Study 8(b)(i)

Study of Interconnection of Private Telecommunications Systems with the Systems of the Telecommunication Common Carriers

The Department of Communications

REPORT

TO

DEPARTMENT OF COMMUNICATIONS, TELECOMMISSION

BY

ACRES INTERTEL LIMITED

STUDY OF INTERCONNECTION OF PRIVATE TELECOMMUNICATION SYSTEMS WITH THE SYSTEMS OF THE TELECOMMUNICATION COMMON CARRIERS

TELECOMMISSION SECTION 8 (b) (i)

August 1970

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 $2.25 Catalogue No. Co41-1/8B

Price subject to change without notice

Information Canada
Ottawa, 1971

TABLE OF CONTENTS

ABBREVIATIONS

AE	Automatic Electric (Canada) Limited
AGT	Alberta Government Telephones
Alcan	Alcan Aluminium Limited
BC Tel	British Columbia Telephone Company
CBC	Canadian Broadcasting Corporation
CEA	Canadian Electrical Association
CGE	Canadian General Electric Company Ltd.
CN-CP	Canadian National-Canadian Pacific Telecommunications
CNR	Canadian National Railway Company
CNT	Canadian National Telecommunications
COTC	Canadian Overseas Telecommunication Corporation
DND	Department of National Defence
DOC	Department of Communications
DOT	Department of Transport
IBM	IBM Canada Ltd.
PBX	Private Branch Exchange
PGE	Pacific Great Eastern Railway Company
RCMP	Royal Canadian Mounted Police
RCC	Restricted Common Carrier
TCTS	Trans-Canada Telephone System
UHF	Ultra High Frequency
VHF	Very High Frequency

SECTION 1

SCOPE OF WORK

1.1 This report is the result of the study carried out by Acres InterTel Limited under a contract with the Department of Communications, Telecommission, Section 8 (b)(i), described as:

> "the interconnection of private telecommunication systems with the systems of the telecommunication common carriers".

This is elaborated to mean:

a) the interconnection of private and entrepreneurial systems with the switched telephone network;

b) the interconnection situations that could exist for systems comprised of user leased,or user leased and user owned facilities; and

c) the interconnection of private systems to each other.

1.2 For the purposes of the study, private telecommunication systems have been defined as:

a) private systems that are totally "user owned";

b) private systems that are totally "user leased" from one or more telecommunications common carriers or systems comprised of both leased and owned facilities;

c) entrepreneurial systems, either owned or leased, which offer telecommunication services for hire.

1.3 The objectives of the study are classified under the following two major categories:

a) examination of the interconnection situation which currently exists and the economic, commercial and/or technical factors which contribute to it. (i.e. existing interconnection policies of the Federal and Provincial departments concerning telecommunications, common carriers and private system users).

b) examination of the interconnection situation that could arise in the future, in terms of trends and developments; the necessity for the formulation of suitable public policy on interconnection to safeguard public interest; and the impact of such policies on common carriers and private system users.

1.4 The types of interconnections discussed in the study are:

a) interconnection of a private system or equipment such as a PBX to the common carrier switched telephone network;

b) interconnection of a user owned system with that leased from a carrier;

c) interconnection between several networks leased from different carriers by the same user.

d) interconnection between two or more leased networks belonging to different users;

e) interconnection of user owned systems to each other.

NOTE:

1. The scope of the study does not include examination of the Telex network. The interconnection with regard to data circuits as discussed in the text does not in any way reflect the problems that may be associated with the Telex network.

2. The study also examines broadband and video networks, where applicable.

3. The provision for specific RF channels to meet user needs (e.g. TV) is not considered as interconnection.

SECTION 2

INTRODUCTION

2.1 GENERAL

Canada's primary telecommunication capability is provided by the telephone companies and railway companies that form the family of telecommunication carriers.

In addition to the telecommunication networks for service to the public, there is a growing telecommunication capability under private ownership. In most cases these telecommunication systems are used to serve special users' needs and do not form part of the public telecommunication network.

In general, most systems offering public service are interconnected to provide a nation-wide telecommunications network.

Such interconnection does not exist in the case of private systems which are generally isolated from the nation-wide public system and from each other. It is the subject of this report to study the problems associated with the interconnection of private systems with other private and public systems.

2.2 DEFINITIONS

The definitions in this section apply only to this report and were derived to give clear meaning to terms which, though in general use, lack common understanding.

Carriers

Common carriers or entrepreneurs offering telecommunication

service for public use, for hire, or for both.

Common Carrier/Telecommunication Carrier

A company chartered to provide the public with telegraph and/or telephone service through a switched network.

NOTE: This definition covers only the basic function of the common carrier and does not reflect a limitation of its operations. All the major common carriers use their transmission systems to carry other forms of traffic.

The purpose of common carrier systems is to handle traffic for the general public. Except for administration and maintenance they do not originate their own traffic.

Restricted Common Carrier

An organization offering a specialized service to the public such as a radio paging service or land mobile service.

Private System

A communications system designed to meet the special needs of certain users which does not provide service to the general public.

A private system may be either user owned, user leased from carriers or a combination of both.

A private system originates and carries its own traffic. In addition the system may offer specific services to the user, which may not be available from the common carriers via public networks.

Entrepreneurial System

A commercial system operated for the purpose of providing telecommunication facilities to any interested party (private user or common carrier). An entrepreneurial system is sometimes called

"Carrier's Carrier".

Interconnection

The connection of a given private system to that controlled by a different operator or user such that the information carried over one system is transferred to the other.

2.3 SYSTEMS CLASSIFICATION

All systems investigated and considered for the study are classified under the following headings, as defined above:

a) Common Carrier Systems

b) Private Systems

c) Entrepreneurial Systems

This system classification is governed by operational use rather than ownership; thus leased networks operated by private users are classified under private systems, although the facilities may be owned by common carriers.

SECTION 3

EXISTING TELECOMMUNICATION SYSTEMS IN CANADA

3.1 COMMON CARRIER SYSTEMS

3.1.1 Review of Domestic Communications Systems

The telecommunications systems belonging to the telephone and railway companies are integrated to provide a nationwide public telephone service.

The concept of an integrated telephone system is a matter of fundamental importance. The public demands instant, reliable and efficient telephone service at reasonable rates between any two subscribers in the country. On the basis of existing technology such a requirement can only be met by:

a) having an integrated operational system through close and stable relationships between the telephone companies,

b) having a switched telephone network connecting all terminals reliably and economically.

While coordination and cooperation between various telecommunication carriers control system optimization (i.e. coordinated planning to achieve efficient service with minimum redundancy), the system integrity, which governs the quality and the reliability of the telephone service, requires control over the quality of inputs into the network. Therefore, in considering the question of interconnection between private systems and the public switched telephone network,

the technical compatibility of the interface and the maintenance and operation of the private systems which affect system integrity, have to be examined. Technical considerations alone cannot ensure that the quality and reliability of the switched telephone network will be maintained.

3.1.2 Common Carrier Classifications

The Canadian common carriers can be divided into the following groups:

a) Trans-Canada Telephone System (TCTS)

Formed by the major telephone companies in Canada with the object of developing and maintaining a coast to coast, long-distance, telephone network.

b) Independent Telephone Companies

Over 1,600 independent telephone companies providing public telecommunication service in the areas they serve.

c) The Railway Telecommunication Systems

3.1.3 Telephone Company Systems

Members of the Trans-Canada Telephone System work together on a nationwide basis. Their systems are interconnected to provide a complete network capable of carrying a diversity of communication traffic including public telephone traffic and defence traffic. The Canadian Overseas Telecommunication Corporation (COTC) is an associate member of TCTS and is responsible for international (overseas) traffic. COTC and TCTS systems are interconnected to provide routes

for overseas telephone calls.

The independent telephone companies are interconnected with the TCTS telephone network to form a single large integrated public telephone service network. This integration is achieved through inter-company agreements within the Telephone Association of Canada and through Federal and Provincial Acts. By virtue of these acts the public switched telephone service of the common carriers is protected against destructive competition in their respective areas of operation.

Interconnection for services other than the telephone is provided in some cases. The telephone companies follow no set rules in such instances and interconnection is generally made on the basis of mutual agreement.

3.1.4 Railway Telecommunications Systems

CN-CP Telecommunications operate under Federal Charter and, besides their extensive private line business, provide

a) telegraph services from coast to coast

b) public telephone service (CN) in parts of Newfoundland, North West Territories and Yukon Territory

c) telecommunication services for railway use (analogous to a private system)

For all public telephone services as well as for the railway operation, facilities for interconnection with the public switched network are available. Any other interconnection requirements are met by mutual agreement.

The PGE, under British Columbia Provincial Charter, enjoys

common carrier status but does not offer telephone service facilities to the general public on the same basis as telephone companies. Apart from the specific circuits used for railway communications, the PGE system is available for hire to various users in the area as private line service. PGE's circuits serving the railway operational requirements are interconnected with the public switched telephone network of the telephone companies under the provision of the Public Utility Act of British Columbia.

