TELECOMMISSION

Study 3(d)

The International Role of Canadian Telecommunications Companies

The Department of Communications

Study 3(d)

The International Role

of

Canadian Telecommunications Companies

Available by mail from Information Canada, Ottawa,
and at the following Information Canada bookshops:

HALIFAX
1735 Barrington Street

MONTREAL
1182 St. Catherine Street West

OTTAWA
171 Slater Street

TORONTO
221 Yonge Street

WINNIPEG
393 Portage Avenue

VANCOUVER
657 Granville Street

or through your bookseller

Price: 75 cents Catalogue No.: C041-1/3D

Price subject to change without notice

Information Canada
Ottawa, 1971

This Report was prepared for the Department of Communications by a project team made up of representatives from various organizations and does not necessarily represent the views of the Department or of the federal Government, and no commitment for future action should be inferred from the recommendations of the participants.

This Report is to be considered as a background working paper and no effort has been made to edit it for uniformity of terminology with other studies.

PROJECT TEAM

Mr. L. Balcer, President
Electronic Industries Association
of Canada
Ottawa

Mr. J.A. Campbell
Assistant Vice-President
Consulting Services
Bell Canada
Montreal

Dr. D.A. Chisholm, Vice-President
Research & Development Laboratories
Northern Electric Company Limited
Ottawa

Mr. J.E. Delorme
Telesat Canada
Ottawa

Mr. D.V. Doran-Veevers
Executive Assistant to the Vice-President
Canadian Overseas Telecommunication
Corporation
Montreal

Mr. E. Eliasen, Vice-President
Engineering and Operations
Canadian Overseas Telecommunication
Corporation
Montreal

Mr. H. Flynn
Strategic Planning Officer
Department of Communications
Ottawa

Mr. C. Fortier
Electronics Division
Department of Industry, Trade
and Commerce
Ottawa

Mr. D.W. Fulford, Deputy Head
Transport, Communications and
Energy
Department of External Affairs
Ottawa

Mr. D.L. Fytche
Senior Electrical Engineer
Canadian International
Development Agency
Ottawa

* Mr. V.C. MacDonald, Chief
International Telephone and Data
Systems
Department of Communications
Ottawa

Mr. W.R. MacWilliam
Communications Engineer
Canadian International
Development Agency
Ottawa

Mr. T.M. Mimee
Electronic Industries Association
of Canada
Ottawa

Mr. S. Moore
International Liaison Officer
Canadian Broadcasting Corporation
Ottawa

Mr. D. Quarterman
Chief, Electronics Division
Department of Industry, Trade
and Commerce
Ottawa

Mr. L.L. Samuel
Electrical and Electronics Branch
Department of Industry, Trade
and Commerce
Ottawa

Mr. W.H. Scott
Bell Canada
Montreal

Dr. H.J. von Baeyer, President
Acres Intertel Limited
Ottawa

*Liaison Officer

TERMS OF REFERENCE

TO:

1. Describe the categories of Canadian operating, scientific/technical and manufacturing telecommunications companies which are active in respect of foreign countries.

2. Identify their interests and interactions with foreign entities, together with the general effect of different standards and practices.

3. Consider whether any changes, such as in national or international co-ordination, are desired.

4. Generally state in broad outline any other considerations affecting this role of the companies.

5. Indicate trends if significant changes are foreseen.

TABLE OF CONTENTS

ANALYSIS OF THE INTERNATIONAL ROLE OF CANADIAN TELECOMMUNICATIONS COMPANIES

SECTION I Canadian Telecommunication Enterprise Involved in a Direct International Role

Introduction

The conclusions and recommendations in this report are presented as prepared by the company representatives who were for the most part senior executive engineers. As well, representatives of the Department of Industry Trade and Commerce (IT&C) and the Canadian International Development Agency (CIDA) played an important part in discussions where their international work was involved.

Contributions together with papers prepared at the request of other groups are listed in Appendix I. The material received from the Canadian Broadcasting Corporation is gratefully acknowledged, but at the request of the CBC representative, is not reflected in the text of the report. This is because the Telecommission deals mainly with public telecommunications services other than broadcasting and because there was difficulty in assimilating some of the more general aspects of electronics and radio, particularly with regard to consultation abroad. In the same way, telecommunications for air traffic control and hydro-electric power projects are not generally considered here.

Perhaps one of the important factors of this study is that it presents the views of the companies concerned, with little attempt made to reach a consensus. When all of the International reports of the Telecommission Study Groups are seen together, the conclusions given here can therefore be taken as those industry wished brought forward on its international role. This in turn will, it is hoped, contribute to the general conclusions.

1.1 Operating Companies

It is generally accepted that the Canadian public finds that telecommunications services to other countries are adequately met by the operating companies but there does not at present appear to be very much public interest in the roles which they play.

...2

This may not always be the case though. There may be strains in the present operations which could develop into cracks. Do the operating companies find the International regulatory picture simpler than our domestic situation with its Federal, provincial and municipal boards and commissions with legal powers? What role does the operating industry play in the drafting, promulgation and enforcement of international regulations and standards? Are the monopolies of operation which feature domestic telecommunications as clearly established in the International section of the business? How do private companies deal with foreign government Post and Telegraph and Telephone departments? If a foreign government advises the Canadian government that an immigrant to Canada owes a telephone bill, does the Canadian telephone company have a role to play? These are a few questions which might be asked concerning the role of Canadian companies operating international telecommunications services.

Like the developing nations and natural resource-oriented middle powers, Canada may be said to have an international telecommunications service compatible with its stature as a nation, but it is still reliant on other countries for the design and production of much of the special equipment used, e.g. submarine cable and repeaters, telex equipment, and more recently the message switching computers.

Probably because of the special commercial arrangements, operating techniques, equipment design and financing conditions which are characteristic of most international enterprise, details of the business arrangements, corporate responsibilities and planning which support our international telecommunications are not as widely understood as they might be. The experts are comparatively few in number, and like the old-time telegraphers have tended to keep their art somewhat to themselves.

International Telecommunications are however increasing in economic and social importance even more quickly than domestic telecommunications. To the sociologist this may seem a simple extension of the brotherhood of man from the tribe to the super-tribe. To the economist, it is a most interesting study in the allocation of resources. International Telecommunications-Testing a Forecasting Model of Demand by W. Naleszkiewicz, Professor of Economics, Cleveland State University, and Evaluation of Forecasting Techniques for U.S. International Telecommunications Traffic by Norman Learner, Ph.D. thesis, American University, 1968, are examples of recent interest in this subject.

...3

Like the earlier work of A. Jipp, published in German in the late fifties, all the results tend to indicate a close association between the level of demand for international telecommunications services and major economic variables such as GNP, national income, the level of foreign liabilities, and demand deposits. They also tend to indicate that the relative importance of political, social, and other non-economic variables is inversely related to the degree of a country's economic development. Other factors requiring further research include the influence of the number of telephone instruments per capita, the quality and cost of international circuits, and the impact of government policies and international regulations.

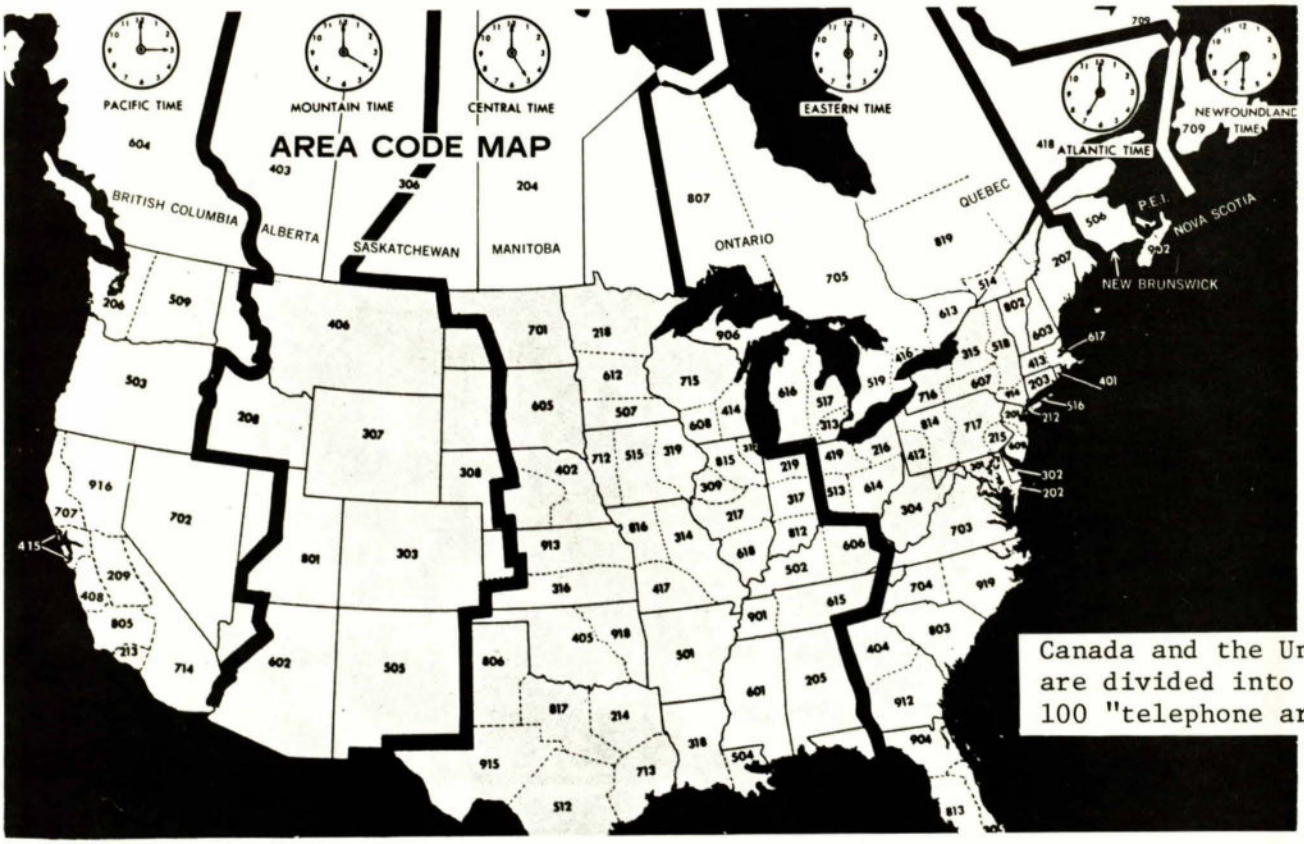
When forecasting the demand for international circuits, the rate of increase of telephone traffic is extremely important. The influence of human factors such as language and time zone separation is obvious, but difficult to quantify. For the computer communications of the future machine factors as well as human factors will determine traffic patterns. A Canadian subsidiary of an European firm could do data processing on the Headquarters machine after office hours in Europe. Japanese computer time could become very attractive on the West Coast of North America, and Canada could sell computer time to Australia if high quality, high speed circuit economics develop favourably. This situation will be sensitive to data transmission costs but different from the way in which overseas telephone rates affect telephoning patterns, since computers can operate 24 hours a day at a profit.

