanded in the North through its subsidiary, NorthwesTel. This company expanded its operations in northern British Columbia and the western reaches of the Northwest Territories. Bell Canada Enterprises Inc. (BCE) acquired NorthwesTel in 1988.



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Canadian National also inherited responsibility for providing telephone and telegraph services in the western half of Newfoundland when the province joined the Confederation in 1949. This operation became Terra Nova Telecommunications, which was sold to Newfoundland Telephone in 1988.

### ***From telephones to telecommunications***

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The origins of Canada's other telecommunications networks can be traced to Alexander Graham Bell and Guglielmo Marconi. 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.

Founded in 1880, the Bell Telephone Company of Canada was chartered to provide telephone service across Canada. However, at the time a coast-to-coast telephone network connecting a population scattered across a vast terrain was impossible. Local telephone companies were formed where conditions permitted and, over the years, Bell sold its facilities in the Maritimes to other interests and its facilities on the prairies to the provincial governments.

The Telephone Association of Canada was formed in 1921 to solve common technical problems and to develop a Canadian telephone network. The Montreal to Winnipeg link was operating by 1928, and in 1931, the TransCanada Telephone System (TCTS) was formed to develop and maintain the transcontinental network. Coast-to-coast links were completed in 1931, and service began in January 1932. In September 1983, TCTS changed its name to Telecom Canada<sup>1</sup>.

The original members of Telecom Canada were: Maritime Telegraph and Telephone Company Limited (MT&T), The New Brunswick Telephone Company Limited (NBTEL), The Bell Telephone Company of Canada (now Bell Canada), Manitoba Government Telephones (now The Manitoba Telephone System, MTS), Saskatchewan Government Telephones (now Saskatchewan Telecommunications, SaskTel), Alberta Government Telephones (now AGT Limited), and the British Columbia Telephone Company (B.C. Tel). Since the origin of Telecom Canada in 1931, three other companies have become members: in 1957 the Avalon Telephone Company (now Newfoundland Telephone), The Island Telephone Company Limited (Island Tel) of Prince Edward Island in 1975, and Telesat Canada in 1977.

In 1958, Telecom Canada inaugurated a 139-station transCanada microwave system. The world's longest at the time, it is still Telecom Canada's backbone network. During the 1950s, Bell Canada developed the world's first tropospheric scatter system, which communicates at distances of up to 300 km by bouncing radio signals off the troposphere. Such systems served areas like the eastern Arctic, which were remote from the microwave network. By the 1970s, satellite communications began to replace the tropospheric scatter systems.

<sup>1</sup> Members of Telecom Canada announced, January 29, 1992, that they were renewing their alliance and that, henceforth, it would be known by the name Stentor Canadian Network Management (Stentor).

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## ***International telecommunications***

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In 1927, the prime ministers of Canada and the United Kingdom inaugurated telephone service between their two countries. By 1933, telephone links had been established between Canada and Europe, Asia, Africa, and Australia. Service to and from ships at sea had started in 1929.

In 1949, the federal government formed the Canadian Overseas Telecommunication Corporation to comply with the 1948 Commonwealth Telegraphs Agreement. In this agreement, each signatory government agreed to have representation at meetings of the Commonwealth Telecommunications Board.

The Canadian Overseas Telecommunication Corporation became Teleglobe Canada in 1975. This company, responsible for overseas communication by cable and satellite, was privatized by the federal government in 1987. Teleglobe is not responsible for communications links between Canada and the United States. These are arranged through technical and operating agreements between Canadian and U.S. telecommunications carriers.

In 1953, an agreement among the British Post Office (now British Telecom), the American Telephone and Telegraph Company, and the Canadian Overseas Telecommunication Corporation resulted in the first transatlantic telephone cable. Several more cables followed and by the late 1960s Canadians could telephone to most countries in the world.

## ***Satellite communications***

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A pioneer in satellite technology, Canada became the third nation in space in 1962, when its experimental satellite, *Alouette I*, designed to study the properties of the ionosphere, was launched. Experimentation on this satellite continued until 1969. By 1967, Canadian objectives had shifted to using satellites to improve domestic communications.

In 1969, Telesat Canada, jointly owned by the federal government and the major telecommunications carriers, was formed to provide commercial satellite communications for the nation's telephone companies, broadcasting companies and businesses. The *Anik A-1* satellite, launched in 1972, was the world's first geostationary, domestic communication satellite. In late 1991, the federal government gave notice to begin the sale of its shares in Telesat Canada.

Throughout the 1970s, the federal government was active in experiments with communications satellites. For example, in 1976 the *Hermes* program pioneered small parabolic antennas suited to transmitting television signals directly to homes. The *Hermes* program also included experiments in tele-health, tele-education and community communications.

## ***Research, development and manufacturing of telecommunications equipment***

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The development of switches to interconnect telephones was as important as the invention of the telephone itself, and switching technology has always been the subject of extensive research. Northern Telecom Ltd. made a major advance in switching technology in the 1970s by designing the DMS series of digital switches. These improved switching throughout the telephone system, from the international toll switches down to the local telephone switches. Northern Telecom's achievement and its spin-off opportunities reinforced the strength of Canada's strong telecommunications equipment industry.

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The advent of the mainframe computer in the 1960s led to remote data processing and time sharing via the telecommunications networks. Telecom Canada responded by forming the Computer Communications Group to design an appropriate network. In 1973, Canada became the first nation to have a commercial digital network (Dataroute). In the 1970s, Canadians were instrumental in developing an international standard (X.25) for public shared data networks. In 1977, Telecom Canada introduced interactive business systems (Datapac). These technological advances and others have helped to place Canada at the forefront of telecommunications.

Canada's geography challenged its inhabitants to find ways to communicate reliably and economically over long distances. The nation responded by developing advanced telecommunications carrier services and by fashioning policies that have nurtured the telecommunications industry. Canadians enjoy affordable access to a sophisticated telecommunications network (98 percent of households subscribe to basic residential services) that has been designed and built by Canadian industry.

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## CHAPTER 2 TELECOMMUNICATIONS INFRASTRUCTURE, OWNERSHIP AND FACILITIES

### *Industry sectors*

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The Canadian telecommunications industry can be divided into two sectors: the telecommunications equipment manufacturing sector and the carriage and services sector. The equipment sector will be described briefly later in this chapter.

The carriage sector consists of the two national telecommunications systems, Unitel Communications Inc. and Telecom Canada<sup>2</sup>, historically derived from the telegraph and telephone industries, respectively. There are 49 independent, generally smaller telephone companies, although six of them are relatively large (see Table 1). There is also Teleglobe Canada Inc., Canada's carrier for overseas telecommunications services. These telecommunications carriers and the cellular mobile companies generated a total of more than \$15 billion in revenues during 1990. One other class of carriers — the radio common carriers — generated approximately \$300 million in revenues in 1990. (See Map 1 for cellular networks and Map 2 for telecommunications carriers networks.)

### *Major telecommunications carriers*

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Telecom Canada is an unincorporated association consisting of the largest telephone company in each province, Telesat Canada and one associate member. The networks of all member companies are completely interconnected in an integrated system for providing telecommunications services. The association coordinates network operations, markets products and services and distributes revenues from jointly provided services. Telecom Canada also represents its members on international and national committees and symposiums.