3.1.5 Private Line Services of Common Carriers

In addition to their role as public utilities the common carriers also offer private line service for hire (an entrepreneurial role) to meet specific needs of users. These private lines, in a majority of cases, share the same equipment and terminal facilities as the public system.

Since private lines have little influence on the integrity of the public switched telephone network a monopoly situation, as in the public service case, does not exist. The common carriers are free to compete with one another for their share of business, but also have agreements for mutual support (piece-out arrangements) in cases where facilities of one carrier can supplement those of another carrier. However, Telephone companies, by virtue of their interconnection forming a nationwide switched network are at an advantage in offering certain service packages and tend to exploit the situation and thereby prevent competition in those offerings.

TCTS members claim that their private line business exposed to competition accounts for about 4 percent of their total business, whereas the CN-CP figure is over 75 percent. With the growth of teleprocessing and other special requirements it is estimated that the rate of growth of private line services in the non-voice categories will be high -- possibly much higher than that of the public switched telephone service in years to come. The study of interconnection problems, which constitutes one of the many factors affecting this growth, and the development of suitable solutions will certainly influence the future pattern of private line services.

As the situation now stands, private line circuits belonging to common carriers other than those of TCTS members (i.e. railway company facilities) do not enjoy the same privilege of interconnection either with the switched telephone network or with each other. Wherever interconnections do exist they are made on the basis of specific negotiations between the parties concerned.

3.2 PRIVATE SYSTEMS

In addition to the common carrier systems a large number of private communication systems exist in Canada. The growth of such systems has been due to the specialized nature of the users' requirements which could not easily be met by the services of the common carriers. The reasons which led users to the establishment of private systems can usually be found in the areas of : the specifically required technical characteristics different from those of the common carrier systems, the desire for electrical systems security (preventing any

form of access or interference from outside sources), and the economics of the situation. The main economical problem is usually that the user is faced with a divergence between the actual costs of a system supplied by himself and meeting his own specific requirements, and the corresponding charges of a common carrier, where the carrier's charges do not necessarily reflect the direct costs of the specific facilities but are related to the impact of the required systems addition to his overall operation.

The difference in costs to the user may then seem to favour the acquisition of a private system, although the advantage may be entirely to the benefit of the private user at the expense to the public at large which may have to bear hidden costs or otherwise be better served by a different solution.

Private systems are either totally user owned, or leased from carrier organizations, or a combination of both. Serving the user's specific internal purposes they may not require any interconnection with the public switched network. On the other hand there may be a primary or secondary requirement for access to the outside world in which case an interconnection requirement arises. Since this report is concerned with problems of interconnection only, the question of justification and economic basis of private systems themselves will be dealt with only to the extent to which interconnection problems are involved.

A broad classification of the various types of private systems which either have interconnection or may have requirements for

interconnection is as follows:

a) Federal Government Systems (DOT, RCMP and DND)

b) Public Utility Systems (Ontario Hydro, Hydro-Quebec, BC Hydro)

c) Public Service Systems (police, fire and hospital services)

d) Broadcast Systems (TV and radio networks)

e) Industrial Inter-Office Systems

f) Private Utility Systems (oil and gas company systems)

g) In-house Systems (hotel PBX)

h) Data Transmission Systems (computer service company networks)

i) Resource Development Company Systems (mining and lumber companies)

j) Paging and Land Mobile Systems.

3.3 ENTREPRENEURIAL SYSTEMS

Strictly speaking no major trunk communication system, built for purely entrepreneurial purposes, now exists in Canada. One system of this type, the NORCOM system in the Kenora area, was sold to Bell Canada in 1968. Some functional characteristics of this system are given in Appendix B.

Restricted Common Carrier systems (RCC)providing radio paging and radio land mobile facilities on a hire basis also fall under the category of entrepreneurial systems.

To a large extent the railway systems play an entrepreneurial role in most of the areas they serve by offering various private wire services to private users.

The telephone companies also utilize their facilities, over and above those of the public switched network, for renting to private users. There is competition for purely private line business (private lines without interconnection to the public switched network) between the railway and telephone companies in areas where both facilities are available, but as mentioned earlier, there are also agreements for mutual support in areas where one carrier's facilities can supplement those of another carrier.

SECTION 4

CURRENT INTERCONNECTION SITUATION

4.1 GENERAL

To ascertain the current interconnection situation in Canada a cross-section of private users, common carriers and manufacturers of telecommunication equipment were interviewed. Summaries of these discussions are given under Appendices A - C. Through these investigations it has been possible to identify the extent of interconnection, isolate the problem areas and carry out a qualitative analysis of the prevailing interconnection situation in the country. However, as information relating to actual costs, revenues, traffic planning, and details of negotiations and agreements were not obtainable from the organizations interviewed, a quantitative analysis of the commercial and economic issues, and their dependence on policies and regulatory action, remained outside the scope of this study.

4.2 PRIVATE SYSTEM USERS

Communication networks operated by the following organizations are typical of private communication systems in Canada:

a) Alcan Aluminium Limited

b) Canadian Association of Chiefs of Police

c) British Columbia Hydro and Power Authority

d) Canadian broadcasters

e) Canadian General Electric Company

f) Department of Transport

g) Ford Motor Company of Canada

h) Hotel Association of Canada

i) Hydro-Quebec

j) IBM Canada Ltd.

k) Interprovincial Pipe Line Company

l) Ontario Hydro

m) Trans Mountain Oil Pipe Line Company

n) Westcoast Transmission Company Limited

o) Resource development companies

p) Others - users of radio land mobile service and radio paging service

The above systems were studied from an interconnection point of view and notes identifying the cases where interconnections are either in existence or have run into difficulties are given in Sections 4.2.1 through 4.2.16.

4.2.1 Alcan Aluminium Limited

Alcan operates an extensive private, national and international network in which all circuits and most equipment in Canada are leased through Bell Canada. Overseas circuits are provided by COTC.

The system comprises a control centre in Montreal with data, record message and voice capabilities.

Interconnection problems are not encountered because of the totally leased, private nature of the system, intended solely for operational use of the company.

4.2.2 Canadian Association of Chiefs of Police

The report contained in full in Appendix A to this report was provided to the Telecommission by the Canadian Association of Chiefs of Police. The underlined portions refer to the subject of interconnection.

4.2.3 British Columbia Hydro and Power Authority

The operational philosophy of BC Hydro is similar to that of Hydro-Quebec. Interconnection between the BC Hydro microwave and power line communication network and that of the common carrier providing public service is not favoured. Our investigations did not reveal the existence of any major interconnection.

Interconnection (private to private) with the Bonneville Power Administration System is made at Ingledow Substation.

4.2.4 Canadian Broadcasters

Canadian broadcasters make extensive use of common carrier wideband private wire facilities for carrying signals from studio to transmitter sites and for network distribution.

Many studio-to-common-carrier terminal links are user owned and interconnection is effected between the user owned and the user leased systems.

The wideband network is usually "custom made" to satisfy the users specifications and requirements, thus interconnection difficulties are not experienced.

4.2.5 Canadian General Electric Company

CGE does not operate a private system requiring interconnection with the public switched telephone network. However, the company offers a time shared computer service to subscribers with connection to computers by private lines leased from common carriers.

4.2.6 Department of Transport

DOT has interconnection facilities between its leased circuits and the public switched telephone network (private to common carrier) for the following purposes:

a) Air Traffic Control

b) Marine Traffic Control

c) Air to Ground Communications

d) Ship to Shore Communications

In the latter case the role of DOT is similar to that of a common carrier and public service is offered when required.

On a private to private basis there are also interconnections between DOT and the leased circuits of the Canadian Switched Network (DND counterpart of the U.S. AUTOVON) and the CP Air system. Messages from CP aircraft are routed through DOT ground radio stations to CP air control.

To achieve economy and higher operational efficiency, DOT is undertaking a program to monitor 287 lighthouses from central locations. However, communication to most of these locations does not exist and DOT is proposing to install its own network from these points to meet common carrier facilities and the public switched network. The telephone companies have not yet responded to the DOT request for provision of interconnections on this basis after more than a year of negotiations.

For pollution control in Lake Erie DOT has proposed an air patrol using VHF equipment and a frequency synthesizer in one of its

aircraft. The object is to detect and report oil patches and probable offenders as and when necessary. To achieve an operational air to ground system, DOT needs interconnection facilities with the switched public network VHF mobile base stations located along Lake Erie. The Telephone Company has been approached on this matter but no satisfactory response has yet been received after eight months.

4.2.7 Ford Motor Company of Canada

Ford Motor Company, like many other large corporations, has an extensive private communications network.

The system includes user owned intercommunication and VHF/UHF mobile radio facilities, and a network of circuits leased from Bell Canada and CN-CP Telecommunications.