Human factors have a significance in Telex as well, since printed material in a foreign language presents less barrier to comprehension than the spoken word, and a telex message received after office hours simply remains on the machine until it can be handled. For example, a question sent from Montreal to Zurich at 5 p.m. can be examined as soon as European offices open and replied to in time for the opening of business in Canada.

The geographical, historical and economic ties of Canada have led to an International service which like many other aspects of Canadian telecommunications is unique. Our International services may be classified in several different ways. For example, Canadian owned or foreign owned; companies with public shareholder financing and Crown Corporations set up with Government financing. A third classification is by principal income, i.e. the role in which they appear to their customers - public telegraph, public telephone, or leasing of circuits. A fourth classification is whether or not they play a role in the special inter-governmental arrangements which have always existed between Commonwealth Countries.

...4

CHART 1A

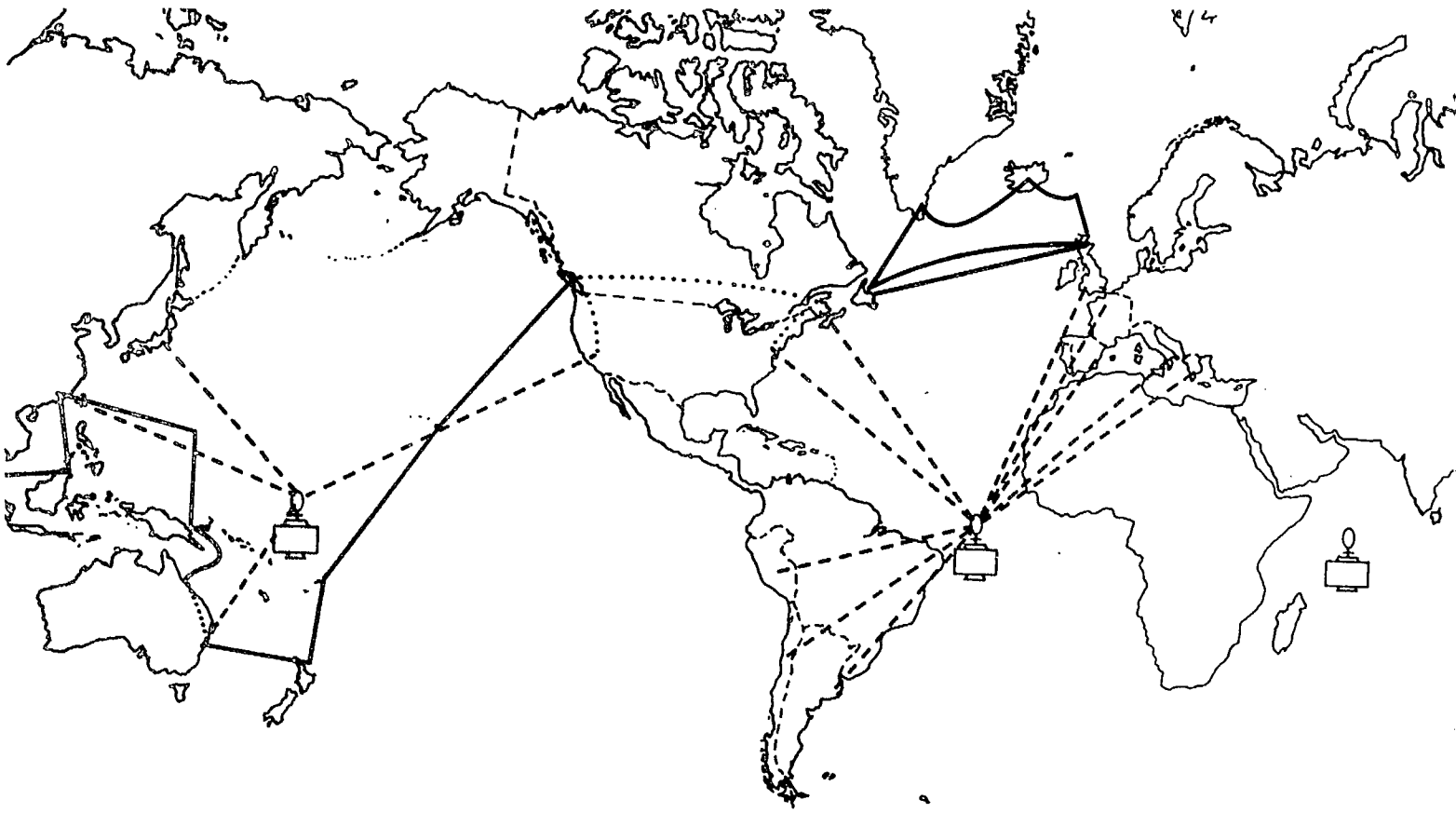


DIRECT DISTANCE DIALING enables you to dial your own Station to Station long distance calls to millions of telephones in Canada and the United States.

TELECOMMISSION 3d Figure (1 a).

...5

CHART 1B



CABLE ROUTES =————————

SATELLITE =– – – – – – –

CANADIAN OVERSEAS TELECOMMUNICATION

Comprising a total of 495 circuits for telephone, telex and telegraph services between Canada and 33 countries.

TELECOMMISSION 3d Figure (1 b).

...6

A fifth classification would be to separate "overseas service" from "continental service". This has a basis in history, since our overseas facilities are successors to the trans-Atlantic telegraph cables of 100 years ago.

The apparent simplicity of this division may be seen by comparing the long distance telephone call areas in Canada and the USA in Chart 1A with the overseas routes of the Canadian Overseas Telecommunications Corporation in Chart 1B. Company roles are however more complex, as summarized* below:

INTERNATIONAL (Overseas)

Telecommunications services between Canada and all other countries except continental U.S. and Mexico.

Carriers: Canadian Overseas Telecommunications Corporation (COTC)
Western Union International Inc. (WUI)
Commercial Cable Co. (CCC)

Operators: The COTC provides operators for overseas telegraph and telex services but not for overseas telephone service, WUI provides Montreal operators for its overseas telegrams. CN and CP operators accept all telegrams.

All overseas telephone calls are handled by Bell Canada and the British Columbia Telephone Company at Montreal or Vancouver, respectively, through TCTS.**

Billing: Follows the operator patterns, but the telephone bill is presented by the local company.

INTERNATIONAL (Continental)

All services between Canada and continental U.S.* and Mexico. St. Pierre et Miquelon Telegraph Service.

Carriers: Telephone Association of Canada members
COTC in case of St. Pierre et Miquelon
Canadian National Telecommunications
Canadian Pacific Telecommunications

Dial: Direct dial telephone service is generally available to US points the same as it is to Canadian points. Telex is a direct dial service through Western Union to Mexico as well as USA.

*This summary is intended to indicate Company roles. For details of connection on any particular route, refer to Telecommission Study 3(e).

**Trans Canada Telephone System (TCTS) is described later in this Report.

Operators: Such calls from Canada to the USA involve only the originating long distance telephone operators.

This also applies to operator handled calls to Mexico, Hawaii and a number of points in the Caribbean. CP and CN telegraph operators accept telegrams for "continental" and "overseas".

Billing: Follows the operator pattern.

The present organization of the Canadian International Communications industry is the product of long technological evolution and numerous corporate and government decisions largely governed by type of traffic and mode of transmission.

The total international revenue is estimated to be nearly one hundred and fifty million dollars for the year 1970. The overseas sector was about 26 per cent of the total in 1968. It is estimated as 30 per cent for 1971. Table 1 gives some revenue estimates for 1968 and 1969.

TABLE 1	CANADIAN INTERNATIONAL REVENUE BY ROLE					
	"OVERSEAS"			"CONTINENTAL"		
	Annual Revenue $1 Millions		Rate of Increase	Annual Revenue $1 Millions		Rate of Increase
	1968	1969 (est)		1968	1969 (est)	
Telephone	9.20	11.50	25%	61.70	67.25	9%
Telegrams	6.30	6.60	5%	2.60	2.42	-7%
Telex/twx	5.10	6.90	35%	2.90	3.50	20%
Data	.02	.03	30%	.02	.03	30%
TV & Radio	.14	.15	5%	.16	.17	5%
Leased Circuits	9.20	10.10	10%	20.00	4.40	7%
TOTALS	29.96	35.28	17%	86.38	94.77	9½%

The most rapid growth rate shown is for Overseas Telex which is still an operater service. The introduction of direct dialling to Europe might mean an even higher growth rate. The decrease in telegrams to USA reflects the decline of domestic telegrams observed in most countries where long distance telephone and Telex is readily available.

In looking at telephone statistics it is interesting to note that calls to the USA are almost twice those placed from one province to another in Canada. Overseas calls run about one tenth of the USA calls. The telephone revenue figures do not of course indicate the proportion of calls, since the average overseas call costs more than the average call to the USA. The number of International calls total less than eight per cent of Canadian long distance traffic.

The corporate pattern and international contacts of the companies are described in the following:

Canadian Overseas Telecommunications Corporation (COTC)

A Crown Corporation established by Act of Parliament in 1949, "to carry on the business of public communications by cable, radiotelegraph, radiotelephone, or any other means of telecommunication between Canada and any other place".

COTC was formed at the time the international telecommunications of the United Kingdom were being nationalized by the post-war Labor government. It was necessary to create a successor to the service historically provided by Marconi and Cable and Wireless to the British Empire in earlier days. By intergovernmental agreement, a chain of Crown corporations was formed to modernize Commonwealth cable and radio facilities and to operate the Commonwealth Telecommunications System. The first notable change was in 1956 when telephone circuits to Europe began. Satellites brought the next big change, ten years later.