Telecom Canada members are:

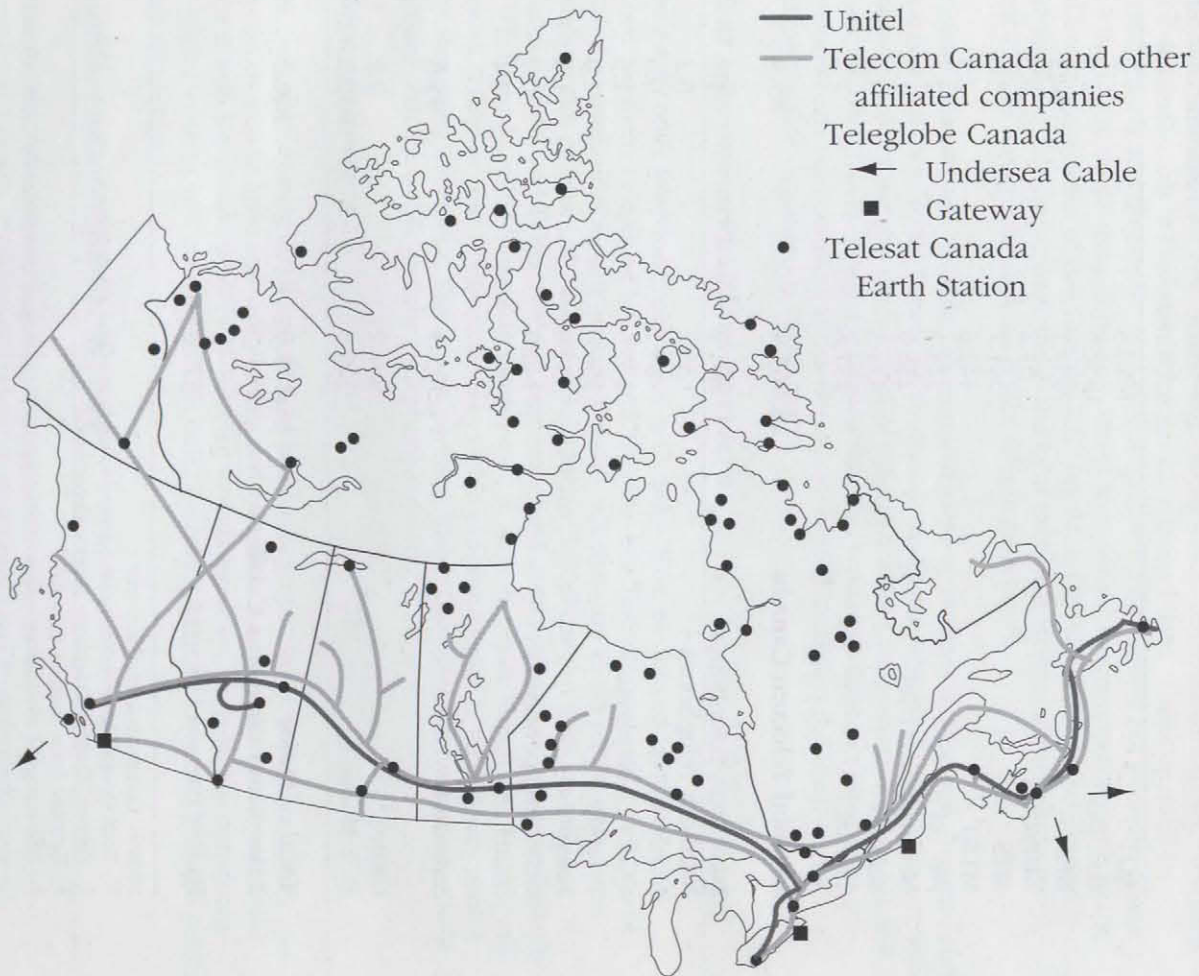
- AGT Limited
- Bell Canada (Bell)
- British Columbia Telephone Company (B.C. Tel)
- Maritime Telegraph and Telephone Company Limited (MT&T)
- Newfoundland Telephone Company Limited (Newfoundland Telephone)
- Québec Téléphone (associate member)
- Saskatchewan Telecommunications (SaskTel)
- Telesat Canada (Telesat)
- The Island Telephone Company Limited (Island Tel)
- The Manitoba Telephone System (MTS)
- The New Brunswick Telephone Company Limited (NBTel).

<sup>2</sup> Telecom Canada, now called Stentor Canadian Network Management, as of January 29, 1992, will continue to manage and monitor the telephone companies' interprovincial networks and their North American interconnections. The organization also administers the division of revenues from national services. On the same day, the telephone companies announced the creation of two jointly held companies, Stentor Resource Centre Inc. and Stentor Telecom Policy Inc. The Stentor Resource Centre will consolidate the telephone companies' research and development, and national and international marketing activities and will start business on January 1, 1993. Stentor Telecom Policy Inc., which officially began operation on February 3, 1992, will act as a government relations advisory arm for the telephone companies.

**MAP 1 - CELLULAR COVERAGE**



## MAP 2 - MAJOR NETWORK FACILITIES



**Table 1**  
**Estimated Total Operating Revenues for Telecommunications**  
**Carriage Industry 1990**

Telecommunications Carriers	Total Operating Revenues (\$ millions)	% of Total Operating Revenues Telecommunications Carriers
AGT	1189.3	7.8
B.C. Tel	1852.6	12.2
Bell	7654.7	50.3
Island Tel	51.2	0.3
MTS	541.7	3.6
MT&T <sup>1</sup>	442.6	2.9
NB Tel	324.1	2.1
Newfoundland Tel	256.9	1.7
SaskTel	574.5	3.8
Telesat	177.8	1.2
<b>Subtotal Telecom Canada</b>	<b>13,065.4</b>	<b>85.9</b>
Edmonton Telephones	261.2	1.7
Northern Telephones <sup>2</sup>	35.2	0.2
Northwestel	84.1	0.6
Québec Téléphone	223.5	1.5
Télébec	159.8	1.0
Teleglobe	234.0	1.5
Other Independents <sup>3</sup>	140.0	0.9
Unitel	362.2	2.4
<b>Subtotal</b>	<b>14,565.4</b>	<b>95.6</b>
Cantel <sup>4</sup>	334.2	2.2
BCE Mobile <sup>5</sup>	329.2	2.2
<b>Total of Major Telecommunications Carriers</b>	<b>15,228.8</b>	<b>100.0</b>
Radio Common Carriers <sup>6</sup>	310.0	

Source: Company Annual Reports

<sup>1</sup> Total Operating Revenues were adjusted to exclude Island Tel Revenues.

<sup>2</sup> Source: Ontario Telephone Service Commission.

<sup>3</sup> Estimate from Statistics Canada.

<sup>4</sup> Revenues of Cantel are revenues of holding company, Rogers Cantel Mobile Communications Inc. which also include revenues from Cantel Paging and Mobitex.

<sup>5</sup> CellNet revenues are also included as part of total operating revenues of respective telecommunications carriers except for companies which report revenues from cellular service separately. The BCE Mobile corporation includes the following companies: Bell Cellular, National Pagette, Bell Radio, Skytel, Mobidata, Bellpoint.

<sup>6</sup> Estimate from RadioComm Association of Canada. This estimate includes revenues from some cellular companies.

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**Telesat Canada** operates Canada's domestic satellite communications system, leasing satellite capacity to broadcasters, cable television operators, other Telecom Canada members and smaller firms that provide telecommunications services to business. Telesat also provides telecommunications services directly to business. Telesat's services are fully integrated with the public switched telephone networks.

**Unitel Communications Inc. (Unitel)**, formerly CNCP Telecommunications, competes with Telecom Canada in business telecommunications services. Unitel operates its own microwave and fibre-optic relay system and switching centres, but generally leases loops from local telephone companies. Unitel was granted interconnection rights to the local exchange facilities of Bell Canada, B.C. Tel, AGT, NBTel, MT&T, Island Tel and Newfoundland Tel. Interconnection to the local exchange facilities allows clients to access Unitel's services through the public telephone network.