The intercommunications facilities in the plant and the main office which are separated by about half a mile are interconnected by a cable leased from Bell Canada.

No interconnection exists between the Ford communication circuits and the public and there is no interconnection of circuits leased from the telephone company and those leased from the railway common carriers.

4.2.8 Hotel Association of Canada

The Hotel Association of Canada is one of the major critics of telephone companies who, in hotelmen's opinion, due to their monopolistic position compel hotels to accept unreasonable contractual agreements for telephone service provided in hotel rooms.

The major areas of complaint are summarized as follows:

a) Telephone companies charge a higher rate for extension service in hotel rooms than in private residences. Hotels feel that these extension telephones in guest rooms are definitely residential; therefore telephone companies are being indirectly subsidized by hotels amounting to undue discrimination against hotels.*

b) There appears to be inconsistency in the contracts made between hotels and the telephone companies.

c) Hotels pay rental charges on the same PBX with no suggestion from telephone companies about replacement by more modern equipment.

d) Hotels require custom tailored telephone installations to meet their needs. However, the charges imposed by the telephone companies often discourage

* Hotel guests normally pay between $0.15 and $0.50 on their hotel bill for each call made from telephones installed in guest rooms.

this. The hotelmen reason that they should have a choice of either purchase or lease from any reliable supplier (including the telephone company) with interconnection privileges to the public network in order to provide better service to their guests and to reduce their own operating costs.

4.2.9 Hydro-Quebec

Hydro-Quebec operates its own telecommunications system which includes microwave as well as power line carrier networks. The microwave network which is used mainly for power system operation purposes, also carries administrative circuits. The P.L.C. system is used exclusively for power system operation.

In general, no interconnection facilities exist between the Hydro-Quebec communication system and the public switched telephone network. Such interconnections are not favoured as they lead to a reduction in system security and reliability.

To allow access to the public telephone system, most of the power stations and sub-stations also have public telephone facilities. As a special case, in the Rouyn area, a few Hydro-Quebec circuits have been made available (free-of-charge) to Northern Telephone Limited to extend the public telephone service to Hydro-Quebec generating stations and sub-stations in this region. In addition, during the construction period of the Manicouagan project, Hydro-Quebec is leasing approximately 40 voice circuits to Quebec Telephone in order to make available public telephone service, at the construction sites. Some circuits may be retained (free-of-charge) to provide public telephone service to the new hydro stations when operational.

The following intercompany interconnections (private-to-private) exist:

a) with New Brunswick Electric Power Commission via power line carrier.

b) with Alcan via powerline carrier and their Saguenay PBX.

c) with Ontario Hydro at eight locations (Section 4.2.12).

In view of its operational philosophy, Hydro-Quebec has no demand either for leased communication channels or interconnection facilities via the common carrier operated public switched telephone network for power system operation, protection and control purposes.

4.2.10 IBM Canada Ltd.

IBM Canada has an extensive leased communication network interconnecting branch offices throughout Canada for administrative purposes and data transmission. IBM's 23 Datacentres are also linked by common carrier telecommunication facilities. This system makes a substantial variety of machines, programs and services available to users across the country.

The IBM telecommunication networks are comprised of circuits provided by telephone companies and CN-CP Telecommunications. The IBM Datacentre offers a broad range of remote data processing services. The customer, through a terminal in his own office, can communicate directly with a Datacentre computer via a public or private telecommunication link and make use of a data processing service without leaving his office. Flexibility of access to many data processing services from a single terminal, access to a given data processing centre from many points, or alternate routing capability may be reduced from the users point of view by the current interconnection practices.

IBM stated that interconnection, by using privately-owned equipment, of telecommunication carriers' leased line services with switched services, and interconnection between these services and privately-owned telecommunication facilities would be helpful in encouraging expansion and new developments of data processing applications and services. Users of data processing would benefit from the expansion of applications and economies which would result.

IBM recognizes the importance of maintaining the integrity of the telecommunication carrier's system. They believe, however, that a more liberal policy towards interconnection should be considered and that suitable technical specifications could be determined to permit this.

4.2.11 Interprovincial Pipe Line Company

Interprovincial Pipe Line operates a long but simple communication system composed entirely of leased circuits. All leased circuits are arranged through Alberta Government Telephones and the arrangement is considered satisfactory.

Interconnection between the pipeline leased system and the public network is considered detrimental to pipeline operation and no such facility has been requested. However, all pipeline stations are served by the public telephone system. A VHF mobile system is used for pipeline maintenance but it is not interconnected with the leased network.

4.2.12 Ontario Hydro

Ontario Hydro operates a large communication network which includes a privately-owned microwave system, some privately-owned powerline carrier channels and also an administrative telephone system leased from Bell Canada and other connecting companies.

The service and interconnection agreement with Bell Canada which was recorded under DOT Approval R-1567, 22 February 1968 and filed with the Canadian Transport Commission records office, allows the interconnection of certain facilities of Ontario Hydro with the facilities of the telephone company including the public switched telephone network via PBXs located on Ontario Hydro premises. The use of the leased system and interconnections is limited to Ontario Hydro employees only for power commission business.

Points of interconnection (private to private) with other utilities are:

a)	Manitoba	-	Seven Sisters Generating Station	
b)	Quebec	-	Beauharnois	Bryson
			Masson	Rouyn
			Val Tetreau	Kipawa
			Paugan	Rapide des Iles
c)	U.S.A	-	Niagara Falls, N.Y.	
			Lewiston, N.Y.	
			Massena , N.Y.	
			Detroit, Mich.	
			Marysville, Mich.	
			St. Clair, Mich.	

These interconnections with the switched public network are permitted by the telephone company in circumstances where such interconnections are either vital for conducting power company business

or for emergency situations involving safety of life or property.

In every case of interconnection, Ontario Hydro is responsible for taking all restrictive measures to prevent misuse of such interconnections.

4.2.13 Trans Mountain Oil Pipe Line Company

The Trans Mountain Oil Pipe Line Company communications facilities include for operational purposes the following facilities:

a) A high grade voice circuit consisting of a microwave channel leased from CN Telecommunications which follows approximately the route of the pipe line from end to end.

b) A private wire teleprinter system leased from B. C. Telephone Company. This system interconnects in Canada located facilities with U.S. located ones.

c) Telex facilities to the major pump stations, administrative offices and central warehouse facilities.

d) Leased private wire voice grade, narrow band and telegraph circuits (D.C. loop) for station remote control and telemetering purposes.

The facilities required for operational purposes are supplemented by:

a) A VHF radio telephone system leased from CN Telecommunications. This system can be patched-into the microwave channel via repeater stations from the base station and all the mobile stations. This VHF radio system provides total voice communications from any point along the pipe line route to any other given point along its route. The circuit is primarily used for maintenance purposes.

b) Public Switched Telephone System to all pump stations, administration offices and warehouse facilities.

Interconnection of leased network facilities with public switched telephone system is not considered necessary for pipe line operation and the Company has never negotiated with the carriers for such facilities.

4.2.14 Westcoast Transmission Company Limited

Westcoast operates an extensive landline and microwave network of circuits leased from PGE and CN Telecommunications with major exchanges leased from BC Tel. In addition, West Coast also operates a large VHF mobile system for pipeline maintenance.

Details of interconnections are contained in Appendix A.

4.2.15 Resource Development Companies

Resource development companies experience interconnection problems, particularly when operating in remote northerly areas where the need for communications and access to the common carrier systems is considered vital to the community.

As long as the requirements are small, say, only one or two voice channels, the telephone companies usually enter into interconnection agreements which allow users to own and operate equipment at the users end. A number of HF circuits and land mobile VHF circuits are operated in this fashion. However, complications arise when the communication needs call for more than this number of voice channels and dictate the use of wideband equipment.

When the development area is located far away from the available common carrier route economic considerations usually make it difficult for the operating company to enter into an agreement with the common carrier for the extension of the common carrier telecommunications services to the region under consideration. In a situation like this the company is forced to provide its own system to the point where common carrier facilities begin.

Difficulties are experienced when interconnection aimed at extending public service to company personnel in the remote area is requested from the common carrier. Some common carriers refuse to provide the interconnection and insist on providing an entire system at a price which is usually too high from the point of view of

the company. Others are prepared to enter into some form of barter agreeement with the operating company.

Historically situations of this kind have led to the formation of chartered telephone companies which were then fully integrated into the public network (La Compagnie Telephone Ungava is an example). In other cases negotiations are aimed to find a compromise between the costs the user anticipates for a system satisfying his own internal needs and those arising from the interconnection requirement. As mentioned earlier these latter costs are not directly related to the actual facility costs but reflect the telephone company's assessment of the requirement in the light of overall investment, revenue, operational implications and company planning.