Prior to 1963 the COTC participated in the Consultative committees CCITT and CCIR of the International Telecommunications Union (ITU) (see Appendix II) as part of the Government of Canada. Since them COTC membership in the CCITT and the CCIR has been as a Recognized Operating Agency. COTC has not participated in ISO or IEC. Although it holds Associate Membership in the Trans Canada Telephone System, concerned with the sharing of revenue on overseas calls, COTC is not a member of the Telephone Association of Canada, and consequently does not participate in the TAC technical committees.

...9

Canadian membership in Intelsat is held through COTC as the operating agency. In the recent re-organization of Commonwealth Telecommunications, the President and General Manager of COTC became the Canadian member of the Commonwealth Telecommunications Council. The COTC Vice-President, Engineering and Operations, represents Canada on the Commonwealth Cable Management Committee which maintains operations and engineering management of the whole Commonwealth system, now including many communication satellite circuits. On occasions COTC has been an invited observer at the Committee of European Posts and Telegraphs (CEPT) for particular items of trans-Atlantic operations.

COTC contacts with international telecommunications organizations are a continuation and expansion of those established by the predecessor companies, Pacific Cable Board and Canadian Marconi Company and include, in addition to those countries with whom COTC has direct circuits, the following, in which there is active participation:

- The Commonwealth Telecommunications Council and its various bodies.
- INTELSAT and its Committees.
- CCITT Plenary, Study Groups and Working Parties.
- CCIR
- Some of the Sub-Committees of the CEPT (Conference of European Post and Telecommunications Administrations), when dealing with North Atlantic matters.

The issues discussed and pursued by COTC in these forums are:

a) The provision of efficient and economic international telecommunication service for Canada;

b) The standardization of services, facilities offered, and transmission parameters;

c) The compatibility of equipment and functions;

d) The day-to-day and long term administration and operation of international services.

Participation is at all Administration and most operating levels.

...10

The Western Union International Inc. (WUI) is a public corporation split off from Western Union as a result of a US government decree of the late 1950's which called upon WU to sell off its external communications. No satisfactory buyer being found, WUI was finally announced in 1963, as an independent company. Its origin can be traced to Samuel B. Morse and the first transatlantic telegraph cable, as well as to the San Francisco to Moscow overland telegraph route which gave the Telegraph Creek to B.C., its name. WUI maintains an office in the UK. Its headquarters are in New York. A small operating staff at Montreal accepts cablegrams, and CN/CP operations at any Canadian point can accept WUI business.

The Commercial Cable Company (CCC) is a public corporation with headquarters in New York, which leases lines to its Montreal terminal. It is a subsidiary of International Telegraph and Telephone through ITT World Communications Inc. New York. It has no operating staff in Canada: CN/CP performs this function. Its origin goes back to trans-atlantic telegraph cable including the reorganization of the pre World War 1 German cable assets in New York. The introduction of submarine telephone circuits to Europe took place in 1956, and since then WUI and CCC telegraph circuits have been established on these because of the lower cost and higher speed operation than was possible on the old telegraph cables. By an FCC decision of 1964, the US international telegraph companies became entitled to a share of the ownership of the fourth (TAT-4) and later US sponsored cables.

The Canadian Pacific Telecommunications (CPT) is a department within the operating structure of the Canadian Pacific Railway, which is a public corporation with Canadian stockholders in the majority. One hundred years ago as one of the inducements to complete the first trans-Canada railway line it was given a monopoly of the telegraph services along its route. As there were not many trains and few settlers it was economical to use the same telegraph lines for both. These rights were successfully defended by CPR in 1919 when Marconi sought to provide trans-Canada Radio Telegraph Service to Vancouver, and again in the early 1930's when the Teletypwriter Exchange System (TWX) was being established in the United States.

In 1956 when Telex (dial teleprinter services) Europe to Canada became possible on introduction of submarine telephone cable, CPT together with CNT formed a consortium to construct a Telex network in Canada. Overseas connections were available through COTC. Western Union did not introduce Telex until the following year, but provided Canadian connections as soon as a Telex exchange was constructed in the USA.

CN/CP now have over 16,000 telex subscribers who generate seven million dollars worth of business to Europe and four million dollars worth to USA annually. There are 102 Telex exchanges in Canada. All the subscribers can dial USA and Mexico directly. Overseas Telex is still reached through a COTC operator, but direct overseas dialling is planned.

...11

CPT has never offered telephone service although its corporate charter would permit it to do so. CPT experts participate in CCITT and CCIR through the Railway Association of Canada, (RAC) which holds Recognized Operating Agency membership status in these two ITU consultative committees. RAC is the only railway organization with ITU committee membership. The microwave and space radio groups in CCIR and the telegraph and data groups in CCITT are their chief interest.

The Canadian National Telecommunications (CNT) is a department within the operating structure of the Canadian National Railways, which is a Crown Corporation reporting to Parliament through the Minister of Transport. CNR was formed 50 years ago when the financial difficulties of private railway companies would have left Canada with only one trans-continental line. Like CPR these private companies had telegraph concessions. Both the old Dominion Telegraph Company (a private company on whose lines Alexander Graham Bell held the historic field trial of his telephone) and the Government Telegraph Service can be traced to CNT. In the 1870's the federal Government set up the GTS line to the north of the Winnipeg-Regina-Calgary CPR line in support of the North West Mounted Police and settlement on the prairies.

Unlike CPT, CNT provides some public telephones now serving 22,400 subscribers, in Newfoundland and north-west Canada. These telephones have access to the rest of Canada through the TCTS and to overseas through COTC.

The CN/CP microwave network and participation in Telesat lead to interest in CCIR study groups. Concentration in CCITT has been on telegraph and data matters. Participation is through the Railway Association of Canada.

CN/CP telegraph service, where overseas telegrams are concerned, is compatible with the ITU Telegraph Regulations, to which Canada is a signatory. When these regulations are under revision, CN/CP consult directly with Government. They attend administrative Telegraph and Telephone Conferences (a regulations body of the ITU) as expert advisers and part of the government delegations.

The Trans-Canada Telephone System (TCTS): Member companies of TCTS interconnect directly and provide long distance dialling with companies in the USA. As indicated on Table 1 on page 8, the annual value of our continental telephone traffic is now about $70 million with an annual rate growth of nearly 10 per cent. In this continental service the TCTS plays a vital role.

...12

Another vital international role of TCTS is to provide operator service on overseas calls where dial service is not yet available. There are two national "operator gateway" offices at Vancouver and Montreal respectively. Through facilities of the Canadian Overseas Telecommunications Corporation (COTC), BCTel Vancouver is interconnected with New Zealand, Australia, Japan and most Pacific countries. Through facilities in the United States it interconnects with a few countries as shown in Chart 1(b). Similarly, Bell Canada Montreal interconnects with Europe and countries beyond through COTC. It also interconnects with a few others through ATT New York. The annual value of Overseas telephone calls is now about $10 million with a growth rate of 25 per cent.

Canadian public access to International telephone service has been expanded and modernized constantly through the co-operative efforts of those telephone companies which are the largest in each province respectively. There are eight full members of the Trans Canada Telephone System:

The Avalon Telephone Company Limited
Maritime Telegraph and Telephone Co. Ltd.
The New Brunswick Telephone Company Limited
The Bell Telephone Company of Canada
Manitoba Telephone System
Saskatchewan Government Telephones
Alberta Government Telephones
British Columbia Telephone Company
(The Canadian Overseas Telecommunication Corporation is an associate member.)

The member companies provide, own, and maintain the necessary plant in their respective territories, working to common plans, with uniform standards of engineering and operation, and with long distance revenues shared. The inter-company service information agreements hereafter indicated, and inter-company planning and operating committees, play major roles in ensuring compatibility and efficiency throughout the network in Canada and in connections to the USA.

All-Canadian coast-to-coast long distance telephone service has been provided to all Canadian telephone companies since 1931. The TCTS is not an incorporated body, and does not own any plant. The services in the system include Telephone T.W.X. and other data communications as well as leased circuits for telegraph, facsimile, radio and television programme transmission. All of these are involved in the international exchange of telecommunications.

...13

The largest member company, Bell Canada, plays a special role in international aspects of the Canadian telephone industry. Bell Canada obtains from the American Telegraph and Telephone Company a flow of general operating information for an annual fee. It also has access to discoveries made by the Research and Development Laboratories of the Northern Electric Co. Ltd., a Bell Canada subsidiary. In turn, Bell Canada provides information services to a dozen other companies in Canada.

Although some of the TCTS members are provincial companies, Bell Canada has a federal charter. It operates in Ontario and Quebec, the Northwest Territories and Labrador. It serves six million of Canada's eight and a half-million telephones. Subsidiaries operating in the four Atlantic provinces, Quebec and Ontario serve an additional six hundred thousand telephones. Only 2 per cent of its stock is held by the American Telephone & Telegraph System. Bell Canada shares are on the market; 98 per cent of the shareholders are Canadian and they own 95 per cent of the common stock. It took a high degree of cooperation to create a coast-to-coast telephone network in Canada. The problems involved in linking this network with the United States were surmounted by cooperative planning. Now that overseas telephone service is growing so rapidly, experience gained in continental network development is being exercised in the provision of global network service to Canadian subscribers through international cable and satellite facilities such as those operated by COTC and Intelsat.

The Telephone Association of Canada (TAC): Through arrangements made with the Department of Communications, which represents Canada in the International Telecommunications Union (ITU), and under the conditions of participation of the ITU Convention, Chapter II, TAC holds membership as a Recognized Private Operating Agency, in the two consultative committees of the ITU. These, the *Comité Consultatif International de Télégraphie et Téléphonie* (CCITT) and *Comité Consultatif International de Radio* (CCIR) are described in Appendix II.

TAC was formed in 1921 to promote the interchange of technical and operating information between a somewhat wider range of Canadian telephone operating companies than those forming the TCTS. TAC's activities centre around multi-lateral committees; the Association is not directly engaged with operating enterprise.