**Teleglobe Canada Inc.** operates international gateway switches in Montreal, Toronto, and Vancouver that route traffic between Canadian domestic carriers and 200 countries overseas via transoceanic cables and the satellites of the International Telecommunications Satellite consortium (INTELSAT). Teleglobe Canada Inc. also represents Canada's interests at the Commonwealth Telecommunications Organization, INTELSAT and the International Maritime Satellite Organization (INMARSAT).

### ***Independent telecommunications carriers***

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There are 49 other telephone companies in Canada. Most are located in Ontario and Quebec. Northern Telephone Limited and Thunder Bay Telecommunications are two of a total of 30 companies serving areas in Ontario. Quebec has 16 telephone companies throughout that province, the largest being Québec Téléphone, an associate member of Telecom Canada, and Télébec Ltée. Companies serving other areas of the country include: ED TEL, formerly called Edmonton Telephones, in Alberta; Prince Rupert City Telephones in British Columbia; and NorthwTel Inc., which provides service in the western portion of the Northwest Territories, Yukon and northern British Columbia. All networks are fully integrated with the public switched telephone network.

### ***Radio common carriers***

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There are approximately 200 licensed radio common carriers (RCCs) in Canada. They provide various mobile radio and radio-paging services, mainly in urban areas. The services compete with the mobile services of Telecom Canada members. Regulations permit one-way paging systems and two-way mobile radio systems to be interconnected with the public telephone system.

### ***Cellular mobile radiotelephone service***

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Cellular mobile radiotelephone service was inaugurated in Canada on July 1, 1985 in Montreal and Toronto. Cellular service rapidly spread to other cities in every province. Service is now available to close to 80 percent of Canadians. Two service providers compete nation-wide for cellular business: Rogers Cantel Inc. and CellNet Canada, an association of telephone company affiliates (members are listed in Table 2 and cellular networks on Map 1). Cellular service now is available to approximately 80 percent of the population. There are over 600,000 subscribers to cellular service and it is available in metropolitan areas in all ten provinces across Canada. Service has been extended into smaller communities and major highway corridors between cities. Continuous radio coverage exists from Windsor, Ontario, to Halifax, Nova Scotia, one of the longest corridors of its kind in the world.



■ **Table 2**  
**CELLNET Canada Members**

Company	Province
B.C. Cellular Limited	British Columbia
ED TEL Cellular	Alberta
AGT Cellular Limited	Alberta
SaskTel Cellular	Saskatchewan
MTS Cellular	Manitoba
Thunder Bay Cellular	Ontario
Kenora Cellular	Ontario
Bell Cellular	Ontario and Quebec
Québec Téléphone Cellulaire	Quebec
NBTel Cellular	New Brunswick
NewTel Cellular	Newfoundland
MT&T Cellular	Nova Scotia
Island Tel Cellular	Prince Edward Island

### **Miscellaneous services**

Miscellaneous services, such as monitoring of fire and burglar alarms, are offered by the telecommunications carriers in competition with many cable television companies.

### **Telecommunications equipment**

Telecommunications carriers, both foreign and domestic, have links with Canada's strong telecommunications manufacturing and research industry. Northern Telecom Ltd., owned by BCE (53.1 percent), is a global telecommunications equipment manufacturer. Bell-Northern Research Limited, owned by Northern Telecom (70 percent) and Bell (30 percent), is the largest private industrial R&D organization in Canada. Mitel Corporation, of which British Telecom holds a 51 percent controlling interest, conducts research and development and manufactures telecommunications equipment that it sells on the international market. B.C. Tel is affiliated with Microtel Ltd. and MPR Teltech Ltd. NovAtel Communications Ltd. in Alberta manufactures cellular systems and other telecommunications equipment.

### **Government telecommunications research**

The Department of Communications operates the Communications Research Centre (CRC)<sup>3</sup> and the Canadian Workplace Automation Research Centre (CWARC). CRC's role is to conduct R&D in support of Communications Canada's mandate to develop telecommunications policies, regulations and standards. CWARC's role is to promote the growth of the Canadian telematics industry by designing, testing and implementing new concepts in office automation and telematics technologies. Both CRC and CWARC are engaged in a wide range of joint research projects with industry and universities.

<sup>3</sup> The CRC will become a Research Institute on April 1, 1992.

## ***Ownership of the telecommunications carriage industry***

Canadian investors or governments control most Canadian telecommunications carriers. Member companies of Telecom Canada are all privately owned, except Telesat Canada, owned jointly by the Government of Canada (although the government has recently acted to sell its shares to private interests), the telephone companies and provincially owned SaskTel and MTS (see Table 3 for ownership interests).

Bell Canada is the largest member of Telecom Canada, earning 50.3 percent of total Telecom Canada operating revenues. Since April 1983, Bell Canada has been a wholly owned subsidiary of BCE Inc. In 1988, BCE also acquired NorthwesTel. Through Bell and NorthwesTel, BCE has significant direct and indirect equity interests in the principal telephone companies in the Atlantic Provinces, Ontario, Quebec and in the North.

In 1985, Newfoundland Telephone and NBTel reorganized and in 1988, Newfoundland Telephone purchased Terra Nova Telecommunications from CN.

■ **Table 3**  
***Telecommunications Carriage Industry Ownership (1990)***

Company or government holding interest in telephone company	Telephone company and interest
BCE Inc.	<ul style="list-style-type: none"> <li>• Bell (100%)</li> <li>• MT&amp;T (33.8% and Island Tel. is a subsidiary of MT&amp;T)</li> <li>• NBTel (31.4% of parent Bruncor)</li> <li>• Newfoundland Tel (55.7% of parent NewTel)</li> <li>• NorthwesTel (100%)</li> <li>• Northern Telephone (99.9%)</li> <li>• Télébec (100%)</li> <li>• Teleglobe (1/3 interest of parent Teleglobe Inc.)</li> <li>• Island Telephone (52.4%)</li> </ul>
Anglo-Canadian Telephone Company of Montreal (subsidiary of GTE Corporation)	<ul style="list-style-type: none"> <li>• B.C. Tel (50.2%)</li> <li>• Québec Téléphone (50.7%)</li> </ul>
Government of Canada (49%)	<ul style="list-style-type: none"> <li>• Telesat</li> </ul>
Bell Canada (24%)	
Other Telecom Canada members (16%)	
Other telecommunications carriers (9%)	
Telesat Canada employees (2%)	
Rogers Communications Inc.(40%)	<ul style="list-style-type: none"> <li>• Unitel</li> </ul>
Canadian Pacific Limited (60%)	
Government of Saskatchewan	<ul style="list-style-type: none"> <li>• SaskTel (provincially owned Crown corporation)</li> </ul>
Government of Manitoba	<ul style="list-style-type: none"> <li>• MTS (provincially owned Crown corporation)</li> </ul>
Government of Alberta	<ul style="list-style-type: none"> <li>• AGT Limited (43% of voting shares of parent TELUS Corporation)</li> </ul>

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BCE also has interests in Teleglobe, which Memotec Data Inc. purchased from the federal government in 1987. The parent company, renamed Teleglobe Inc. in 1991, designs, manufactures and markets a comprehensive range of data communications products and services internationally.

The Anglo Canadian Telephone Company of Montreal, a wholly owned subsidiary of U.S.-based GTE Corporation, controls Canada's second largest telephone company, the British Columbia Telephone Company (B.C. Tel). The Anglo Canadian Telephone Company also controls Québec Téléphone, which provides service in parts of Quebec.