4.2.16 Others - Users of Radio Land Mobile Service and Radio Paging Service

a) Radio Land Mobile Service

Over the last decade there has been an increasing demand for radio land mobile service from a broad group of private users comprising industrial, commercial and public service organizations. In the majority of cases, the requirements call for a base station and a few mobile units for each installation. Common carriers offer a similar public commercial service with access to the public telephone network but the system offered is usually more sophisticated than is actually needed and is considered quite expensive. It is understood that the Bell Canada rate for this land mobile service is $46.00 per month for each unit when the mobile is leased from Bell Canada and $16.00 per month if the mobile unit is Bell Canada approved but customer owned.

A number of users of radio mobile systems have expressed the need for interconnection facilities with the public switched telephone network for improvement of their operations. Of these, the interconnection requirements of the hospital services and fire fighting services are of special interest. These organizations provide public

emergency services and operate extensive radio mobile systems. Telephone company attitudes toward the provision of interconnection facilities to these public service organizations do not appear to be uniform. Independent telephone companies seem to have a more flexible policy than do TCTS members and cases exist where interconnection requirements have been met by independent common carriers.

b) Radio Paging Service

Radio paging permits an office or department of a company to maintain contact with its representatives or sales force throughout the working day and, in fact, after hours, if necessary.

The system is essentially one-way in which the message is transmitted to a paging receiver carried by the person to be contacted. Each call is coded so that it is received only by the person for whom it is intended.

The service is applicable to all areas of endeavour - construction, maintenance, security, medical, sales, etc., and the improvement in operating efficiency through its application has promoted its use many fold over the last few years.

Two types are in common use - tone paging and one-way voice paging. Voice paging is becoming more popular because it enables the person paged to receive specific instructions regarding his immediate action.

Bell Canada offers wide area tone paging (Bell Boy "35") in Montreal, Toronto and Ottawa. The rental for the paging units is $18.00 per month. The system is integrated with the public telephone exchange and the subscriber can access the paging transmitter via a normal telephone handset. During our investigation we did not find any organization using a purely private, wide area, paging facility.

4.3 COMMON CARRIERS

The following were successfully contacted for contributions:

a) CN-CP Telecommunications

b) Trans-Canada Telephone System

c) Pacific Great Eastern Railway

d) La Compagnie Telephone Ungava
Labrador Telephone Company

Comments and opinions are summarized in Section 4.3.1 through 4.3.4 inclusive and in greater detail in Appendix B.

4.3.1 CN-CP Telecommunications

CN-CP will arrange the interconnection of a user owned system and its own network. under the following conditions:

a) Technical compatibility of the private system with the CN-CP network at the point of interconnection.

b) The carrier has the absolute right to disconnect a private interconnected circuit if, in CN-CP opinion, the private network introduces a degrading factor into the carrier's system.

c) The carrier will not guarantee the performance of the private network beyond the point of interconnection.

CN-CP feels that subscribers to Broadband service, which has no monopolistic characteristics should be permitted to interconnect with the local telephone switched system. This view is supported by the reasoning that the local telephone distribution system is a natural monopoly using much of the public domain. Therefore, users should have the right to access Broadband through the local telephone switched service, at least for digital transmission purposes.

4.3.2 Trans-Canada Telephone System

The policies and opinions of the TCTS were solicited in a form of questionnaire covering the various aspects of the interconnection situation. This is reproduced in Appendix B together with the TCTS response. Because policies are individual to particular companies and vary across the country some questions remain unanswered.

In summary TCTS policy is aimed towards ensuring desired overall integrity of the public telephone network; the interconnection between private communication systems and the public switched telephone network is not generally allowed unless there are overriding reasons stemming from economics, public interest or public safety.

4.3.3 PGE

PGE enjoys common carrier status but does not provide public telephone service. With the exception of circuits used for railway communications the PGE system provides private line service to users.

PGE has adopted a liberal policy towards interconnection with the private systems. Other than by requirements for technical compatibility, the customer is virtually free to use leased circuits in any manner he chooses. This facility, together with low circuit charges gives PGE a competitive edge in the area it serves.

The company has gone on record in the past in objecting what it claims to be discrimination against PGE or its lessees when interconnection between PGE private line circuits and those of the telephone company is desired.

4.3.4 La Compagnie Telephone Ungava
Labrador Telephone Company

La Compagnie Telephone Ungava and the Labrador Telephone Company are independent telephone companies provincially chartered in Quebec and Newfoundland respectively. These companies operate the Quebec North Shore and Labrador Railway communication system and are prepared and capable of providing all services that may be offered by any major telephone company.

The companies offer no serious objection to interconnection with private systems provided the private system operator can meet the necessary technical, operational and maintenance standards to protect the integrity of the public telephone system. As examples private systems operated by the police and fire services in Labrador City and Schefferville have access to the public switched telephone network.

4.4 ENTREPRENEURIAL SYSTEMS

No major entrepreneurial system offering trunk circuits now exists in Canada. Norcom Telecommunications Limited, which provided trunk route communications in the Kenora area of Ontario was acquired in 1968 by Bell Canada. Restricted common carriers, which provide land mobile service and paging service on a hire basis appear to be the sole representatives of entrepreneurial systems in the country. Further details are included in Appendix B.

4.4.1 Norcom System

Norcom Telecommunications Limited owned and operated a private microwave network connecting the major centres in North Western Ontario (Fort Francis, Atikokan, Kenora, Dryden, Red Lake) carrying telephone channels between these centres under contract with Northern Telephones Ltd. and TV under contracts with the CBC. For TV the network was interconnected with the trans-continental CN-CP microwave system which carried CBC programs from Winnipeg to interconnection points - a private line service. For telephones the network was interconnected at many places with the Northern Telephones trunk line system, a public switched network, which in turn was interconnected with the municipal telephone systems of the various locations.

The evolution of an entrepreneurial system such as Norcom serves to illustrate how such systems can be successfully integrated with the public telephone network to provide communication to remote communities on an economic basis.

4.5 MANUFACTURERS

The following manufacturers of communication equipment were contacted for their views on interconnection:

a) Automatic Electric (Canada) Limited

b) Canadian Motorola Electronics Company

c) L. M. Ericsson Limited

d) Northern Electric Company Limited

Further details are given in Appendix C.

4.5.1 Automatic Electric (Canada) Limited (AE)

AE feels that uncontrolled interconnection of privately owned telephone exchanges with exchanges of the telephone companies will increase the problems of the equipment suppliers because most users will not be able to provide the degree and quality of maintenance needed to keep a telephone exchange operating within specified limits. Malfunctions due to inadequate maintenance also reflect indirectly on the workmanship of the equipment manufacturer and may cause considerable concern in the industry, to the equipment manufacturers, the common carriers and to the general public.

4.5.2 Canadian Motorola Electronics Limited

Canadian Motorola is one of the major suppliers of equipment used for paging service and land mobile service.

The company feels that the benefits of a radio paging service to both commercial and non-commercial users, in the form of improved efficiency in day-to-day operations would be further enhanced if the paging terminal facilities of the user could be interconnected with the public switched network.

In the land mobile service the situation is similar. Considerable benefit to the customer would accrue and, because design, reliability and maintenance of the associated equipment is continually improving, any detrimental effect on the public network is no longer an overriding factor.

4.5.3 L. M. Ericsson Limited

Ericsson supplies equipment to common carriers and to private users. However, Ericsson's present marketing policy discourages the sale of telephone exchanges to users having no technical capability to maintain the equipment.

4.5.4 Northern Electric Company Limited

The Northern Electric preference is to deal only with the telephone companies and at present is not oriented to the private system market but sees no difficulty in adapting to this aspect. The Company equipment development programs are predicated on the present common carrier policies which, if altered, may in turn alter major programs for the modernization of telephone company plant. Moreover, the Company feels that telephone system integrity would be lowered through uncontrolled interconnection and substandard installation or maintenance.

SECTION 5

INTERCONNECTION POLICIES

5.1 FEDERAL AND PROVINCIAL GOVERNMENT POLICIES

Telephone companies are incorporated under either Federal or Provincial Acts.

5.1.1 The various Acts are quite similar and the following is a list of pertinent points found in the Acts:

a) Telephone companies must meet all reasonable requests for service.

b) The service must be just and without prejudice to any person requesting service.

c) Similarly, charges and tariffs for service must be fair, just, without prejudice, etc.

d) Nothing may be connected or coupled to the telephone company's lines and equipment without the specific approval of the telephone company.

e) The telephone company may refuse a service if it feels that the requested service will jeopardize the whole system.

f) A telephone company may form an agreement with other telephone companies to interconnect their systems. If no agreement can be reached, the regulating government body will judge the case.

g) There is always a government body that regulates the activities of telephone companies.

h) Such regulating bodies arbitrate conflicts between telephone companies and the public. They are more concerned with tariffs but also handle questions of service, quality and reliability.

As can be seen, interconnection is left to the discretion of the telephone company within the limitations imposed by the Acts and Charters of Incorporation. The Acts specifically prohibit any

form of tampering with, connecting to, destroying, harming, mutilating and otherwise interfering with telephone company equipment.