Within the TAC-TCTS environment, technical operating and accounting studies on overseas telecommunications are conducted by a small group within Bell Canada, serving as a committee focus and working centre. This group co-ordinates the related work of the member companies, who help support it financially, and augment it with manpower from time to time. The work of these international committees requires continuity of specialized expertise from the national representatives. Co-ordination at the national level, as with COTC on Canadian interface matters, also requires continuity. The TAC, with COTC and the other Canadian membership of the CCITT, were hosts for world study meetings at Montreal in 1963 and 1970.

...14

Manufacturing Companies Exporting Telecommunications Equipment:

In 1969 the value of telecommunications equipment exported from Canada was $92 million, compared with $72 million in 1967. Over half the product is sold in the USA.

Since 1961, the Export Development Corporation has financed $91.7 million for telecommunications. This sum has been exceeded only by loans for Nuclear Power and Railways. The loans were for Dominican Republic, Greece, Israel, Jamaica, Philippines, and Turkey. For microwave equipments there were loans totalling $10.8 million for Columbia, Liberia, Mexico and the United Arab Republic. Forty-eight million was loaned to Brazil for satellite earth station equipment. The total was $103 million to 31 May, 1970. Other financing has been arranged through the Canadian Industrial Development Agency.

The categories of equipment considered here are:

Telephone equipment ($20 millions, 1967; $53 millions, 1969)

(As well as telephone sets and switching this includes carrier and multiplex for telephony and telegraphy.)

Some of the projects are:

Turkey

CIDA is contributing $4,000,000 in grant aid to a $25,000,000 telecommunications project in Turkey won under international competition by the Northern Electric Company of Canada. The project consists of supplying telephone equipment to the Turkish Posts Telegraphs and Telephone Administration.

Nigeria

In 1967, a $1,600,000 loan was allocated to Nigeria's telecommunications programme to provide, through the Northern Electric Company of Canada, a 7,000 line telephone exchange in Lagos. In 1968, the project was increased by $8,000,000 to provide telephone exchanges in eight additional locations and extend the Lagos exchange. A third phase is under study.

Asia

At the present time the major Canadian telecommunications project in Asia consists of a development loan for $40,000,000 in support of a $600,000,000 telecommunications development programme in India. Under this programme, major Indian cities are to be joined by high capacity coaxial cable and microwave systems increasing the capacity of existing urban and rural telephone networks, and generally improving efficiency and service. Canada will supply approximately $23,000,000 worth of cable and

$15,000,000 worth of microwave equipment, as well as some technical assistance support.

Radio Equipment ($13 millions, 1967; $10 millions, 1969)

(This includes microwave links, space borne and ground station satellite communications equipment and other radio communications, but excluding broadcast apparatus.)

Asia

Canada is undertaking three earth satellite stations, two in Pakistan and one in India, (RCA Company Montreal). The Pakistan stations will be used to transmit television, radio and telephone between the eastern and western parts of the country, through INTELSAT. The Pakistan loan is $10,500,000 and includes, in addition, to the satellite stations, major improvements to other communication facilities, and training. A similar project in India at $4,000,000 will help provide an earth satellite station at Poona, east of Bombay. The station will cost $7,000,000 and will tie India to Europe by satellite. In India in 1963, Canada supplied and installed four dual diversity receivers and four transmitters in a $250,000 project for the Indian Meteorological Service. This project was necessary to fill an Indian commitment to maintain the Moscow-Delhi-Tokyo link in the Northern Hemisphere Meteorological Communication System. Canada has just recently finished $56,000 worth of test equipment for the Training Department. Malaysia has also been given fifty two-way semi-portable radio sets for $150,000 to be used for the Aborigine Medical Service.

Commonwealth Africa

Other telecommunications projects are underway in Commonwealth Africa. Technical Meterial Corporation is supplying electronic equipment for five communications stations for the Kenyan national police force under a grant aid project of $200,000.

In 1966, Canada agreed to a project to provide approximately $115,000 worth of equipment and engineering services necessary for ground-to-air communications facilities for the Blantyre Flight Information Centre in Malawi. Two projects were done for the former East African Common Services Organization. In 1965, a $38,000 radio transmitter was given to the East African Meteorological Department in Nairobi. Ninety-two thousand dollars worth of aviation electronics equipment, consisting mainly of 9 T.M.C. transmitters for the use of the Civil Aviation Authorities, have also been given to East Africa.

Francophone Africa

There have been no telecommunications projects undertaken by CIDA in Francophone Africa, although possibilities are being pursued for satellite communication earth stations.

...16

Commonwealth Caribbean

There are no large telecommunications projects in the Commonwealth Caribbean comparable to the projects in India and Nigeria. At the 1966 Commonwealth Caribbean-Canada Conference, Canada suggested a regional broadcasting system. A feasibility study was prepared by the CBC and forwarded in February 1968. Reaction to the study has not yet been received but indications are that the smaller islands find the estimated operating cost to be high.

Two smaller projects have consisted of providing aviation electronics equipment. In 1963, Canada supplied an instrument landing system at Piarco Airfield, Trinidad. The total cost was about $134,000. Canada has recently allotted $165,000 to Guyana for the Guyana Airways Corporation.

The largest Caribbean telecommunications project in this area provided a radio telephone system for Jamaica. The $770,000 loan purchased VHF and HF equipment for 65 fixed base and 66 mobile receiving and transmitting stations to link government departments. A 1968 extension brought in the Jamaican Railway.

Latin America

Through the Inter-American Development Bank, CIDA is now participating in a north-south backbone route in Chile. The loan of $4,230,000 will extend the microwave system and provide radio telephone networks for access from isolated areas. Chile first prepared a National Telecommunications plan, using ITU technical assistance. The planning dates from the Latin American Regional Plan Meeting of the ITU at Santiago de Chile in 1965. Previous to this the Chile Telephone Company (ITT) had provided all the services.

There have been quite a number of changes in South America but the nationalization of communications services in Argentine in early September of 1970 came as a surprise to many. The holdings of a number of foreign companies, including American Cable and Radio Corporation, RCA Global Communications, The Western Telegraph Co. of Great Britain, which runs an open wire line over the Andes de Chile, and Italy's Italcable, were affected by this action. At the same time, the Argentine government announced a 15 per cent increase in rates for telephone, teleprinter and telegraph services.

The Argentine government stated that the termination of the concessions to the foreign companies was necessary to maximize its own revenues from Argentina's earth station, which went into operation in September 1969. Prior to this, Canadian calls to Argentine went by way of A.T.T. Among the companies involved, ITT Communications Mundiales, S.A., a subsidiary of AC&R, has been providing international services in Argentina under a concession granted in 1928. Since 1963, this International Telephone & Telegraph Corporation affiliate has invested $6,000,000 in new and improved facilities.

...17

As a result of the termination of the private carriers' concession, ITT has said that its Argentine subsidiary will suffer damages of $3,800,000, in undepreciated equipment. ITT noted that its long service in the country, combined with the obligation under the concession to invest large sums in new equipment, "created a reasonable expectation" that it would not be put out of business "precipitously" before depreciating its new investment. RCA Globcom's interest in Argentina involved a 25 per cent ownership of Trans Radio Argentina, another company which is being nationalized.

There will be little difference in the international operations which have existed since the advent of satellite communications services. The correspondent for all carriers for telegraph traffic will be *Correos y Telecommunicasiones*, while for all other traffic the correspondent will be *Empresa Nacional de Telecommunicationes* (ENTEL).

Wire and Cable ($9 million 1967; $10 million 1969)

(This includes all the varieties used in telephone service, from the home telephone to the exchange, within and between switching centres. Between cities, coaxial cable is used in competition with microwave relay according to the technical and economic circumstances. Although the great distances in Canada have tipped the balance in favor of microwave and domestic satellite, some coaxial cable is produced.)

Asia

Canada is now supplying telephone cable to both India and Pakistan. The National Standard Company of Guelph is manufacturing $900,000 worth of cable over a three year period for Pakistan. The General Electric Company of Canada is completing $353,000 worth of telephone cable of various sizes for India.

Commonwealth Africa

The major CIDA involvement in telecommunications in Commonwealth Africa has been Nigeria. In 1965 an initial development loan for $3,500,000 was made to purchase telephone cable from Phillips Cable Limited of Brockville. This was done in co-operation with two British firms which supplied $10,500,000 worth of telephone equipment. In Lesotho, $33,000 worth of Canadian telephone cable is to be installed and a PABX system for 200 telephone lines is to be added by Canada.

Continental versus Overseas Marketing

But in spite of Canada's effort to sell equipment overseas, the USA is still the best customer, buying more than all the rest of the countries put together. The structure of manufacturing plant ownership in Canada facilitates some of this. The largest single exporter to the USA is the Canadian owned Northern Electric Company, which has a close understanding of the requirements of the US telephone market. Design, sales promotion, and sales financing to US customers are, of course, very close to Canadian market practices.

...18

Summary

The composition, structure, and product lines of the telecommunications manufacturing industry are described in Telecommission Study 2(g). More than half of the industry's total output of manufactured products is supplied by Northern Electric, a subsidiary of Bell Canada. Recently a new company, Microsystems International, has been formed by this group.

Other major companies manufacturing in Canada described in Study 2(g) include Lenkurt and Automatic Electric as subsidiaries of General Telephone and Electronics of the United States and The B.C. Telephone and Quebec Telephone are also part of this group. The important subsidiaries of United States companies include RCA Ltd., Montreal, (Radio Corporation of America), Collins Radio, Raytheon, Canadian General Electric, Canadian Westinghouse, Canadian Admiral, TMC (Canada) Ltd. Radio Engineering Products began as a Canadian company and is now US controlled. Canadian controlled manufacturing companies include Canadian Aviation Electronics, Electrohome, Clairtone, Leigh Instruments, and Hermes Electronics.

Both the Canadian controlled companies and the subsidiaries have contributed substantially to our economy. Initially most companies, whether Canadian or foreign controlled are set up to service the domestic market. Due to the relative smallness of the Canadian market, and the comparatively high cost of innovation, most companies are forced to export a high proportion of their total output - often as much as 80 per cent. Even companies able to obtain licensed designs, either from parent companies or elsewhere, find that the limited size of the Canadian market makes it very difficult to manufacture competitively with foreign producers commanding larger (3-10 times larger) domestic markets.