A merger of Canadian National Telecommunications and Canadian Pacific Telecommunications created CNCP Telecommunications as a joint partnership in 1980. In 1988, Canadian Pacific Limited purchased Canadian National's share in the company. Then, in September 1989, Rogers Communications Inc. acquired a 40 percent equity interest in CNCP Telecommunications, which was subsequently renamed Unitel Communications Inc.

Cellular telephone companies are also majority owned by Canadian interests. CellNet members are wholly owned subsidiaries or affiliates of their parent telephone companies. Rogers Cantel Inc., the competing cellular system, is now fully owned by Rogers Communications Inc., one of the founding owners of Cantel in 1985.

Telesat Canada is owned jointly by the federal government, Telesat employees and telecommunications carriers. The government has introduced legislation in Parliament enabling it to sell its shares to the private sector.

Privatization of the Alberta Government Telephones company in 1990 resulted in a new holding company, TELUS Corporation, with AGT Limited as its largest subsidiary. The government of Alberta controls 43 percent of the voting shares of TELUS. The remaining shares were offered publicly on the condition that no purchaser could obtain more than 5 percent of total shares issued.

Some telecommunications companies are solely owned by municipalities, as is the case with ED TEL (Edmonton), Thunder Bay Telecommunications and Prince Rupert City Telephones. Such companies are governed by municipal councils or commissions elected by the subscribers.

### ***Carrier facilities***

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The telecommunications carriers already use virtually every means of electronic transmission and now are turning to fibre optics for increased performance.

Telecom Canada and Unitel each maintain coast-to-coast microwave routes for interprovincial and long-distance traffic. Telesat Canada's network of satellites and earth stations augments the capacity of the microwave systems and provides links to remote areas that cannot be served by terrestrial links. Telecom Canada, Teleglobe Canada and Unitel are upgrading their networks with fibre optics and new digital systems. Telecom Canada completed a 7,000-kilometre fibre-optic network in 1990 at a cost of \$500 million and extended this network to Newfoundland in 1992. At the end of 1990, all of Teleglobe Canada's switching facilities and 60 percent of its transmission systems were digital.

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The heavy-traffic routes connecting most major cities already provide digital service. Conversion will continue at a pace permitted by the economics of the industry. Overall, in 1990, the telecommunications industry had capital investments amounting to \$5.6 billion, which represents approximately 40 percent of the industry's revenues.

Conversion of networks to digital technology improves network performance, increases the carriers' ability to manage their installations, multiplies the services offered to businesses and homes and lowers costs dramatically. Most newer service offerings, such as call-screening and caller-identification, result from the conversion of networks to digital technology. The goal of supplying fully digital voice and data services to every subscriber is generally known as the Integrated Services Digital Network (ISDN).

For some years, the telecommunications carriers have been working on international standards to convert the analog voice (telephone) network to ISDN without sacrificing universal access or ease of use that subscribers are accustomed to. Testing of the ISDN concept is well advanced in many parts of the world, and Telecom Canada plans to introduce ISDN commercially in 1992 once the federal regulatory agency, the Canadian Radio-television and Telecommunications Commission (CRTC), renders its decision on rates for ISDN services. Both Telecom Canada and Unitel are committed to implementing the Common Channel Signalling (CCS) concept on their networks, a fundamental requirement for ISDN conversion.

Telesat Canada provides commercial satellite services throughout Canada. It owns and operates five satellites (including *Anik E-2* and *Anik E-1*, launched in 1991) and a network of some 500 earth stations.

Telesat's subsidiary, Telesat Mobile Inc. (TMI) plans to launch a mobile satellite (*MSAT*) in 1994 to provide mobile voice and data communications services for ground use and to vehicles, ships and aircraft. TMI has already started a mobile satellite service using leased satellite facilities.

Today's cellular industry still uses analog technology which restricts each channel to one conversation at a time and, therefore, limits network capacity to the number of channels available. Conversion to digital technology will permit several simultaneous conversations to be multiplexed onto one channel. In 1989, the Cellular Telephone Industry Association (CTIA) chose a technique called Time Division Multiple Access (TDMA) which will increase the system's capacity and improve the quality of communication.

### ***Terminal attachment and procurement***

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The attachment of customer-owned and maintained terminal equipment to carrier networks is permitted, subject to compliance with certain basic technical criteria. The technical requirement exists to protect networks and personnel. Generally, a full range of terminal equipment may be attached to carrier networks in all provinces, though there are small variations among provinces. Competition stemming from customer attachment of terminals has brought about increased product choice, lower prices and accelerated technological innovation. In areas under CRTC regulation, all equipment manufactured after September 1, 1983 must be certified as meeting the requirements of Communications Canada's Terminal Attachment Program prior to connection to a public network.

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Subscribers can own their telephone sets. The inside wiring associated with single-line residence and business subscriptions usually remains the property and responsibility of the telephone companies except in Alberta. Multi-line business subscribers who choose to own their terminal equipment must also own and be responsible for the associated inside wiring.

Carriers can both lease and sell terminal equipment directly in compliance with regulatory requirements concerning prices. The pricing regulations ensure that terminal equipment offerings are not subsidized by revenues from the carriers' monopoly activities.

The Terminal Attachment Program Advisory Committee (TAPAC) develops technical standards for terminal equipment intended to be attached to networks. TAPAC is chaired by Communications Canada and includes the voluntary participation of carriers, manufacturers, suppliers, users and provincial governments. The program aims to develop terminal attachment standards suitable for nation-wide adoption. These standards are intended to guard against network harm. Network harm has been defined as hazardous voltages for carrier personnel and the user, electrical damage to the network, interference with network functions such as billing, and the degradation of service to others. The CRTC and some provincial regulatory agencies require Communications Canada certification for equipment attached to carrier networks.

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## CHAPTER 3 OVERVIEW OF TELECOMMUNICATIONS SERVICES

### *Public network services*

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The Canadian telephone companies have a monopoly on public telephone service in their respective operating territories. Unitel has a monopoly in the provision of public message (telegram) services. In all other service categories, there are varying degrees of competition between Telecom Canada and Unitel. Teleglobe Canada is the sole provider of Canada-overseas telecommunications facilities and services. Close to 60 telephone companies and cooperatives provide public telephone services. The Telecom Canada telephone companies (listed in Table 1) account for 90 percent of the telecommunications carriage industry revenues.

### *Rate setting*

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Most telephone companies in Canada have adopted comparable rate structures. Local residential and business telephone services are offered on a flat-rate basis. Rates for long-distance service, however, are based on a number of usage-sensitive variables. These variables include distance, duration of the call, time of day, day of the week and whether the call is direct-dialled or operator-assisted.

The key principles and factors in rate-setting are company-wide rate averaging, value of service, costs, and usage.

**Rate averaging** means that all customers pay the same base price for the same class of service.

**Value-of-service** is the principle that prices should be reasonably related to the value of the service. Local calling areas with numerous subscribers pay higher subscriber rates than areas with fewer subscribers. Business telephone rates are higher than residential subscriber rates in the same local calling area because the service is deemed to be more valuable to businesses.

**Costs** are recovered by charging more for services that are costly to provide. Thus, operator-assisted long-distance telephone calls are priced higher than direct-dialled calls.

**Usage** considers both value and costs. For instance, discounts for service on Sundays, weekends or at night are justified on the grounds that they promote use in low-traffic periods, thus defraying fixed system costs and helping to reduce peak traffic demands.

### *Special usage rates*

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Telephone companies offer several discount options for long-distance usage that allow volume users to achieve cost savings. For example:

**Wide Area Telephone Service (WATS)** is a plan that charges outgoing direct-dialled calls to prescribed zones at a bulk rate rather than charging each call individually.

**800 Service** is a service similar to WATS that businesses can purchase to let their customers call in toll-free from selected areas.