The Provincial and Federal Acts and Charters have one common characteristic - no telephone company in Canada has been given the exclusive privilege to carry all communication traffic in its area of operation.

By law, the companies have the right to install equipment, erect structures, run wires and cables, use radio, and otherwise to further their objective of supplying a subscriber telephone network. But there is no implication that because a company has existing equipment in an area it is entitled to serve all telecommunications needs in that area. The important aspect of this is that any form of telecommunications, except public telephone service, is open to competition.

From the point of view of interconnection it is essential to distinguish between the services controlled by the Acts and Charters and the other incidental communication business handled by telephone companies. Thus, the public switched telephone network is protected and any question regarding interconnection is left to the discretion of the telephone company, while other services such as private lines can legally be supplied by anyone.

However, the broad wording of the various Acts and Charters allows the telephone companies to veto any form of interconnection whether such a connection would become part of the switched network or not.

5.1.2 Federal Bill C-11

Recent adoption of Bill C-11 amending paragraphs (30) and (31) of Section 2 of the Railway Act, brings the leased line services of the Federally chartered common carriers (Bell Canada, B. C. Telephones, COTC and CN-CP) under the regulatory control of the Canadian Transport Commission (CTC). There is no particular reference to the question of interconnection. However, by regulating private line rates, and by virtue of the fact that private lines of the telephone companies can be interconnected with the public switched network whereas the private lines of other carriers such as the railway companies are generally denied access to the public network, it is likely that Bill C-11 will have an effect on the competitive situation in the formation of private systems. More than before, interconnection privileges may become a deciding factor in negotiations for private systems.

5.2 COMMON CARRIER POLICIES

5.2.1 General

The comments from the common carriers given in Section 4.3, reflect the general attitudes of these organizations towards interconnection. Basically, for all types of interconnection, the common carriers within the limitations imposed by the regulatory authorities decide whether or not a required interconnection may be allowed. From the user's point of view there does not seem to be much difficulty in interconnecting a private system with the private line circuits of the common carriers. However, when interconnection with the public

switched telephone network is required, the common carriers tend to exercise their right to refuse to meet a customer's request.

5.2.2 CN-CP Policy

Of the major telecommunication carriers, CN-CP generally allows interconnection between their public network and private systems under the following conditions:

a) Technical compatibility of the private system with the CN-CP network at the point of interconnection.

b) The carrier has the absolute right to disconnect a private interconnected circuit, if, in CN-CP opinion, the private network introduces a degrading factor into the carrier's system.

c) The carrier will not guarantee the performance of the private network beyond the point of interconnection.

5.2.3 Telephone Company Policies

Telephone companies generally have a rigid attitude towards interconnection though the smaller telephone companies tend to be more flexible.

Telephone companies normally do not allow the connection of privately owned switching equipment to their own switching equipment apparently for two basic reasons. First are the technical problems of possible incompatibility of equipment and potential damage to telephone company service by faulty private equipment and sources of interference. The second reason lies in the difficulty of fitting the private system into the rate structure which is based on 'value

of service', i.e., as the utility of a service increases, so does its monthly rate.

Of the two Federally chartered telephone companies, BC Tel specifically disallows the interconnection of 'foreign systems and equipment'. Their Tariff Section II, Item 10, Rule 9 states:

> "The Company's equipment and wiring shall not be re-arranged, disconnected, removed or otherwise interfered with, nor shall any equipment, apparatus, circuit or device which is not provided by the Company be connected with, physically associated with, attached to or used so as to operate in conjunction with the Company's equipment or wiring in any way whether physically, by induction or otherwise, except where specified in the Tariffs of the Company or by special agreement. In the event of a breach of this Rule, the Company may rectify any prohibited arrangement or suspend and/or terminate the service as provided in Rule 35".

Section XII, Item 325 goes on further to state that

> "connection of subscriber-provided PBX's to company-provided Exchange Service trunks is not permitted".

However, Item 100, Subsection C(9) does state specific cases where private systems may be connected at BC Tel discretion.

> "In special instances where the Department of National Defence and certain other Government Departments provide and maintain their own private branch exchange switchboards with associated distribution plant and telephone instruments,

connection to exchange facilities may be provided, at the Company's discretion. The monthly charge for the required central office trunks shall be equivalent to one and one half times the regular monthly rate for the number and type of trunks so provided. No charge will apply to subscriber-owned private branch exchange installations when hazardous or difficult conditions make it impractical for the Company to own and maintain the private branch exchange equipment. The foregoing is restricted to systems in operation on June 16, 1969".

Bell Canada, the other Federally chartered major telephone company, is also regulated in restricting the attachment of privately owned systems with wording in its Tariff similar to that of BC Tel Rule 9. This restriction was approved by Parliament in the amendments made in 1967-68 to the Bell act of incorporation. However, there is recourse to the Canadian Transport Commission. The relevant sections from 16-17 Elizabeth II, Chapter 48 are:

"4) For the protection of the subscribers, of the Company and of the public, any equipment, apparatus, line, circuit or device not provided by the Company shall only be attached to, connected or interconnected with, or used in connection with the facilities of the Company in conformity with such reasonable requirements as may be prescribed by the Company.

5) The Canadian Transport Commission may determine, as questions of fact, whether or not any requirements prescribed by the Company under subsection 4) are reasonable and may disallow any such requirements as it considers unreasonable or contrary to the public interest and may require the Company to substitute requirements satisfactory to the Canadian Transport Commission in lieu thereto or prescribe other requirements in lieu of any requirements so disallowed.

6) Any person who is affected by any requirements prescribed by the Company under subsection 4) of this section may apply to the Canadian Transport Commission to determine the reasonableness of such requirement having regard to the public interest and effect such attachment, connection or interconnection is likely to have on the cost and value of the service to the subscribers. The decision of the Commission is subject to review and appeal pursuant to the Railway Act".

SECTION 6

ANALYSIS OF CURRENT INTERCONNECTION SITUATION

6.1 GENERAL

A logical approach towards an analysis of the current interconnection situation requires consideration of the following:

a) Identification of various interconnection situations

b) Technical and operational issues

c) Commercial and economic issues

d) Analysis and conclusion

6.2 IDENTIFICATION OF VARIOUS INTERCONNECTION SITUATIONS

The various types of interconnection situations are broadly classified as:

a) Interconnection between private systems.

b) Interconnection between circuits leased from two or more common carriers by the same user.

c) Interconnection between user owned and user leased systems.

d) Interconnection between leased systems of two or more users.

e) Interconnection between private systems and the public switched telephone network.

6.2.1 Interconnection Between Private Systems

With minor exceptions (e.g. DOT, BC Hydro, Ontario Hydro, Hydro-Quebec) investigations failed to discover any major instance of

interconnection between private systems.

6.2.2 Interconnection Between Circuits Leased from Two or More Common Carriers by the Same User

This type of interconnection appears to be most common. There is no principal difficulty for users to obtain such interconnection but the common carriers may require that the lease arrangement be made through one of the participating common carriers as prime contractor subcontracting portions of the circuits to other common carriers. Thereby the "integrity" of the circuit as a whole is safeguarded and operational issues of maintenance, failure reporting, etc. are clearly defined.

6.2.3 Interconnection Between User Owned and User Leased Systems

Most of the major private users own some specific communication facilities which are not normally offered by common carriers. Investigations have shown that once technical matters are solved, problems seldom exist in interconnecting these privately owned circuits or equipment with those leased from the common carrier.

Broadcast companies, which make extensive use of common carrier wideband leased circuit facilities for distribution of their programs, fall in this category. In most cases studio links (i.e. the link from broadcasting studio to the common carrier terminal) are user owned and interconnection with the common carrier dedicated channel is permitted on the basis of an agreed technical specification. These prevailing arrangements appear to be satisfactory.

6.2.4 Interconnection Between Leased Systems of Two or More Users

This type of interconnection is equivalent to the interconnection between private systems as discussed in Section 6.2.1. Of various systems examined, those belonging to Hydro companies and to the DOT have such interconnections by mutual agreement.

6.2.5 Interconnection Between Private Systems and the Public Switched Telephone Network

Requirements for interconnection between private communication systems and the common carrier public switched telephone network present the greatest problem.

Most users of private systems classify their communication networks into operational or administrative circuits. The need for interconnection of one or the other type of these circuits with the public switched network varies widely depending on the nature of the private business.

Public Service Organizations

Organizations like DOT, police, fire, and hospitals offering public and emergency service require interconnection of their operational circuits with the public switched telephone network. The need for interconnection of the corresponding administrative circuits is considered of secondary importance since these are for internal use.

A number of DOT operational systems are interconnected with the public network but so far the lighthouse control and air to ground pollution control systems have been denied access. The reason for this situation could not be ascertained.

For emergency services operated by police, firefighting and hospitals, it appears that the independent telephone companies are more cooperative in permitting interconnection than the major common carriers. The reasons for this were not identified. The installations of the Department of National Defence also present some special cases not investigated in this study.