To solve these problems the Canadian Government has been encouraging companies to be outward, rather than inward looking, and in the case of subsidiaries, to rationalize their production activities with their parent company. This philosophy has been accepted generally by most Canadian electronics companies, and many now make product lines, from a Canadian base, for the world market. This method of operation is not without its peculiar difficulties, however, even though there are attendant benefits.

The Northern Electric Company participates in CCITT as a member. A great many companies participate in the CCIR through the Electronic Industries Association of Canada. Through the Canadian Standards Association, several participate in ISO and IEC (Appendix II).

...19

1.3 International Consultants (Active in Respect of Foreign Countries)

The annual export value of all consulting engineering services exported during 1969 is estimated at some $40 million, a marked increase over the $10 million average from 1964 to 1967. No break-out of the telecommunications sector is available. Considering the relative importance of civil engineering power, communications, airports, forestry, transport, gas and oil, it is not likely that communications consulting, however defined in detail, could be much more than ten per cent. That could make $5 million an upper estimating figure. This is a little less than five per cent of the value of the international operating revenue per year, and a little more than five per cent of the value of the exported telecommunications products.

Export credits insurance is available for both short and medium term transactions, from the Exports Credits Insurance Corporation. Without this the problem of financing overseas consulting jobs would present serious difficulties particularly to the smaller consultive firms founded under the ownership limitations, allowed by professional engineering practice. Consulting engineers have no supplier affiliations or manufacturing interests.

The interest and support of the Canadian External Aid program stems in part from the value of disinterested professional advice when aid countries are selecting route and equipment alternatives. The largest project, in which no equipment was supplied, of $490,000 was for consultation on architecture and engineering of television facilities at Kuala Lumpur for the Government of Malaysia.

Some Canadian consulting firms seek foreign work through the United Nations Development Program. The UNDP as well as other UN agencies at New York maintain lists of interested firms. The custom is that a short list of five or six firms is sent to the government involved when a project is being planned. The Canadian Mission to the UN at New York and at the UNESCO in Paris will assist. Successful consultants have been those who are highly competent in a particular field and selective in their approach to the UN agencies concerned. They get to know something of the Agency role and its procedures and even their changing mood pattern as international needs and funding change. Market analysis for international services and products, is another consulting service. This has been found useful by both government and manufacturers.

A variety of overseas engineering consultations have been performed. A typical listing published by one firm includes:

Empresa de Radio Telegrafos Y Telefonos del Ecuador
(now Empresa Nacional de Telecommunicaciones)

Route and propagation survey system design and specifications for main national microwave system.

Government of Malawi

Upgrading Flight Information Centre facilities, Chileka International Airport (a Canadian External Aid project).

Abu Dhabi International Airport

Planning, system design and specifications of telecommunications and radio aids to navigation (with CANSULT Limited, principal consultant).

Western Nigerian Government Broadcasting Corporation, Nigeria

Study and system design for extension of television coverage over Western Nigeria Region (a Canadian External Aid project).

Government of Ecuador

Two microwave route designs - One of 250 miles in the one coastal area and one of 200 miles crossing a volcanic range of the Andes mountains with 960 channels for government use.

Supreme Headquarters Allied Powers Europe

(SHAPE Technical Centre)
Study and design of internal message movement system in new SHAPE Headquarters, Casteau, Belgium.

Siemens and Halske, West Germany

Consultation on proposed provision of an Earth Satellite Station in Canada.

An attempt to list the Canadian international consultants providing services abroad could only be made on the basis of an agreed definition. The description chosen was: "Canadian international telecommunications consultants identified in this listing are engaged for remuneration and from a Canadian base, in international consulting relating specifically to telecommunications".

Although the list given here is not necessarily complete, it was prepared by the consultant members of the study group with some particular restrictions which tended to limit the number included. They decided to omit any names where:

...21

(i) Practice was primarily related to non-telecommunications projects such as civil engineering, or electrical power.

(ii) Consulting services by manufacturers, distributors, or promoters in conjunction with equipment sales were involved.

(iii) Consulting services by government and benevolent organizations were performed free or at cost.

(iv) Consulting services were "farmed out" to non-Canadian foreign controlled associates.

It was necessary then to take into account the consulting services of the Bell Telephone Company, now being sought by various smaller countries seeking to place their telephone service on a more efficient basis. The reputation of the company is well-known abroad, partly through technical presentations at ITU seminars and study sessions. There are many such demands, and Bell Canada, has established a small consulting group to deal with them.

Finally, the study group decided to list consultants who could not qualify for membership in the Association of Consulting Engineers of Canada, provided that the services were at the level of professional engineering or organizational consulting in telecommunications abroad, but to differentiate between the two categories. The list is:

*Acres Intertel Ltd., Ottawa
Bell Canada Consulting Services, Montreal
Cancom Corporation Ltd., Montreal
*Demers, Gordon, Baby Limited, Montreal
*Gamma Engineering Ltd., Edmonton
*Hoyles, Niblock International Ltd., Vancouver
Pappas, N.J. & Associates, Montreal
Pan-Com Canada Ltd., Montreal
*Surveyer, Nenniger & Chênevert Inc., Montreal

Because of solicitation of work from UN agencies, and because they do not consider it professional to advertise their services, Consulting Engineers have to be very much aware of the importance of listings. The above list may be qualified by stating that firms that have been omitted may be added by application to the study group which prepared the list.

*Member of Association Consulting Engineers, Canada (ACEC)

...22

SECTION 2 Vital Issues Affecting their Interests and Interactions with Foreign Entities.

2.1 International Operating Services

Seen from the point of view of operating company executives, the following major roles could be discussed:

(a) Corporate Management

- planning, organizing, staffing, controlling corporate operations

(b) Establishing and Equipping Routes

- technical, economic and politically feasible alternatives, negotiating with other operating companies both foreign and domestic

(c) Operations Including Engineering and Maintenance Standards

- plant, automatic traffic and manual operations

(d) Billing Customers and Settling Accounts

- rates, procedures, credits and accounts, by-lateral and international agreements

(e) Regulatory Matters

- domestic, continental and international

(f) Planning for Route Expansion

- re-equipment and new services

(g) Acquisition of Capital for Business Expansion

For short-term planning five years projection of current trends may be sufficient. This is the period chosen by the CCITT/CCIR World Plan, which last met at Mexico City in 1967. Telegraph and Telephone circuit routes are re-drawn for the next 5 years, routing and numbering plans are reviewed on the basis of Regional Plans. The emphasis now is on a greater accuracy of forecast. There is a suggestion that the data might be refined and the World Circuit Plan put into the ITU Computer for better calculation procedures. At present Intelsat makes its own predictions, and each operating company has to decide on its own specific route and circuit plans.

Taking the planning function by itself five activities could be noted as follows:

(1) System Planning encompasses formulation of the broad policies and service goals on which all other planning is predicated;

(2) Marketing Development Planning includes market analysis of present and future consumer service needs;

(3) Technological Planning applies to all aspects of the network;

(4) Financial Planning ensures availability of adequate financial resources to meet construction program requirements;

(5) Manpower Planning is essential, of course, to ensure the availability of personnel skilled in communication technology.

The Telephone Association of Canada and the Canadian Overseas Telecommunications Corporation are vitally interested in the creation of a fully automatic world-wide telecommunications network. In the rising curve of overseas telephone and telex calls, in the emergence of new nations, in the growth of world trade and travel, and in the important technological developments of the past few years, they see a greatly increased demand for world-wide communications. They also see, in the International Telecommunications Union, a means of ensuring that the world's telephone systems are indeed organized to serve when the demand comes.

The different countries have varying standards of local service depending on national policy, economics and efficiency of telecommunications service organizations. There are about 998 telephones for every 1,000 families in Ontario and Quebec. (Coverage exceeds 100 per cent of families in Southern Ontario, where many families have telephone-equipped summar cottages.) Canada's rates, relative to the general wage level, are the lowest in the world. The cost of a month's residential service is equivalent to two hours' pay for the average manufacturing worker in Canada, two and one-quarter hours in the United States, more than four hours in the United Kingdom, and 16 hours in France.

The improvement of telecommunications services in overseas countries adds to the satisfaction which Canadian companies can give to their customers. Unproductive waiting time on international circuits and on operator assistance can reduce operating profit, hence improvement of service in other countries is among the vital issues recognized by Canadian companies. The same principles which have guided Canada in creating a largely automatic nationwide telephone network are today being applied by the members of the International Telecommunications Union, as they lay the foundations for a world-wide automatic telephone system. A system over which calls will be dialed with the same ease as they now are within the boundaries of North America and within parts of Europe. The linking of newer services such as television network transmission,

...24

data transmission and picturephone, requires significant co-ordination in several vital respects as well.

Vital issues in international traffic handling are identified in Telecommission Study 3(e). This Report will give only a brief general comment.

Because of the role played by TAC and CN/CP and agreements with the telephone and telegraph services, international services between Canada and the USA are as convenient to the public as local services. Maintaining customer satisfaction on trans-border service is one of the issues considered to be vital. Newer services such as television network transmission, data transmission, data transmission and picturephone, require co-ordination in several vital aspects.

The various overseas countries have different standards of service depending on national policy, economics and efficiency of organization. As the improvement of telecommunications services in overseas countries adds to the satisfaction which Canadian companies can give to their customers, this is among the vital issues recognized by Canadian companies.

There are many international technical, operating, and tariff rate situations under review. Communications satellites and international computer communications are specific examples of current international consultative studies vital in their increasing participation in ITU international Consultative Committees, which are absorbing more skilled manpower resources than previously. The participation of COTC in the drafting of new international management arrangements for Intelsat is another.

2.2 Information Flow as a Vital Issue

All the categories of companies are quite naturally anxious to obtain vital information on foreign operations, manufacturing and consulting, and they also seek to pass on Canadian work to other countries.

For all the companies, information on future radio frequency assignments and interference considerations are an obvious necessity. Knowledge of the trend of standardization in operating, commercial and technological criteria for telephone, telex, and data services is also essential because the services used in other countries must be matched or interfaced in many detailed ways.

International routing and numbering require continual exhange of information as changes and additions are made. Up-to-date estimates of forecast demand are essential for planning each route. International consultants must be able to update their information in complete detail for the different kinds of engineering and management projects undertaken. Other standards and practices are frequently encountered.