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**900 Service** is a one-way mass calling service that sponsors can purchase to obtain multiple and simultaneous responses immediately from audiences of electronic and print media. It also provides access to pre-recorded messages, conferences and live broadcasts.

The Common Channel Signalling #7 Protocol (CCS7) is being implemented in the carrier networks. This new technology can route information about call set-up and control relating to a particular call from one location to another throughout the network. In addition to switching a call to the desired location, CCS7 allows the system to manipulate information about calls. This added power makes possible a host of innovative service offerings, such as:

**Call Management Service (CMS).** This service allows subscribers equipped with an electronic display to identify the telephone number of all incoming calls, trace them or screen them out.

**Remote Call Forwarding (RCF)** permits businesses to purchase local telephone numbers in specific distant communities for a small monthly fee, plus direct-dial charges on calls received through RCF. Customers in these communities calling the local number will be routed, automatically and at no cost, to the business's regular telephone.

### **Network services**

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Unitel and Telecom Canada each provide public switched data network services. The two competitive service offerings are Fas\*Pac and Datapac. Teleglobe Canada provides a gateway to overseas locations for Unitel and Telecom Canada subscribers to these services.

**Fas\*Pac** (formerly Infoswitch) is Unitel's public, packet-switched digital service, which is charged on a usage basis. This service interconnects a large variety of terminals and computers of different manufacturers and permits communication between X.25 (packet-switched) terminals of different operating speeds.

**Datapac** was introduced by Telecom Canada in 1977. It then was the world's first commercially available, nation-wide, public packet-switched data network. This pay-for-use network supports a wide variety of host computers, front ends and cluster controllers as well as intelligent and non-intelligent terminals.

**Globedat** (Teleglobe Canada) provides low-to-medium speed data transmission for packet-switched and circuit-switched traffic. Globedat can route both Fas\*Pac and Datapac to numerous other countries.

Telecom Canada also offers three other digital data services:

**Dataroute**, the world's first public digital data network, serves customers with large dedicated data-handling needs.

**Datalink** is a circuit-switched digital data transmission service designed for the low-to-medium volume user. It is best suited to users requiring a transparent service to transmit data in batch or remote job entry form.

**Megaplan** integrates a customer's voice, data and image information into a single network. It is Telecom Canada's response to Unitel's Mach III.

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Unitel's data offerings consist of:

**Infodat**, a private, non-switched, digital data transmission service. It offers dedicated circuitry for terminal-to-computer and computer-to-computer communications for large organizations. Infodat's applications include reservation systems, inventory control, and credit verification.

**Mach III** introduced in 1986, is a portfolio of integrated digital telecommunications services. Mach III offers private voice networking, wideband data transmission, and the integration of voice, data and video traffic over the same channels. This service consolidates these traditionally separate technologies within one comprehensive network.

Megaplan and Mach III are the forerunners of the Integrated Services Digital Network (ISDN) which will transform the present telephone system into a digital network that will carry voice, data and image services over standard twisted-pair telephone wire.

Telecom Canada's Voicecom, Teleroute and Telpak compete against Unitel's Broadband Exchange Service and Voiceline; these discount long-distance voice and data network services are for medium- and high-volume users.

Telesat Canada's Anikom series of satellite services also competes for voice, data and video traffic. Telesat's hub stations or teleports offer clients a range of support services and network management tools. Satellite network services can be configured to user requirements for applications in high-speed data transfer, electronic publishing, video-conferencing, remote sensing or telemetry data collection, and specialized voice communications.

Teleglobe Canada's Globesat offers overseas digital transmission via satellite, and its Globestream is an international private digital cable service. These Teleglobe services offer the means for Canadian businesses to create private digital networks for communicating with their overseas operations by voice, data, or teleconferencing.

### ***Leased circuits***

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Carriers lease circuits (sometimes called "private lines") that remain dedicated to the communications needs of the customer. Leased circuits may be connected to the public switched voice or data networks. Dedicated circuit services include:

**Tie lines** — for directly connecting private branch exchanges (PBXs) in remote sites;

**Foreign exchange (FX)** — which provides the equivalent of local telephone service to and from a distant exchange; and

**Off-premise extensions (OPX)** — an extension telephone in a location remote from a company's main telephone switch.

The telephone companies and Unitel sell leased circuits in direct competition with each other in most regions of Canada. A CRTC decision in 1985 permitted the resale of leased circuits for purposes other than the provision of public telephone service. Another CRTC decision in 1990 liberalized resale and sharing of private lines leased from Bell Canada, BC Tel, Unitel and Telesat Canada. It is now possible to combine traffic from multiple users over a single channel ("joint use"). The CRTC also allows the resale and sharing of Teleglobe Canada's international services but not on a joint-use basis.



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Teleglobe Canada's policy for international leased circuits abides by the recommendations of the International Telecommunication Union (ITU) and the International Telegraph and Telephone Consultative Committee (CCITT).

### ***Other services***

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Canadian telecommunications carriers offer several electronic message and information retrieval services that can be used separately or in conjunction with data services.

Telecom Canada offers the following services:

***Envoy 100*** is a nation-wide store-and-forward service accessible by standard terminals through the telephone network or Datapac. Envoy 100 users also can access locations in the United States served by Telenet or Tymnet packet-switched networks.

***EnvoyMHS*** is the world's first commercial public X.400-based service. It has domestic and international links to other public and private messaging systems.

***EnvoyPost*** allows Envoy 100 users to send messages through Canada Post for delivery as a letter on the next business day to any address in Canada.

***Inet 2000*** provides a wide range of terminals with a message store-and-forward service and access via Datapac to on-line databases virtually anywhere.

***TradeRoute*** is a national Electronic Data Exchange (EDI) service that enables organizations using different computer systems to exchange documents electronically.

Unitel offers the following competitive services:

***Dialcom***, which allows office equipment to access a comprehensive range of computer-based communications, information and support services. Dialcom users can reach subscribers of many other messaging services and access a number of large international databases.

***Telepost***, which allows messages to be sent by telephone, Telex or computer through Canada Post to anywhere in Canada or the continental United States. At the destination, the messages are delivered as letters in the next mail delivery.

***WPMail***, a high-speed messaging service between word processors of different manufacturers.

***Teletex***, a high-speed letter-quality text communication service.

Switched teleprinter services have largely been eclipsed by facsimile technology. Telex, provided by Unitel, is experiencing declining revenues, while TWX, provided by Telecom Canada is no longer offered to new customers.

***FaxCom*** (Telecom Canada) and ***FacsRoute*** (Unitel) are national facsimile networks.

***Globefax*** (Teleglobe Canada) provides connections to overseas destinations.

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Unitel, Telecom Canada, and Telesat Canada provide audio and video transmission services to business users. All three carriers transmit radio, television, and cable television signals locally, regionally, and nationally. The carriers also offer public video-conferencing facilities at locations across the country.

Telecom Canada obtains international teleconferencing links from Teleglobe Canada and offers:

**TeleForum**, an audio link that also permits an exchange of graphics; and

**VideoForum**, a fully interactive service that combines two-way compressed colour video with audio links.

### ***Integrated Voice Messaging Systems (IVMS)***

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The major telephone companies are offering IVMS as a voice equivalent of an internal electronic mail service. The service integrates a 24-hour telephone answering and messaging capability with the customer's telephone system. This service ensures that all calls are answered automatically.

The Telecom Canada companies also provide **Exten**, an electronic voice messaging service accessible on toll-free telephone lines from anywhere in Canada and the continental United States. Exten subscribers are billed according to usage.