Hydro Companies

These companies own and operate extensive microwave networks to meet their operational needs. The study has indicated that for reasons of security they do not favour interconnection between their operational circuits and the public telephone system.

Both BC Hydro and Hydro-Quebec use their respective microwave networks for internal administrative purposes, and the public telephone service is used for communication with the outside world. Hydro-Quebec has rented some of its circuits to Bell Canada and Quebec Telephone for the extension of public telephone service to some of the remote hydro electric generating stations.

Ontario Hydro, on the other hand, depends entirely on a private wire system leased from Bell Canada to meet its administrative needs. These circuits have access to the public switched telephone network. Interconnection by PBX patching of the operational circuits with the public switched network is allowed under emergency conditions. In addition to these leased administrative circuits, all hydro stations have independent access to the public telephone service.

Oil and Gas Transportation Companies

Oil and gas transportation companies, like hydro organizations, do not favour interconnection between their operational circuits and the public switched telephone system. For administrative circuits, however, such a facility is considered vital particularly for reasons of safety and security of the company personnel living in remote locations.

All users interviewed in the course of the study use circuits leased from the common carriers to meet their major communication needs. Interconnection requirements have been met to a large extent but users complain of the protracted period of negotiation necessary before facilities are made available.

Private Industrial and Commercial Organizations

Cases of private systems operated by industrial and commercial organizations cannot be generalized. They vary from totally independent internal systems made up from user owned or leased facilities, without interconnection, to totally interconnected networks leased from a common carrier. It appears that in the latter case exceptions occur insofar as the common carrier leased interconnected network may contain the odd user owned facility.

Resource Development Companies

Resource development companies, particularly those operating in the north, are provided with service facilities which allow them to interconnect their own radio telephone equipment with the public switched network as long as the requirement does not exceed one or

two telephone circuits. However, in the case of private land lines or wideband radio systems, the user is faced with interconnection difficulties. The problem then is to either divide the network into two parts, one serving the internal needs of the company and the other providing access to the outside world, or to treat both as an entity and negotiate an appropriate agreement with the connecting common carrier company.

Computer Utilities

Computer utilities companies do not normally require interconnection between the public telephone system and their leased data communication channels. However, for greater flexibility and benefit to their customers, (and obviously for the betterment of their own business) these companies would prefer to have all customer leased circuits, including CN-CP Broadband circuits, connected to the public switched telephone network. The study failed to discover any instance of interconnection between CN-CP Broadband circuits and the public switched telephone system.

RCC Operations - Paging and Land Mobile Service

There is evidence that manufacturers, RCC operators and their subscribers, and operators of private land mobile systems would benefit by interconnection to the public switched network. The concern of the carriers about the implications of such interconnection on technical grounds is becoming less valid, but the economic impact cannot be neglected and requires further analysis.

Hotels

Hotels represent another case of private commercial organizations. They have a clear requirement for a complex internal communication system serving a wide variety of needs, and at the same time

for complete access to the public switched network. For reasons of economy they may wish to operate their own internal system, however the interconnection problem has prevented them to combine the internal and external requirements into one system. With the exception of a very few isolated cases all hotel PBX installations are owned by, and leased from the telephone company serving the particular area.

6.3 TECHNICAL AND OPERATIONAL ISSUES

Due to the diversity of requirements, there are many technical and operational problems associated with the interconnection situation, the primary objective always being to ensure that the provision of such a service does not in any way, directly or indirectly, produce an adverse affect on the public switched telephone network.

In the course of discussions, both with the users and the common carriers the question of technical compatibility was often raised but it was not possible to establish whether clearly laid down standards for different interconnection situations actually exist. It was, however, recognized that the technical issues are not the major stumbling blocks.

Operational problems of common carriers encountered due to interconnection cannot be ignored and maintenance is considered to be a problem of major import. However, these problems may not be so formidable once standards of equipment, installation and interconnection are clearly laid down. Further, suitable maintenance agreements between the users and the common carriers may assist the latter in

solving any operational problems created through the provision of interconnection.

6.4 COMMERCIAL AND ECONOMIC ISSUES

6.4.1 General

The paucity of public information on interconnection cases made it impossible to carry out a quantitative analysis. Instead, the work is oriented more towards a qualitative approach, aiming to identify the economic and commercial factors that may have influenced the present interconnection situation. Furthermore, an attempt has also been made to isolate various issues which would merit further economic and statistical analysis in order to provide realistic guidelines to future policies on interconnection.

6.4.2 Two Basic Assumptions

The analysis of the basic issues in interconnection from the economic point of view is governed by two main assumptions. One is that the operation of the telecommunication services in Canada should be as free of unnecessary restraints as the nature of the service will allow, i.e., competition should be the rule and public control or protection of monopoly position should rather be the exception. Whenever the present monopoly position enables the telecommunications carrier to hinder or delay the introduction of services or facilities that may be beneficial to the economy at large, without showing that such introduction would impede its operations unduly, decrease its service to the public, or adversely affect the total economic benefit to the country, competition should be allowed.

The second assumption is that the public at large should not be made to protect either the level of revenue, a given rate of growth in the volume of business, or the right to all future development in the business to any telecommunication carrier simply because it has a charter to conduct certain business on an exclusive basis in a given area. The only right such a charter gives is to assure the franchisee that in consideration of his provision of the specified service of convenience and necessity to the public at large he shall be protected from ruinous competition and that should there be a change in the technology or business practices affecting his service he shall be first to be given an opportunity to provide service under the changed circumstances. Public control over franchised operations need not provide anything more than the opportunity for a fair return on investment.

The possibilities for increased service to the public due to the vastly increased telecommunication needs and the development of corresponding technical equipment and service packages outside the established common carrier industry raises the issue whether such a change in the nature of the business has taken place that the public interest would not be better served by a more liberal policy towards interconnection than the one presently in practice.

6.4.3 Issues in Interconnection

In the absence of empirical data it is extremely difficult to provide the logical justification of the current interconnection situation on economical grounds and to recommend action one way or another. We can now only investigate in general the possible economic

effects of interconnection on the carriers and the public at large.

From the purely economic point of view it does not make much difference whether the lines and equipment to be interconnected are leased from the carriers or are owned by the users if the total costs including those to the public at large are the same. We could then dismiss the distinction between systems composed of leased facilities, leased and owned facilities, and owned facilities. This distinction becomes valid where the total cost of facilities differs on the basis of ownership which is the case when a strictly private acquisition of facilities is compared with the expansion of the switched network plant of a common carrier. As mentioned earlier the rates quoted by common carriers do not necessarily reflect the cost of a specific addition to their plant but are based on the costs of the overall operation (cost averaging) and the value and operational expense related to the particular extension of the public network. The fact of interconnection with the public network is therefore a determining factor in the economics of private systems.

On the basis of the above observations, the interconnection between circuits leased from two or more common carriers by the same user and the interconnection between user owned and user leased systems, referred to in Section 6.2 should not present any problem, as long as technical and operational questions can be settled. Comments in Sections 6.2.2 and 6.2.3 substantiate these conclusions.

Thus, the economic study can be limited to two other cases of interconnection, namely,

a) Interconnection between private systems,

b) Interconnection between private systems and the public switched telephone network.

6.4.4 Interconnection Between Private Systems

This case can be subdivided in two. The first instance is interconnection between physically closely situated systems that can be connected without infringing on the telephone company franchise. In such an instance no regulation can be applied under the free enterprise system (e.g. all the tenants in one building can be interconnected privately with the next building in the block or within the confines of the property).

The second instance of interconnection of private systems is over an intervening expanse of space outside the private property on which they are situated. In this case either the aid of the franchised common carrier is needed or the operators would need to establish their own link by a special permit.

In the case where special use and special equipment may be involved, interconnection of private systems by a separate private link may be justified (e.g. hydro lines, railroad, etc.). In the case of common telecommunications needs, permission to operate an independent connection link may lead to "cream skimming" if this arrangement causes substantial reduction in revenue of the franchised company earned through the public switched telephone system. This latter situation may be taken care of by the use of leased wire from the franchised common carrier to interconnect the two private systems

in which case the private line rates will safeguard the carrier against losses. It is then the customer's choice to pay for common carrier service either through public network rates or through leased private line rates.

6.4.5 Interconnection Between Private Systems and Switched Network

In the question of interconnection between a private system and the switched network, three system structures are possible - one in which the private system is local and long-distance connection is provided by the common carrier, another where the long-distance link is provided by the private system, and a third structure where a private system is interconnected with the carrier's local network.

a) Local private system interconnected with the common carrier long-distance network. In this case, apart from technical considerations of compatibility of equipment and network integrity and reliability of service there are no issues of significance. This has been decided by the Carterphone case in the United States. If foreign attachments can be connected to the public network on individual terminals, an addition of a system is no different. The effect on the carrier's revenue would be, at the most, equal to the extension of WATS rates to all the calls from the private system.