The manufacturers are the most concerned with a broad approach to information flow. Telecommunications has one of the highest levels of technology, and one of the most rapid rates of development of any industry. Its future development is extremely sensitive to the information flow involved in innovation. This process covers the whole range of activities from the concept through research and development, to manufacture and distribution at home and aborad.

Information from outside Canada also has an effect on what Canadians want, and how much they will pay for it. Timeliness of information is vital to high innovation industry. The losses from an expensive development overtaken by new technology can be enormous. The life cycle of a product is already so short that it is difficult to pay for development during product life time. To this technological information must be added economic data. What will it cost to manufacture? Since production may be several years away this means a prediction on how the economy will move. What will people be prepared to pay for the service or product? What competition will there be?

It is vital to have all the information available at the time of the commitment. As the development proceeds the cost of incorporating new ideas becomes more and more prohibitive. Assuming then that a new system is chosen for development, what is the subsequent role of Canadian R & D organization? The project, if it is a major system, will involve dozens of professionals and may take five to seven years before it reaches the customer. Some 90 per cent of the information needed for the task will be available, and the R & D organization's role is to prepare it for profitable manufacturing.

As the extent of the innovation is increased, the risk increases. On the other hand, if innovation is limited, there is the risk that a more

...26

aggressive entrepreneur will defeat the venture. There is thus an optimal range of innovation. The results of research effort can be estimated by observing developments in all parts of the world with experience serving as a guide.

When a competitor starts to sell an item information in it becomes public knowledge. At this time he will publish in order to maintain the prestige of his research group, and trade information with other groups. When literature on the item becomes available, information on its strengths and weaknesses begins to flow among the operating companies and consultants. There is a world-wide range of discovery available to the telecommunications innovator. The main limitations will be in local economics.

This matter of information sharing cannot be handled well by a system. The practical problem is knowing where to look for data, what data to select, and what to do with it. This is why a company or a country does research or exploratory development. Nearly all the information, technical, marketing, political, is available but in Canada our ability to get it to people who can use it is very poor.

The price for sharing in the world's information pool is to make a contribution to the pool. The publishing of Canadian papers in Journals of wide international distribution is an important basis step. Prestige in one field helps in others. It is important to be sufficiently competent in one field so that this prestige may be used to share in information in related fields. The paths are many and varied. Undoubtedly, contact between scientists who know each other's work is the most effective and the most stimulating. No laboratory is large enough to do more than a small fraction of the work in the field. This is particularly true in Canada where a total effort in telecommunications, private and governmental, is about one-tenth that of the Bell system in the USA. Considering a 20:1 ratio to the rest of the world, Canada has a great deal more to gain than to lose. Each piece of information gained may help avoid domination by groups whose scale of R & D might otherwise allow them to lead without fear of being overtaken.

Effective personal contact can often be made in committee work related to the several international societies and organizations. Standards committees can be doubly important. Some foreign standards have a negative impact on the Canadian telecommunications industry amounting, in many cases, to tariff barriers and work on this has not been utilized in Canada as much as it might be. Until quite recently no real importance was attached to this participatory activity. Even now only a handful of Canadian companies can afford to finance participation by employees, and within government it is an activity which has to be continually justified.

...27

However, in Canada, by careful concentration, it is possible to lead in a few fields, and by the allocation of sufficient resources, to stay with the leaders in other selected research and development areas. The picture is complicated by a tendency to attempt to be all things. It is also complicated by national diffidence, lack of entrepreneurial drive, and lack of co-ordination of information available in different companies and government agencies. To compete you must have the best information and build it into the best product. To be effective we need centres of excellence in selected fields. Their prestige and expertise will allow Canada to trade in the international information system, and to use the information to good effect.

...28

2.3 Vital Issues As Seen From a Consultant's Point of View

1) Telecommunication systems often constitute relatively small components of much larger systems (for example telecom portion of power grids, telecom portion of airports). Therefore what is done to encourage Telecom export must be closely correlated with other export activities(terms of financing, aid programs, missions) and the "package" concept should be recognized.

2) Telecom consultants, in seeking overseas business, find on occasion that a certain amount of consulting advice is being given by Canadian government departments and agencies at the request of overseas countries. Professional Consultants would like preference to be given by the Canadian government to supplying such advice on a commercial basis.

3) More and more overseas clients are interested in "turn key" jobs rather than separate engineering/supply/construction contracts. Financing is the key problem. Within large telecom turn key projects the consultants' part is small compared to the total supply and construction parts. Ad hoc consortia are needed but case histories show the difficulty of arriving at proper terms.

4) Acceptance of overseas contracts for consultant engineering work often depend on the ability to provide the required performance bonds. Because there is no equity involved — other than brain work — the provision of financial guarantees and bonding is very difficult for small operators.

2.4 Issues in Exporting of Canadian Telecommunications Products

General Problems

The primary difficulty facing all exporters of telecommunications equipment is that by far the majority of the developed countries protect their own manufacturing industry by non-tariff barriers of one kind or another. Invitations to bid are generally only issued to favoured domestic suppliers and foreign sources of supply, like Canada, are discouraged from entering into effective dialogue with the operating telecommunications companies which are usually government owned.

In Canada a more open policy is adopted, insofar as permitting and encouraging foreign suppliers to compete for domestic needs. This policy, while ensuring that Canadian operating costs are kept low, often removes the chance that a Canadian company might have in getting started in a new product line that would eventually lead to exports. The cost is too high to compete with foreign competition when the innovative and fixed expense of manufacture is amortized over the limited domestic market only, and he cannot afford to risk amortizing fixed costs over a larger world market when so many non-tariff barriers exist. Canadian government R & D incentives have helped to reduce this risk but it is still significant.

Problems Facing Subsidiary Companies

As far as markets in the developing countries are concerned a total systems approach is usually required. These countries are not yet ready to do their own systems synthesis and integration and although a total system capability exists in Canada it is usually fragmented due, at least in part, to the need for rationalization. The subsidiary companies are sometimes inhibited from joining export consortia in any continuing, permanent basis because they might be helping to increase the competition their parent companies would face in the markets concerned. In addition, anti-combines law in the country of the parent company sometimes inhibits integration of the subsidiaries whose parent companies might face court action in their own country. On the other hand business often flows to Canada, whenever the parent company obtains a turnkey project in a developing country, because of subsidiary/parent rationalization.

Problems Facing Canadian Controlled Companies

Even the largest of the Canadian controlled companies is small by world standards. The need for sales offices abroad, the need to establish manufacturing subsidiaries to overcome local non-tariff barriers and the magnitude of the risk on major export jobs create problems which companies in Canada will need the utmost ingenuity to solve. Only large multinational companies have the resources to tackle more than a fraction of the world's telecommunications needs. Many of the companies active in

...30

Canada are part of multinational corporations and in this way Canadians can develop export expertise which would otherwise have to be learned the hard way, i.e., independently. From such a pool of expertise other Canadian companies can learn and our total degree of knowledge is thereby enhanced, leading to the eventual formation of multinational companies of our own.

Incompatibility of North American and European Telecommunications Equipment Standards

Because there was no need for Telecommunications standardization between North America and Europe before the use of voice-carrying submarine cable and the more recent COMSAT services, there are certain historical incompatibilities between the standards adopted in Europe and those adopted in North America. As well as the COTC, the Telephone Association of Canada has considerable interest in international technical compatibility affecting Canadian subscribers. As well, Canadian Manufacturing Companies seeking to export Telecommunication equipment to countries where there are European standards must face problems of incompatibility. In certain instances it would appear that incompatibilities may be difficult to eradicate, as they tend to protect equipment market areas.

Participation abroad in international standards work is beyond the financial and human resources of small companies. Even the largest companies find it difficult to keep up with the pertinent working parties and study groups of the ITU consultative committees, particularly the CCITT, whose meetings are now almost continuous the year round. The documentation and meetings on standards in the ISO and IEC, presents a similar problem (see Appendix II for a more detailed description).

...31

SECTION 3 General Conclusions Concerning the Role of Canadian Companies

1. Operating Companies

(i) In its role as Canada's overseas carrier the Canadian Overseas Telecommunication Corporation aims to provide telecommunications, including the newer services such as intercontinental television and data transmission, to the satisfaction of Canadian carriers and users and their foreign correspondents. For this role the COTC maintains planning and co-ordination of world-wide network operations with the international carriers of other countries, always seeking that Canadian investment in international facilities will be utilized to the greatest advantage.

(ii) In their role of Canada's domestic operating industry, the telephone and telegraph companies aim to provide service to Canadian customers compatible with and connected to other North American telephone, telegraph, and data communications customers. In general, a Canadian telephone telegraph or data service subscriber can reach another Canadian or United States location with equal facility. Planning and co-ordination of service procedures and operations with companies and government agencies in the USA and abroad providing service to foreign customers are an important international role of the Canadian telecommunications companies.

2. International Consulting in Telecommunications

(i) The role of Canadian telecommunications consultants in the international field adds to our balance of trade by exporting Canadian knowledge in a technology which has always been well advanced here due not only to our geograph, but to our social and economic history as well. The fact that Canadian innovation engineering, and management in telecommunications is well thought of abroad, and that Canada as a country is widely acceptable to many nations, means that telecommunications consultants find their international role closely interwoven not only with Canadian operating and manufacturing interests, but with the Canadian International Development Agency, the Department of Trade and Commerce of the Canadian government, the Department of Communications, and several other departments and agencies. Their work also brings them in contact with foreign government departments and agencies due to the many different forms of corporate structure providing telecommunication services abroad.

...32

(ii) In their role of identifying opportunities for work abroad, Canadian firms can benefit from extensive access to the information available in Canada on business developments in international telecommunications, and can keep in touch with other Canadian interests. Technical, financial, marketing, political and diplomatic support from all private industry and and government sources available is welcomed because business is being carried out in competition with foreign consultants, some of which may be government supported. Competition is felt to be just as strong as that met by international marketers of telecommunications equipment.

(iii) Canadian Government agencies undertake some international consultation on government to government requests. In certain cases, private consulting enterprises feel they could handle the job successfully and would like to be asked to do it on a commercial basis.