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## CHAPTER 4

### THE REGULATORY FRAMEWORK

Until recently, regulation of the telecommunications industry was split among agencies of the federal, provincial and municipal governments. The industry, as outlined in Chapter 2, includes corporations owned by provincial governments, municipal governments, private investors, or a mix of these shareholders (government/investor-owned). This mixture of ownership and regulation has made the development of Canadian policies difficult and time-consuming. It has also impeded the development of Canada-wide telecommunications services.

The Supreme Court of Canada examined the complex division of regulatory responsibilities between federal and provincial jurisdictions. This case was initiated in 1982 by a CNCP application for permission from the Canadian Radio-television and Telecommunications Commission (CRTC) to interconnect with Alberta Government Telephones (AGT). AGT was a provincially owned and regulated Crown corporation. In 1989, the Supreme Court ruled that AGT, and by extension, all other member telephone companies of Telecom Canada, were subject to federal jurisdiction. In addition, the court ruled that AGT, at that time a provincial Crown corporation, was not subject to CRTC regulation, because existing federal legislation was not binding on provincial Crown agencies. By implication, this ruling also applied to SaskTel and MTS, which are also provincial Crown corporations.

The court's decision had an immediate effect. It brought the four investor-owned companies in Atlantic Canada under the jurisdiction of the CRTC. With the privatization of AGT, the only Telecom Canada members outside federal jurisdiction are the provincially owned companies, SaskTel and MTS. Since the AGT decision, there is more uniformity in the availability of telecommunications services and equipment as more companies become subject to the same regulator.

Teleglobe has been under federal regulation since its privatization in 1987. All other telephone companies are regulated by municipal or provincial regulatory agencies. Cellular companies are regulated by the regulatory agencies that regulate their holding companies (see Table 4).

The purposes of telecommunications regulations are to serve the public interest, to protect subscribers from unreasonable treatment by monopoly providers of services, and to ensure fairness in areas of competing services.

The primary responsibility of the federal regulatory agency, the CRTC, is the approval of carriers' tariffs. In addition, the CRTC has broad powers to make regulations, approve construction programs, inquire into company operations and establish service standards. It also has the power to recover costs incurred from regulating the telecommunications carriers and to order the reimbursement of plaintiffs. The CRTC is an independent federal agency and the federal cabinet does not give policy directions to the regulator. However, Cabinet has the power to vary or rescind CRTC decisions under the *National Telecommunications Powers and Procedures Act*, section 67. This power is exercised sparingly.

■ **Table 4**  
**Telecommunications Carriers and Regulatory Agencies**

**Telecommunications Carriers**

Carrier	Regulatory Agency	
AGT	Canadian Radio-television and Telecommunications Commission (CRTC)	
B.C. Tel		
Bell Canada		
Island Tel		
MT&T		
NBTel		
Newfoundland Telephone		
Northwestel		
Teleglobe		
Telesat		
Unitel		
MTS		Crown immunity*
SaskTel		
ED TEL	City of Edmonton	
Northern Telephones Limited	Ontario Telephone Service Commission	
Thunder Bay Telecommunications		
Québec Téléphone	Régie des télécommunications du Québec	
Télébec		
Prince Rupert City Telephones	City of Prince Rupert	

**Cellular Mobile Radio Telephone Companies**

<i>Cellnet</i>	
AGT Cellular	CRTC
B.C. Cellular	
Bell Cellular	
Island Tel Cellular	
MT&T Cellular	
NBTel Cellular	
NewTel Cellular	
MTS Cellular	Crown immunity*
SaskTel Cellular	
ED TEL Cellular	City of Edmonton
Kenora Cellular	Ontario Telephone Service Commission
Thunder Bay Cellular	
Québec Téléphone Cellulaire	Régie des télécommunications du Québec
Rogers Cantel Inc.	CRTC

\* As provincially owned Crown corporations MTS and SaskTel are immune from federal regulation pending the passage of appropriate federal legislation.

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For several years, the CRTC conducted a detailed inquiry into the cost of telecommunications services. The CRTC divided telecommunications services into broad categories of competitive services and monopoly services, and in 1985 specified methods for identifying costs and revenues associated with these categories. This allows the CRTC to identify any cross subsidies among services that would undermine competition among service providers. The methodology also assists in monitoring the effects of rate rebalancing, in which a balance is struck between residential rates and other service charges. In 1988, the CRTC accepted Bell Canada and B.C. Tel's procedures manuals as conforming to the prescribed methodology and other carriers are now following suit.

Public participation is an important element in regulating telecommunications. When deliberating important questions, the CRTC frequently uses public proceedings to receive and study submissions from interested parties. When rendering decisions, the CRTC tries to balance the interests of the industries it regulates with the interests of the public, special-interest groups and subscribers.

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## CHAPTER 5 CURRENT POLICY INITIATIVES

Canadian communications policy must continue to take the initiative in a world economy that increasingly is characterized by global considerations. The goal of current policy initiatives is to build upon Canada's acknowledged excellence in telecommunications. Modification of the regulatory environment during the 1980s to introduce competition among vendors of advanced telecommunications services was commensurate with that goal. The process of attaining that goal will generate innovative telecommunications services which will improve the competitive position of all Canadian industries.

Telecommunications policy in this decade will have to stimulate technological development, channel entrepreneurial vigour and encourage the assimilation of innovative services within the domestic market. The impact of converting the global telecommunications industry to digital technology will transform society as significantly as did the introduction of the telephone or the motor car. Optical-fibre transmission's low cost and virtually unlimited availability of bandwidth will magnify the changes brought by digital conversion.

Policy development must also take into account the interdependence of federal and provincial interests in communications, the traditional monopolistic structure of the industry, the increasing number of communications channels being exploited in the spectrum, and the development of standards, which is an important element for networking international communications. The 1989 Supreme Court decision, the telecommunications policy framework and planned comprehensive legislation for telecommunications will place Canada in a position to make policies that address the challenges of the 1990s.

### *A new telecommunications policy for Canada*

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Canada has made a number of regulatory and policy decisions that give a greater role to market forces and competition in the provision of telecommunications services. Implementation of these policies has been complicated by the mixed private and public ownership of carriers and the divided jurisdictions between the federal and provincial governments.

#### **Policy principles**

In 1987, the federal and provincial ministers of communications agreed on certain principles for framing a coherent Canadian policy. The ministers also reached consensus on interconnection policy and on sharing governmental responsibilities in telecommunications. That same year, the federal Minister of Communications announced a Telecommunications Policy Framework for Canada.

#### **Telecommunications policy framework**

The Telecommunications Policy Framework for Canada, first announced in July 1987, has three central objectives:

- to maintain a universally accessible and affordable telephone service;
- to foster an efficient telecommunications infrastructure that will deliver services to Canadians at the lowest possible cost; and
- to permit Canadians to have access to the same level of competitive telecommunications services in all regions of Canada.

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The telecommunications policy establishes a framework for the Canadian telecommunications system by distinguishing between facilities-based carriers and all other carriers. Telecom Canada members, Unitel, Teleglobe, Telesat, Cantel, CellNet members and other independent carriers, all of which own and operate network facilities, are included in the first category and are regulated. Companies that lease transmission facilities to provide competitive services belong to the second category and operate without regulation.

The telecommunications policy framework also establishes an 80 percent Canadian ownership and control requirement for facilities-based carriers with appropriate exemptions for any existing facilities-based carrier which is currently foreign-owned or controlled. The requirement for 80 percent Canadian ownership and control does not apply to carriers that resell leased facilities to provide basic or enhanced services.