The effects of interconnection between private systems and the public switched network will therefore

be beneficial to the private network. Its aggregated charges for the long-distance interconnection will not increase, but will most likely decrease with the availability of WATS rate. However, system integrity is involved and the private system may by the possibility of denial of interconnection be forced to invest more in its plant.

b) Long-distance link is provided by the private system. In this case the private network can hypothetically deprive the common carrier of some of its toll route revenues by duplicating facilities available on the same route. As there is less control over the operation of the private network the integrity of the system could be impaired through negligence of the private system which is not accountable for its operations to the public.

This case of the interconnection between privately owned trunk communication system with the public switched telephone network is of special interest. Many sparsely populated and remote development areas cannot economically support a common carrier owned telephone system and associated trunk network. Development companies in these areas often operate long distance systems for their own administrative use, with sufficient capacity to carry additional circuits.

The question arises whether members of the public should be allowed to use such private systems and should such systems be interconnected to the switched network, since the extension of parallel facilities by the common carrier would mean duplication of expense without any hope of recovery for the common carrier within a reasonable time.

Under such circumstances complete denial of interconnection would be against public interest in the area concerned. Also the attempt to force service by the common carrier at standard rates would be to the disadvantage of society since this service would have to be subsidized by the carrier's other operations. Therefore the public's interest would benefit by solutions based on appropriate arrangements between the common carrier and the private organization. There are various alternatives for such arrangements. The telephone company may own all terminal facilities which are to be connected to the public switched network, and may lease from the private organization the trunklines subject to performance specifications. This creates problems of terminal equipment maintenance unless a joint maintenance agreement can be worked out. Or all facilities may be operated by the private organization under an interconnection agreement with

the telephone company similar to a privately owned PBX installation. This poses problems of a technical nature since control is not in the hands of the telephone company. Another solution is for the private operator to lease all his facilities, the internal ones as well as those which are to be interconnected, from the telephone company at rates which are acceptable to the telephone company from the point of view of its overall operation. The latter solution is likely to be the preferred one by the telephone company, but is usually more expensive to the private organization because of the earlier mentioned difference between facility costs and carrier charges. However, it must be realized that interconnection, whichever way it is established, involves costs which account for increased expenses of a widely distributed nature and which are to be weighed against the increased value of the operation.

From the carriers point of view these types of systems even if completely operated on a private basis, are beneficial, because they result in business from an area where there was no business before. The maintenance of the carrier's monopoly position within the region, if in fact such a position was existent, could perhaps be safeguarded by special agreements

between the common carriers and the private systems by which the public service part of the private network could revert to the common carrier after it reached a certain volume.

c) Interconnection of a private system with switched local network.

In this case, interconnection is no different from that of an installation of a PBX if the private system is a not-for-hire facility.

Important issues arise, however, if the private system is selling its services to the public. Two situations can be distinguished. In one, services offered by the private system are of a highly specialized nature sold to a relatively narrow group of subscribers, such as store and forward data processing, etc. In the other, the service is of a general nature and is offered to the public at large.

In the first case, significant benefit to the users of the communications facility could result without burdening the public carrier with the provision of expensive and complex equipment that may have only a limited market. Businesses that could use that particular service are likely to make use of it where previously they had to rely on alternative means of communications or had no communications. This type

of service is effort-intensive and by its nature may not suit the common carrier operations, although the value received by the special customers is high. System integrity is again involved and the private system costs cannot be looked at in isolation. The costs to the public may be higher as a result of the implications of interconnection.

In the second case, the telecommunications service could be offered to the public in direct competition with the services of the common carriers. It is hardly conceivable that such a system would include more than the occupants of a building or a block in urban areas.

Hotels and large office complexes are the most likely candidates for private local systems. Large apartment developments are also a possibility. Among mobile users paging systems with call-in possibility may become important.

What would be the effect of interconnection in such cases? Insofar as the carriers are concerned the direct revenues will decrease, but so will the investment in terminal equipment. However, the costs of the system itself and the technical and operational costs arising for the carrier company out of the interconnection of the systems addition, presumably reflected in an interconnection charge, will have to be borne by the segment of the public that happens to form the

users of the system. Also problems of system integrity arise because the telephone company is not in control of operation and maintenance of the private system which may affect the overall standard of service.

Resolution of the question whether public policy should or should not allow small local private systems serving public customers in areas served by franchised telecommunication carriers needs further quantitative analysis of all factors, costs and benefits, that enter into situations of this kind.

6.5 ANALYSIS AND COMMENTS

Analysis of various cases of existing interconnection and consideration of the economic, commercial, technical and policy issues involved therein indicate the following:

a) There appear to be no set technical standards for various types of interconnection situations experienced.

b) Situations requiring interconnection between private systems (user owned or user leased or a combination of both) are not widespread at present and have not, therefore, posed any serious problems.

c) Situations requiring interconnection between circuits leased from two or more common carriers by the same user are quite common. The common carriers seem to have reasonably consistent policies towards providing such interconnections provided that certain criteria

are met (for example leasing through a prime contractor)

d) Situations requiring interconnection between user owned and user leased (same user) systems do not appear to present any serious problems. Common carriers seem to have a reasonably consistent policy towards providing such interconnections.

e) For almost all cases of interconnection situations examined, requirements exist for some form of interconnection with the public switched telephone network controlled by the common carriers. Unless leased entirely from common carriers, the required interconnection is difficult to obtain and provision of interconnection appears to be the exception rather than the rule.

An examination of the economic, commercial, technical and operational issues discussed in Sections 6.3 and 6.4 seems to indicate that the common carriers' general reluctance to provide public network interconnection to the private system users is governed more by the economic and commercial effects of such a service rather than by technical issues. In cases of large users, generating substantial private line revenues for the common carriers, exceptions in interconnection privileges seem to be more frequent. Smaller private systems may face considerable problems even for emergency use.

Hotel systems present a particular case in which the establishment of private systems with interconnection to the public switched

network has been consistently denied.

The negative attitude towards providing interconnection to some of the essential services of DOT, police, fire, and hospital services, and to remote resource development companies cannot be explained. These organizations are involved in operations which directly or indirectly render public service with a vital requirement for access to the public switched telephone network.

There appears to be a requirement for interconnection between CN-CP Broadband circuits and the public switched telephone network. Telephone companies have so far refused such facilities.

Interconnection between RCC controlled systems (paging, land mobile service) and the common carrier switched telephone networks would probably benefit the manufacturer , the operator and the subscriber but the common carrier negative attitude on economic rather than technical grounds requires further examination.

6.6 USERS VIEWS

In the course of our discussions with private communication system users, many expressed concern about problems and frustrations they had experienced in their negotiations with the common carriers with regard to all types of communication services. These are summarized as follows:

a) Customer requirements even of a relatively simple nature involve often complex technical, operational and particularly economic problems needing thorough analysis and clarification. The comment then is that common carriers are slow to appreciate customer needs and to display flexibility in finding solutions.

b) The common carrier reaction to interconnection requests is generally negative, unless based on a comprehensive lease arrangement.

c) With the exception of the hydro companies, most users interviewed expressed their preference to use common carrier facilities, rather than owning their own systems subject to the condition that the services offered by the common carriers are economical and are tailored to meet customers' requirements.

SECTION 7

FUTURE INTERCONNECTION TRENDS

7.1 GENERAL

In the assessment of possible future trends two cases are of particular interest:

a) Expansion of user owned networks and interconnections of such networks.

b) Development of wideband cable systems.

7.2 USER OWNED SYSTEMS

Expansion of user owned private systems, besides having a direct effect on the common carrier's public network business, would affect the carrier's private line business and thereby indirectly influence the public network economy. If the private systems then would interconnect with each other, for example in the hypothetical case of an interconnection between the telecommunication systems of Hydro organizations, the systems users may directly benefit from the expanded operation but the impact on the costs to the public at large through the effect on the common carrier business in that area could be substantial. Apart from the trend towards larger private systems - which by itself is not a subject for study in this report - there is no doubt that the question of interconnection between these systems, which could theoretically lead to a nationwide private network, requires a more thorough economical investigation than possible within the scope of this report. Technically, apart from radio frequency

licencing, there is presently no way of preventing certain interconnections as long as they do not extend into the public network domain. In the future, if present trends persist, the introduction of some regulatory function will become inevitable.

7.3 WIDE BAND CABLE SYSTEM

A situation may arise in the future when new development areas or high-rise buildings may have inbuilt wideband cable systems suitable not only for television service but also to carry telephone, data or facsimile. This is often referred to as the "wired city concept". Two types of interconnection are foreseeable.

a) Between the private system and the common carrier private line system for services other than telephone.

b) Between the private system and the common carrier switched public telephone network.

The first situation concerns the common carrier private line services which through the private line rate structure (either regulated under Bill C-11 or through inter-company agreements) will presumably reach a clear definition.