(iv) Because of the amount of work in developing countries, telecommunications consultants are closely interested in the educational and training standards of telecommunications engineers and managers working there. It would seem that at present Canada is at a certain competitive disadvantage with regard to the important matter of attracting ITU fellowship recipients. In other countries where the operating administration is a government entity, training costs are paid by that government. But the costs of the job fellowship training in Canadian telecommunications operating companies have to be charged to the ITU as a fellowship expense.

3. Telecommunications Manufacturers

(i) The international role varies from one Canadian telecommunications manufacturer to another, not only for reasons of size alone, but according to the content of research development and product standardization in the company program, and the nature of corporate relationships outside Canada. Only the largest Canadian companies can afford to participate abroad in drafting international recommendations, practices, and standards. The industry notes that as the importance of this type of activity has not received recognition by all the government agencies concerned, it cannot yet be considered a fully coherent national effort.

(ii) Participation of manufacturing companies in international bodies recommending telecommunications standards is of considerable significance as an international role. The amount of effort that other countries put into this reflects the commercial desirability for products in a telecommunications export program to meet the standards of as many countries as possible.

(iii) For this reason the standards adopted for new technology are not always selected on purely technological grounds. A case in point is the current difficulty between the countries on opposite sides of the Atlantic Ocean on design details for pulse code modulation data transmission and telephone switching systems.

...34

SECTION 4 Recommendations of the Industry Participants to the Government of Canada

1. It is recommended that further study be given to the problem of access to the growing quantity of information on international telecommunications planning, standards, projects, financing, operational developments and national policies. The exchange of information which took place during the Telecommission studies was useful, but already needs to be up-dated.

2. To this end there should be a joint review of international telecommunications projects by government agencies, consultants and manufacturers, at which some further clarification of their roles could be reached. For example, consultants seeking telecommunication business abroad have recommended that Canadian government agencies should examine whether they are in competition for the same work.

3. As an example of one means for up-dating, it is recommended that on the occasion of the World Plan Meeting, CCITT/CCIR to be held in late 1971, consideration be given to mutual briefing on the status of such projects by all Canadian companies and government agencies concerned, whether or not they participate directly at the World Plan Meeting.

4. It is recommended that Canadian loans for financing telecommunications hardware export should encourage, stipulate and make provision for related Canadian consulting services on an expanded basis, and that Canadian contributions to multi-lateral international financing of telecommunication projects retain as much flexibility as possible in respect to co-eligibility of Canadian consultants and associated manufacturers.

5. It is recommended that Canadian government agencies financing international telecommunication projects make modest provision for Canadian industry training costs in support of ITU fellow-ships to Canada for a few engineers and managers annually from developing nations.

...35

APPENDIX I

CONTRIBUTIONS

Contributions received from representatives of participating organizations are gratefully acknowledged as follows:

Canadian Overseas Telecommunication Corporation - International Telecommunications Contacts.

Telephone Association of Canada - International Operating Companies, Conclusions and Recommendations.

Canadian Broadcasting Corporation - International Broadcasting Contacts

Department of Industry Trade and Commerce - Obstacles in Export Sales.

Canadian International Development Agency - Export Obstacles

Research and Development Laboratories Northern Electric Limited - International Information Flow.

Acres Intertel - Four Issues Important to Telecommunications Consulting Engineers.

Bell Canada - International Consulting, Conclusions and Recommendations.

In addition, this group prepared the following at the request of other Telecommission study groups.

Prepared for Study 2(g) - Manufacturing Standards, including CCITT/CCIR Recommendations.

Prepared for Study 3(b) - CCITT/CCIR World Plan and ITU Technical Aid.

Material printed in other final reports is not reproduced here but there is a relationship with other Telecommission studies, especially to:

Study 2(g) A description of Canadian telecommunications manufacturing industries, their size and growth, and international marketing of goods and services.

Study 3(a) International implications of telecommunications; the role of Canada in Intelsat and other relevant international organizations.

Study 3(b) Communications and theCanadian assistance programme for developing countries (hardware and software).

Study 3(e) An analysis of international telecommunications operations and the growth and handling of international traffic.

Study 7(f) Relationships between DOC and organizations internationally oriented.

...36

APPENDIX II

The Origin and Effect of International Standards and Recommended Practices

1. C S A

The Canadian Standards Association (CSA) is Canada's clearing-house for standards. Founded in 1919, it is a non-profit, non-government association of Technical committees. CSA is the member Body for Canada in the International Electrotechnical Commission (IEC) and the International Standards Organization (ISO). The CSA rationale is safety of consumers. It will consider any request concerning fire, explosion, electric shock or other recognized hazard. Testing laboratories of the CSA are at 178 Rexdale Boulevard, Toronto. An early role of CSA was directed toward safety of electrical appliances and equipment and it established a voluntary Canadian Electrical Code in 1927. Under the Canadian Constitution safety legislation, however, is a matter for the Provinces, and the mandatory electrical codes differ somewhat from province to province. More recently, X-Ray radiation hazards from home colour T.V. sets was the subject of another voluntary Canadian standard which has been included in the mandatory electrical codes of various provinces.

The composition of this particular voluntary standards committee is interesting. It included representatives from manufacturers -- Northern Electric, Canadian General Electric, Canadian Industries Ltd., R.H. Nichols Co. Ltd.; from science -- the Canadian Medical Association, the National Research Council, and Atomic Energy of Canada Ltd.; from the federal government -- the Departments of Transport, Health and Welfare, and National Defence; from major users of electronic equipment -- Telephone Association of Canada, CN/CP Telecommunications, and the Ontario Hydro.

The provincial codes require that foreign manufacturers of colour T.V. sets or other electrical equipment destined for sale in Canada must comply with the regulations, and that the factories in which the products are produced be subject to "unannounced inspections by CSA inspectors". The Foreign manufacturer pays a fee if he wants to market in a Canadian province. But in practice, while this has been applied to consumer goods and heavy electrical equipment, telecommunications equipment, with which the public does not come into contact, has not been very much affected.

...37

APPENDIX II

2. C G S B

The Canadian Government Specifications Board (CGSB), an interdepartmental agency of the federal Government which prepares standard specifications at government request. Its committees are composed of members from industry and government; some of these committees serves as Canadian national committees for the ISO Technical Committees working through the CSA procedure herein outlined. These arrangements are under review at the present time, the Department of Industry, Trade and Commerce and the CSA being of the opinion that governments in all countries and at all levels in Canada will become more and more concerned with standards for the goods they buy, codes for the safety legislation they administer, and with the effects of standards on trade, industry and the general welfare of their constituents. The Department of Communications is not directly concerned. It supplies one or two members on committees on radio equipment, at the invitation of the Directors of the CSA.

3. I E C

The Canadian National Committee of the International Electrotechnical Commission (CNC/IEC) is the official channel of participation in the work of IEC by all organizations and persons in Canada and operates under the auspices of the CSA. Their address is Secretary CNC/IEC, Canadian Standards Association, 77 Spencer Street, Ottawa 3, Ontario. IEC was formed in St. Louis in 1904 and has been active, except for the world war periods, and since that time, in the electrical and related fields. In 1947, IEC became affiliated with ISO as the electrical division of ISO, while maintaining its technical and financial autonomy. Secretarial work is handled by the IEC Central Office in Geneva, Switzerland. The texts developed and approved by a technical committee and ratified by at least four-fifths of the National Committees are published as standards recommendations. Like ISO Recommendations, IEC Recommendations are published for voluntary acceptance by industries, trades, and professions in any country. Canada's policy and participation in ISO and IEC technical work is decided by advisory committees composed of experts who represent the industries concerned through their trade and technical groups. These are the corresponding committees operating under CSA and CGSB procedure. Industry and government, therefore, decide whether Canada will participate in an ISO or IEC project. Through CSA, they send delegates to the international meetings. These delegates keep the advisory group, and CSA, informed on all technical matters.

...38

4. I S O

Canada participates in the work of the International Standards Organization (ISO) through a permanent committee of twelve members known as the Canadian National Committee of the ISO (CNC/ISO). Their address is: Secretary CNC/ISO, Canadian Standards Association, 77 Spencer Street, Ottawa 3, Ontario. ISO was formed in 1946 to replace two predecessor organizations that had functioned before World War II. ISO is concerned with industrial and engineering standards other than electrical. The administrative work is handled by the General Secretariat, located in Geneva, Switzerland. A proposed standard developed and agreed upon by an ISO technical committee is called a Draft ISO Recommendation. It is circulated to all member bodies for acceptance, comment, or disapproval. When a draft recommendation has been accepted by 60 per cent of the members voting, it is sent for final approval to the Council. If approved, the draft then becomes an official ISO Recommendation. Acceptance and use of a Recommendation by members and their industries, trades, and professions are entirely voluntary. Use of ISO Recommendations is increasing. ISO Recommendations may be considered for revision at any time upon request by any member. Revisions go through the same steps as those for the original Recommendation. In both ISO and IEC, the work of developing and formulating international standards recommendations is carried on by technical committees. These committees may delegate some of their work to subcommittees or working groups. Representatives to technical committees and their sub-groups are appointed by the member countries on the basis of their technical interests.

Canadian delegates to the technical committees of ISO and IEC are nominated by their respective Canadian technical committees, recommended by the CNC/ISO and/or CNC/IEC, and accredited by the Canadian Standards Association.

The Department of Communications is not concerned with IEC or ISO beyond supplying one or two experts at the invitation of CSA.

5. C R T P B and DOC specifications for Radio Equipment

The Canadian Radio Technical Planning Board (CRTPB) since 1944 has made recommendations to the Government concerning the development and regulation of radio services in Canada. Their address is: 880 Lady Ellen Place, Ottawa, Ontario.

The 22 members of the Planning Board represent manufacturing associations, broadcasting associations, user groups including the Telephone Association of Canada (TAC) and engineering institutes, including the Institute of Electrical and Electronics Engineers (IEEE) (headquarters, New York). Although the Government makes no formalized reply to the recommendations, the Radio Regulations Branch takes them into account when drafting specifications and procedures issued by the Department of Communications.

Experience has shown that users generally tend to press for tighter and tighter specifications in order to guarantee a high degree of performance in their systems. On the other hand, manufacturers tend to press for more relaxed technical requirements in order to keep costs and prices to a minimum and thus increase their opportunities to sell in both domestic and export markets. Foreign owned subsidiary companies often import US or UK designs on equipment which will not meet Canadian draft requirements from the Department of Communications. These companies wish to avoid further expensive engineering development and, therefore, resist tighter limits on performance parameters.