### **Federal-provincial agreements**

The federal government recognizes that the 1989 Supreme Court decision does not remove legitimate provincial concerns about how federal regulation of telecommunications will affect economic development in their territories. The federal government already has entered into agreements with five of the seven provinces directly affected by the Supreme Court decision. These agreements provide for the establishment of regional offices of the CRTC and the appointment of regional commissioners. The agreements also provide for consultations with the provinces about Canada's telecommunications policy. These agreements will allow Canada to secure an open, competitive domestic market under a single regulator.

### **Telecommunications legislation**

New legislation based on the Telecommunications Policy Framework for Canada has been introduced to give full effect to Canada's telecommunications policy. To promote effective competition across Canada, the legislation's objectives bear on policy principles enunciated previously, such as, universal access at affordable prices, an efficient telecommunications infrastructure, a viable competitive marketplace, Canadian ownership and control and research and development for technological innovations in the field of telecommunications.

The legislation will also enable the CRTC, through its regional offices, regional commissioners and regional hearings to apply telecommunications policy goals consistently across Canada. The CRTC will also be able to forbear from regulating certain services where there is a sufficient level of competition to protect users' interests. In addition, the legislation will consolidate the existing body of telecommunications legislation. The government will have the power to give broad policy directions to the CRTC and will continue to bear the responsibility for promoting telecommunications research and development.

## ***Competition***

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In Canada, competition in telecommunications services and equipment exists in supplying customer-provided terminal equipment, private-line services, and public data services. Regulated monopolies continue to provide local and long-distance telephone services.

### **Long-distance telephone service (Message Toll Service or MTS)**

In October 1983, CNCP Telecommunications applied to the CRTC for authority to connect its facilities with the telephone networks of Bell and B.C. Tel. CNCP proposed to compete in providing long-distance public telephone service within and between Quebec, Ontario, and British Columbia. CNCP also proposed to provide long-distance public telephone service to the United States and overseas.

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In August 1985, the CRTC rejected CNCP's application although it found that a number of benefits might result from competition in the long-distance services market. The Commission was concerned that the principle of universality might be undermined, the profitability of CNCP and the telephone companies reduced, the quality and provision of the telephone service impaired, and the need for regulatory intervention increased. However, it did permit the resale and sharing of services other than public long-distance and primary local telephone service.

In May 1990, Unitel again applied to the CRTC for permission to compete in public long-distance service. Unitel is seeking permission to connect its network to the public switched telephone networks of Bell Canada, B.C. Tel, Island Tel, MT&T, New Brunswick Tel, and Newfoundland Tel. Similarly, BC Rail-Lightel is seeking permission to interconnect with Bell Canada, B.C. Tel and Unitel. Permission to interconnect would allow the two petitioners to provide competing public long-distance telephone service, such as Message Toll Service (MTS) and Wide Area Telephone Service (WATS).

### **Resale and sharing**

After extensive consultations, the CRTC issued a decision in July 1984, allowing competition in enhanced services between the federally regulated common carriers and the resale carriers that lease transmission capacity from them. To facilitate this competition, the decision also allowed the resale and sharing of all carrier services for the provision of enhanced services. To forestall undue competitive advantage by the carriers, the Commission developed specific regulatory requirements to govern their participation in the market.

Since 1984, the CRTC has continued to liberalize the restrictions on resale and sharing. It is now possible to resell capacity on private voice lines and to combine traffic from multiple users over a single channel ("joint use"). The new rules apply to private lines leased from Bell Canada, B.C. Tel, Unitel and Telesat Canada. The CRTC also allows the resale and sharing of Teleglobe Canada's international services but not on a joint-use basis.

As part of its proceeding on the application by Unitel and BC Rail-Lightel for facilities-based competition in long-distance service, the CRTC is reviewing its resale and sharing rules for other telephone companies under its jurisdiction.

### ***Radio spectrum resources***

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The radio frequency spectrum is divided into bands of frequencies that are allocated for use by various radiocommunication services. Canadian spectrum allocations are consistent with the International Table of Frequency Allocations with few exceptions. Radio system policies and spectrum utilization policies within each band reflect Canadian needs for particular radiocommunication applications.

Lack of appropriate radio spectrum resources would adversely impact on Canada's ability to conduct its domestic and foreign affairs, and jeopardize the security and welfare of the nation. Radio spectrum resources are a basic element of the Canadian telecommunications and broadcasting infrastructure. Access to suitable radio spectrum is a necessity for future advances in communications services. For many years, Communications Canada has used a public consultation process to establish spectrum policy.

Many factors, such as, technology, service needs and the need to achieve more efficient, effective and economic use of the spectrum determine spectrum-use policies. Such policies encourage the development of more specific radiocommunication applications. One objective is to match radiocommunications demand with spectrum availability, and this objective is often achieved when similar uses are designated in common bands.



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The Department continues to develop well-balanced spectrum policies supporting radio-communications and the Canadian telecommunication infrastructure. Radio frequency bands have been designated for private and public two-way mobile services, paging, public data service and mobile satellite services. Frequency bands allocated to fixed radio services accommodate microwave relay systems of all capacities and ranges; and also point-to-multi-point radio systems that carry voice, data and video and wireless access to telephone subscribers. Domestic communication satellites use large spectrum allocations in the C and Ku bands and several geostationary orbital positions to serve all parts of Canada.

At the World Administrative Radio Conference (WARC) to be held in Spain in February 1992, Canada will participate in the negotiations for the acceptance of new frequency allocations which will have a direct and substantial impact on the development of a new range of radio services over the next twenty years.

### ***Microwave licensing policy***

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Communications Canada's microwave radio licensing policy strives to give proper attention to the social and economic importance of radiocommunications. Consequently, all microwave applications are assessed against the broad principles based on the need to establish microwave facilities that serve the public interest.

Over the years, this microwave policy has evolved. As a result, licences are now being granted to organizations that serve the public such as telecommunications carriers, utilities, licensed broadcasters, and federal and provincial governments. Communications Canada continuously reviews the effectiveness of its policies and conducts public consultations to adjust policies to evolving needs.

In August 1991, as the result of a comprehensive public consultation, Communications Canada published the limited area radio licensing policy. This policy provides greater choice of services and flexibility in the establishment of radio facilities that would generally be confined to a free-calling area. Users needs will be met in a timely and efficient manner through a more open licensing environment and process.

### ***Satellite earth station licensing policy***

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The evolution of the federal government's earth station licensing policy has supported continuing innovation in satellite technology. To foster growth in the Canadian system, the policy originally restricted ownership of earth stations to Telesat Canada and Teleglobe Canada. The policy gradually evolved until now it permits many users to own and operate earth stations. Also, earth stations can now be used as a vehicle for competitive service offerings.

To reduce the burden on applicants and the Department, earth station licensing has been simplified or in many cases eliminated. Individuals or commercial establishments, such as restaurants and taverns, can obtain licensing exemptions for a television or radio receive-only earth station as long as the signals are not distributed to others. Similarly, exemptions are available to broadcasters, or to apartment buildings, condominiums, hotels and motels equipped with master antenna television systems where the CRTC has approved the distribution of the received signals. Despite the licensing exemption, operators of earth stations may still require permission to receive and use satellite programming signals from the signal originators.

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The possessor of a receive-only earth station licence can receive various signals such as news-wire services, weather information, stock market information or other business services. Modification of communications policy in 1992 will eliminate the need for licences to receive this type of information from Canadian satellites.

Radio licences to operate transmit earth stations in the domestic fixed satellite services are available to anyone meeting the general licensing requirements of the *Radiocommunication Act* passed in 1989.

### ***Establishing strategy for telecommunications standards***

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The continued rapid evolution of technology, combined with the formation of world regional trading blocs is placing unprecedented demands on the telecommunications standardization process.