An important difference between US and Canadian regulatory specifications is due to the fact that receivers, as well as transmitters, are regulated in Canada. The majority of companies in the Electronic Industries Association are subsidiaries of foreign companies and often believe that the stringent specifications drafted by DOC, particularly those pertaining to receivers, are unrealistic. This causes sharp differences of opinion in the technical task force work, since the final issuing of regulatory specifications has a direct bearing on cost and price of manufactured equipment. The situation is aggravated because users (who generally want tighter specifications) are in the majority in CRTPB (by number of associations). Although the CRTPB recommendations are not established on the basis of voting alone, there is a feeling among manufacturing companies (who actually have to develop equipment to meet the specifications) that their opinions are sometimes unjustly outweighed by the opinions of the users.

The interpretation of the meaning of the Radio Act is also a source of difficulty between the DOC and the industry. Since the Department is responsible for the administration of the Act, it believes it must uphold the highest possible standards of equipment performance in order to ensure satisfactory service to the user. This obviously involves specification

...40

of parameters which have no bearing on the regulation of the frequency spectrum (receiver audio response and power output, hum and noise level, sensitivity, selectivity, etc.). Strict adherence to narrow or severe limits on such parameters for receivers causes hardship in the industry, particularly where portable equipment of limited range is involved. The price of such equipment has a very considerable effect on the quantity which can be sold, and overly severe restrictions on receiver operating parameters may preclude the manufacture or sale of such equipment.

The CRTPB believes that its work with the Department of Transport (and now the Department of Communications) over the years has contributed greatly to the quality of radio communication services in Canada. It believes it is performing an essential function in the interest of both the Department and the industry. It recommends that this work be continued and strengthened.

Concerning the Department of Communications Radio Standard Specifications for equipment, it is the opinion of the Electronic Industries Association of Canada that the equipment supplied to Canadian users by Canadian manufacturers meets higher standards than in most other countries, with the result that Canadian designed and manufactured equipment is too expensive to compete in export markets.

6. ITU Telegraph, Telephone and Radio Regulations

From its 1865 beginning in Paris as the International Telegraph Union (ITU), making it the oldest international organization of its kind, the International Telecommunications Union has grown to be a recognized United Nations Agency with 137 member countries. The Secretarial headquarters are at Geneva.

Canada is a signatory to the basic instrument or Convention of the ITU; concerning the ITU Regulations, which complete the Convention, (Montreux 1965 is the last), the Canadian position is:

Telegraph Regulations	-	binding on Canada
Telephone Regulations	-	Canada not bound
Radio Regulations	-	binding on Canada
Additional Radio Regulations	-	binding on Canada except for telephone aspects

...41

APPENDIX II

These Regulations, which are quite extensive, are agreed upon at special conferences, of which the next will be the ITU World Administrative Conference for Space Telecommunications and Radio Astronomy.

The aims of the Union, in the name of which the Regulations are promulgated, are:

a) effecting the allocation of the radio frequency spectrum;

b) co-ordinating efforts to eliminate harmful interference;

c) fostering collaboration among its members for the establishment of rates at levels as low as possible;

d) assisting in the creation, development and improvement of telecommunication equipment and networks in new and developing countries;

e) promoting the adoption of measures for ensuring the safety of life through the co-operation of telecommunication services.

7. C C I T T

The International Telegraph and Telephone Consultative Committee and the Radio Committee (CCITT)/(CCIR) are permanent organs of the International Telecommunications Union.

The duties of the CCITT are assigned in Article 14 of the ITU Convention as follows:

> "To study technical, operating and tariff questions relating to telegraphy and telephony and to issue recommendations on them".

CCITT Recommendations (used world-wide) are re-published every four years, in French and English, and in Spanish, Russian and Chinese as required. There are now nine volumes of "Instructions", "Directives" and "Studies of Interest at the National Level", prepared in response to special questions.

The CCITT Recommendations now in force are arranged as follows in the White Book (1968).

A Organization of the work of the CCITT, and collaboration with IEC and ISO.

B Means of Expression (definitions, vocabulary, symbols, classification).

...42

APPENDIX II

C Unallocated.

D Lease of International Telecommunications Circuits.

E Telephone Tariffs and Operations.

F Telegraph Tariffs and Operations.

G Transmission: Lines, radio relay systems, radiotelephone circuits.

H Utilization of lines for telegraphy and phototelegraphy.

I Unallocated.

J Radio and television programme transmission.

K Protection against interference.

L Protection against corrosion.

M Maintenance of telephone circuits and carrier systems.

N Maintenance of programme and television circuits.

O Unallocated.

P Telephone transmission quality. Telephone installation and local line networks.

Q Telephone switching and signalling

R Telegraph channels.

S Alphabetical telegraph apparatus.

T Facsimile telegraph apparatus.

U Telegraph Switching.

V Data transmission.

Related Standards Activities, Canada and Abroad.

Traditionally the working methods of the CCITT have been updated as required in order that CCITT Recommendations will be compatible with other standards activities. Manufacturers work through the International Standards Organization (ISO) and the International Electrotechnical Commission (IEC). The Canadian Standards Association (CSA) works with these, as it does with the United States of America Standards Institute (USASI). The Institute of Electrical and Electronics Engineers (IEEE), New York, also has

...43

committees active in standardization work. The CSA-USASI standardization has not been linked in Canada with the CCITT study program but CCITT and ISO have been represented at each others meetings at the international level. In particular, a representative of ISO now attends all the study sessions of the CCITT dealing with data transmission. The electrical interface between computers and telecommunications lines is an example of continuing standardization studies. There has now been success in achieving an agreed CCITT-ISO alphabet for data transmission similar to the American Computing Society (ASCI) code. In addition to keeping ISO standards and CCITT Recommendations in line in this equipment area, this closer ISO-CCITT link at the study level has been useful as a channel for exchanging views on data system requirements for the future as between manufacturer of computers and supplier of telecommunications services and equipment.

Canadian ISO-CCITT Co-ordination at National Level

Recently we have had the beginnings of Canadian co-ordination at the national level on items for standardization involving both CCITT and ISO. The items concerned were the data transmission alphabet and colour coding of telephone cables. This co-ordination was at the request of the Director of the CCITT, with the object of saving time at the international level, and was successfully completed by correspondence.

When the CCITT was formed in 1956, the Department of Transport co-ordination on behalf of Canada was mainly concerned with Administrative T. & T. Conferences, Telegraph Regulations and operating procedures and tariff principles. Canada's attitude to future signature of the Telephone Regulations (the CCIF meeting which dealt with Telephone Recommendations was not attended by the Department) had also to be considered.

The rising engineering aspects of automated telegraph and telephone world networks led to the appointment of a full-time co-ordinator in 1963 as "an advisor to the Department on International Telephone and Telegraph Matters", replacing a part-time consulting engineer.

The current address is: CCITT Co-ordinator, International Branch, Department of Communications, 100 Metcalfe Street, Ottawa, Ontario.

...44

APPENDIX II

8. C C I R

The International Radio Consultative Committee (CCIR) was established at Washington in 1927. The duties of the CCIR are assigned in Article 14 of the ITU Convention as follows:

> "to study technical and oerating questions relating specifically to radiocommunications and to issue recommendations on them".

The most urgent questions of concern to Canada have recently been listed as:

- technical factors governing the optimal use of the geo-stationary orbit;

- feasibility of frequency sharing between space and terrestrial services;

- direct television broadcasting from satellites.

Canadian Participation Objectives

Canada has started to participate as an observer at CCIR. In Warsaw in 1956 there were 12 delegates and at the last Plenary in New Delhi in 1970 there were 11 Canadians. Current objectives of participation are said to include:

- a direct voice in the spectrum utilization within assigned communication bands as well as an indirect voice in influencing changes to Radio Regulations pertaining to radio spectrum usage through the advisory role played by the CCIR at Radio Conferences;

- a direct voice in the development of preferred technical characteristics for radio systems to be used in fixed and mobile applications, broadcasting, monitoring, navigational aids, radio paging, communications satellites, radio relays, etc.;

- the securing of interference protection for our exceptionally large national telecommunications investments;

- the development of technical standards which will enhance the marketability of Canadian equipment;

- the demonstration of Canada's competence and leadership in the field of radiocommunications, which will assist Canadian industries in their drive to increase their exports to other countries.

...45

APPENDIX II

There are 63 CCIR Recommendations which cover the following Radio fields:

A Emission

B Reception

C Fixed Services

D Mobile Services

E Broadcasting, including T.V.

F Radio Relay Systems

G Propagation

H Standard Frequencies and Time Signals

I Monitoring

J Vocabulary

K Space Systems and Radio Astronomy.

CCIR CO-ordination in Canada

The Canadian National Organization for CCIR (CNO/CCIR) is composed of Study Groups subdivided into Working Parties, using the same model as the CCIR. The Working Parties -- which are composed of representatives from government departments, crown corporations, manufacturers and common carriers -- prepare the first draft of the Canadian documents. These draft documents are then submitted to the Study Groups concerned. They are then submitted to an Executive Committee of the CNO/CCIR for further approval. Finally, the Canadian documents are submitted to the Senior Committee of the Department of Communications for final approval before being sent to Geneva.

The Executive Committee of the CNO/CCIR was established in February, 1968, to bring together senior engineering and management representatives from government departments and industry to organize Canadian CCIR activity. These representatives are expected to have the authority necessary to assign people, time and other resources to this work and to approve the results. The address is: Chairman, CNO/CCIR, International Branch, Department of Communications, 100 Metcalfe Street, Ottawa, Ontario.

...46

APPENDIX II

Operating Procedures, Tariff Rate Principles, and Settlement of Accounts

Recommended standards in these fields are not yet of wide concern to manufacturers and therefore, will not be discussed here. They are mentioned because the introduction of random access satellite circuits, the automation of international telephone and telex exchanges to the point of programmed computer techniques which provide billing and network supervision as well as switching functions, and the proposed World Data Network are likely to have repercussions on manufacturers planning for new products. CCITT and ISO are the current international sources of information.

There is as yet very little information on what Canadian Provincial codes may be applicable.