Following studies and consultations with representatives of Canadian organizations actively involved in the telecommunications standards development activities, Communications Canada and the Standards Council of Canada (SCC) agreed on the need to have a focal point for the establishment and implementation of a telecommunications standards strategy for Canada.

As a result, the Department and SCC jointly established in May 1991 the Telecommunications Standards Advisory Council for Canada (TSACC), which is composed of representatives of Canadian organizations actively involved in telecommunications standards development activities.

The objective of the TSACC is to provide a national focus to:

- enhance coordination within the existing Canadian telecommunications standards infrastructure; and
- develop and recommend strategies for Canadian involvement in world regional, interregional and international telecommunications standardization activities.

### ***Public cordless telephone services***

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Public cordless telephone service is the next step toward the goal of "personal communications," that is, person-to-person rather than place-to-place communications. Public cordless telephone service refers to the use of pocket-sized, cordless, lightweight digital telephones that can be carried about and used interchangeably in residential, business and public settings.

Public cordless telephone service gives the ability to connect with the public switched telephone network within an approximate 200-meter radius of public access points (or base stations) located in areas such as transportation centres or shopping malls. Interest in public cordless telephones evolved from the CT-2 technology developed in the United Kingdom. Today, researchers in Europe, North America and Japan are developing other advanced cordless telecommunications services.

Communications Canada initiated field trials of public cordless telephone service in November 1989. At that time, the Department invited submissions from interested parties describing how they would propose to establish public digital cordless telephone service in Canada.

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## ***Nation-wide paging services***

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In April 1987, the Department announced that a portion of the 929-932 MHz band would be available for local and regional paging systems. The Department also requested comments on technical and policy considerations for nation-wide paging systems in this band. In May 1989, the Department invited applications from parties prepared to provide nation-wide paging services in the three nation-wide paging frequencies common to Canada and the United States, and for other Canadian nation-wide frequencies in the 929-932 MHz band.

In December 1989, the Minister of Communications announced nine successful applicants. Nation-wide frequencies shared with the United States were assigned to Rogers Cantel Inc. and MBM International Network (consortium of Motorola Canada Limited, MacLean-Hunter Communications Incorporated and the Beeper People Incorporated). The exclusively Canadian nation-wide frequencies were assigned to:

- MacLean Hunter Communications Inc.
- Telelink Canada Limited
- Rogers Cantel Inc.
- CNCP Telecommunications (now Unitel Communications Inc.)
- The Beeper People Inc.
- Motorola Canada Ltd.
- La corporation Scotpage limitée

Since then, Communications Canada has assigned five other Canadian nation-wide frequencies on a first come first served basis to:

- GlenNet Inc.
- Telesat Canada Communications Inc.
- CellNet Canada
- National Paging Corp.
- Ray Primack

In February 1991, the Department issued another invitation for expressions of interest for the remaining Canada/U.S. shared frequency. A final decision on this matter is to be announced.

## ***Air-to-ground public telephone service***

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Air-to-ground public telephone service permits passengers aboard an aircraft to place telephone calls using an air-to-ground radio network interconnected to the terrestrial public switched telephone network.

In March 1983, Communications Canada initiated a public consultation process with respect to allocating frequency spectrum for an air-to-ground public telephone service. The Department also invited applications for providing such a service on an experimental or trial basis. In 1986, the Department authorized SkyTel Communications Inc. to provide an experimental air-to-ground public telephone service.

The Department released a consultation paper in 1988 concerning proposals for spectrum allocation for air-to-ground public telephone service. In May 1990, the Department announced that it had designated frequency bands 859-851 MHz and 894-896 MHz for this purpose.

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In May 1991, the Department invited applications for the establishment and operation of two competitive air-to-ground public telephone services in Canada. It was stated that these services must be compatible with North American standards so that comprehensive air-to-ground service could be provided throughout most of the North American continent and especially along all major air routes.

### ***Canada/U.S. satellite telecommunications policy***

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In 1972, Canada and the United States exchanged letters agreeing that the satellites of one country could provide service in the other country in two situations:

- when a catastrophic failure of one country's facilities causes a temporary shortage of capacity; or
- when the service being provided in the other country is incidental and peripheral to what is clearly a domestic service.

In a 1982 addition to the 1972 agreement, the two governments framed terms and conditions for using domestic satellites to provide transborder services. This agreement respects the parties' INTELSAT obligations, and provides for fair use of the facilities of both countries. Furthermore, a review of the policy for the transborder operation of VSAT services on Canadian and U.S. satellites is expected to be completed by the first quarter of 1992.

### ***Mobile Satellite (MSAT)***

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*MSAT* is a proposed new communications system that will provide two-way mobile radio and telephone service throughout Canada by means of satellite. The *MSAT* system was conceived by Communications Canada to satisfy national and regional needs for improved and extended public and government mobile communications in isolated and sparsely populated areas. The goal of the Department's *MSAT* Program is to assist Canadian industry in establishing a first generation commercial mobile satellite system in Canada by 1994.

While most of the *MSAT* Concept Feasibility and Project Definition Phases were sponsored by the government, the Implementation Phase of the program has been assumed by industry with the government playing a support role. This Phase will continue during the period leading to satellite launch. The *MSAT* Joint Endeavour Agreement, which sets out the roles and responsibilities and general principles of mutual cooperation between Communications Canada and Telesat Canada, was signed in February 1987. It also outlines the general principles governing the negotiation of the lease of *MSAT* capacity from Telesat Mobile Inc. (TMI), worth up to \$126.5 million, for use by federal government departments.

In the spring of 1987, Communications Canada announced its domestic L-band spectrum allocation policy (SP 1530 MHz) for mobile satellite service as well as its telecommunications and regulatory policy for *MSAT* that would provide for minimum regulation wherever warranted. As well, TMI and the Department have been conducting early trials and TMI has been offering interim service, using channels leased from INMARSAT. In parallel, Communications Canada and the Province of Ontario are cooperating for the provision of air ambulances serving the province's North that would eventually be served by *MSAT*. The federal government has continued to offer R&D support to industry in the development of technology and products during the Implementation Phase.

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## ***Local network convergence***

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Networks and services are converging as a result of current trends in technology and service opportunities. In 1989, Communications Canada initiated an in-depth review of public policies relating to local distribution networks for the purpose of establishing an appropriate regulatory framework. The Department's objective is to foster an efficient delivery of voice, video and data services to Canadian subscribers.

As a first step, a Public Notice was published in the *Canada Gazette* on September 2, 1989 inviting submissions on a range of important structural and regulatory questions. The Department received 57 written responses to this public consultation along with some 28 comments on the submissions.

Subsequently, in 1991, the Department established a private sector Local Networks Convergence Committee with representation from the telecommunications common carriers, the cable television industry, broadcasters, public interest groups and service providers. This committee's mandate is to examine the technological, socio-economic and cultural aspects of the evolution of local distribution infrastructures, and to identify relevant strategic issues. The committee co-chairs will present a report to the Minister recommending both short- and long-term courses of action.

## ***Future directions***

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Advances in technology are transforming the world of communications. Fibre optics vastly increase transmission capacities. The addition of intelligent capabilities to the networks combined with an ability to compress communications and integrate formerly disparate technologies increases communications capabilities by orders of magnitude. The advent of cellular and intelligent networks technologies are attaching communications to persons rather than places and soon it may be possible to reach individuals anywhere in the world using their personal telephone number. These cumulative advances will remove barriers to international communication. Communication will be possible across time, space and fields of specialization. We are moving toward a world of truly global communication.

This document charts significant changes in the policy and regulatory environment during the 1980s and 1990s. Canada's regulatory environment has been simplified. As we move further into the 1990s, policies will certainly continue to be challenged and future policies will continue to rise to the challenge.

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