The second situation is analogous to a PBX interconnection with the added complication that the "wires" besides carrying telephone carry other types of traffic, not compatible with the telephone service. Serious technical problems arise from the requirement for complex interface equipment to segregate distinctly the different types of service. Unless provided completely through the facilities of the common carrier it is impossible at this stage to see how a

compromise between the public network requirements for systems integrity and the interests of the private service agencies could be reached. The costs arising out of the interface requirements would have to be borne by the private system users in addition to whatever costs are associated with the interconnection. Although simple at first sight the concepts of the "wired city" have not been sufficiently developed yet - technically and economically - to allow an assessment of the economical impact of interconnection with the existing public networks.

SECTION 8

ROLE OF GOVERNMENT

8.1 GENERAL

Government at all levels from federal to municipal has a dual role in telecommunications. On one hand it has the power to regulate within the constraints of the various acts and regulations. On the other hand it is itself one of the major users of the country's telecommunication facilities. Therefore, policy decisions and regulatory action on an issue as fundamental as interconnection have a bearing on the country's economic development as well as on the Government's own effectiveness in administration and the exercise of control in matters of national security and emergency.

In the Canadian environment which consists of a mixture of public, private, regulated and unregulated operating entities, a policy of general enforcement of interconnection of all facilities would without doubt be technically, operationally, and economically unacceptable. On the other hand the lack of a general interconnection policy as it practically exists at present creates problems as outlined in this report. To arrive at an intermediate solution for policy development the basic principle of providing maximum benefit to the public by judicious regulation of interconnection situations would require that effective technical and economic guidelines, standards and regulations be established to remove unnecessary restraints on the development of overall system flexibility. Proper attention

could then be given to organic growth of the common carriers' plant, to the introduction of imaginative approaches and the enterprise of innovators. A typical illustration for this can be seen in the extension of plant and facilities into sparsely populated areas where the economic difficulties of providing service by the established common carriers have many times been countered by the unrestrained flexibility of local entrepreneurs, leading often to complex interconnection problems whose solution would benefit by the existence of a definite public policy.

Whatever policies towards interconnection are adopted, the first aim must be directed towards the economics for the public at large and the preservation of system integrity i.e. emphasis must be given to quality and standard of public service at reasonable cost offered by common carriers. On this basis the following areas present themselves for consideration:

a) Technical and operational standards.

b) Private line interconnections.

c) Switched public line interconnection.

8.2 TECHNICAL AND OPERATIONAL STANDARDS

Investigations have indicated (Section 6.2) that no set rules for technical, operational and economical standards are readily available for the many variations of the interconnection situation as experienced in actual practice. The availability of such standards would not only simplify many interconnection problems but would also provide impetus to the overall improvement of the private communication

systems across Canada.

Government can play a major role in developing guidelines for suitable standards and in ensuring that all systems operational in Canada meet the desired economical, technical and operational requirements.

8.3 PRIVATE LINE INTERCONNECTIONS

Private line services offered by any carrier organization (common carrier or entrepreneur) add to the flexibility and coverage of the overall telecommunications network and if interconnected with the public switched telephone system do not necessarily affect the latter's integrity as long as appropriate standards of operation are maintained. In the interest of responsiveness to the users' needs a variety of services is desirable, and the existence of competition introduces beneficial effects in this respect.

In recent years, there has been a growing demand for private communication services both by the government and business users. With the advent of teleprocessing the demand is expected to grow at a rapid pace. It is here where private and entrepreneurial systems may be able to bring in imagination and innovation at a faster rate than possible with the existing plant and facilities of the common carriers. The problem of devising policies on interconnection between private and common carrier systems is therefore intimately related to the more general problem of devising a regulatory basis for the control of extent and growth of the private and entrepreneurial systems themselves.

Interconnection situations of immediate interest in the private line sector can be classified as follows:

a) Interconnection between circuits of two or more common carriers leased by the same user.

b) Interconnection between private systems.

Of these, as our investigations have shown (Section 6.2.2) the situation as defined in a) is in a satisfactory state and does not require immediate action aimed at altering the present situation.

With regard to b), there are presently not many private systems with mutual interconnection facilities. However, future trends in communications will with all likelihood encourage the development of such interconnected systems (Section 7.2). Although this may be considered undesirable by the common carriers' because of potential loss of revenue, the public interest may be better served by a public policy which decides approval or disapproval of interconnection on a case by case basis.

8.4 SWITCHED PUBLIC LINE INTERCONNECTION

Situations requiring interconnection between private communication systems with the public switched network appear to create considerable problems. On the basis of our investigations, various cases requiring interconnection can be broadly identified as follows:

a) Interconnection requirements for DOT, police, fire and hospital services and other public emergency services.

b) Interconnection requirements of the resource development

and public utility organizations.

c) Interconnection requirements of other private organizations.

d) Interconnection requirements of hotels.

e) Interconnection requirements for CN-CP private line circuits.

In the case of a) above, public interest and security are affected, and this will have to be the basis for the development of public policy. There is no reason why interconnections could not be made mandatory provided that the cost distribution is clearly defined and all technical and operational problems are settled. But at least, the provision for appeal by the organizations concerned against unilateral common carrier decision, would present a safeguard.

Resource development and public utility organizations, directly or indirectly, serve public interest and often pioneer the extension of communications in the remote parts of the country. It appears that in the public interest these organizations, too, are preferred candidates for interconnection. Should this be declared policy these organizations must be given the opportunity to appeal to appropriate authorities against common carriers' decisions.

With regard to c) our investigations have indicated that difficulties arise when the common carriers are requested to provide public switched network interconnections to communication systems of private organizations. The question of whether such requests are in the public interest or not cannot be answered on a general basis.

Economic circumstances vary considerably from case to case, even when full compatibility and systems integrity are assured. The only viable alternative appears to be a case by case decision giving the private operator the right to appeal against the common carrier decision whenever a dispute arises.

With regard to interconnection needs for hotel private systems and CN-CP private line services, our investigations have demonstrated the need for further study of such requirements. Since solutions of these interconnection situations may have far reaching effects on private users, common carriers and users of switched networks, further examination through public enquiry under an appropriate authority appears to be required.

SECTION 9

CONCLUSIONS

9.1 The examination of interconnections between private telecommunication systems and those of the common carriers have identified the following:

a) No set rules for economic criteria, and technical and operational standards for interconnection uniformly applicable throughout Canada exist..

b) Private system operators, with the exception of some public services such as police, fire fighting or hospital services, do not require or want extensive interconnection with the public switched telephone network.

c) Common carriers do not seem to have a uniform policy towards interconnection of private systems with the public telephone network with the exception of hotel systems for which private system interconnections are generally denied.

d) TCTS does not provide access to the public switched telephone network for CN-CP data channels. Users claim that this affects their operations adversely in terms of flexibility and costs.

e) Interconnection of circuits leased by a private user from different common carriers is possible subject to certain conditions in the lease arrangements. However,

interconnection of circuits leased by different private users encounters objections, though TCTS policy allows such interconnection.

f) Interconnections between privately owned systems do not exist at present, except for some isolated cases. However, the potential for such interconnection exists and may create problems for the common carriers in the future, unless regulatory control is introduced.

g) Bill C-11 is intended to regulate the leased line services of the Federally chartered common carriers. Because of the differences in interconnection privileges obtained from different common carriers the growth pattern of user leased private systems is likely to be affected.

9.2 On the basis of the above observations the report concludes that:

a) Rules and guidelines covering economic criteria, and standards for performance, maintenance and operation are desirable to allow private system development with interconnections within the overall telecommunications complex.

b) Interconnection between private line circuits of different carriers leased by the same user allow the build up of private systems subject only to appropriate lease arrangements with the common carriers.

c) The situation created by the interconnection of two or more privately owned communication systems requires further attention.

d) Subject to the development of economic and technical criteria (para a) above) private networks serving the public for emergencies and protection require consideration for interconnection with the public switched telephone network.

e) Similar to d) above, communication networks operated by the public utility and resource development organizations require consideration for interconnection on the basis of their effect on the growth of the overall telecommunications complex.

f) The possibility of appeal to a regulatory authority in cases of dispute between a private systems operator wishing to interconnect with the public switched network and the common carrier serving the area appears to be desirable (it already exists in certain areas).

g) PBX interconnection and CN-CP Broadband interconnection to the public switched network require further investigation. Since private users, industry, and governments are involved enquiries need a broad basis such as public hearings on a commission basis.

h) The effect of the interconnection situation on private line system development with regulated private line rates needs further study.

APPENDIX A

USERS

USER: ALCAN ALUMINIUM LIMITED
Montreal, P.Q.

1. The Alcan communications network is an extensive, national and international system which includes switched teleprinter message, voice and data facilities.

2. With the exception of a short 6 GHz microwave system which is owned by the company, all circuits and equipment, other than computers, are leased from the telecommunications carriers. Within North America these are provided through Bell Canada, with overseas circuits provided by COTC.

3. The system comprises a control centre in Montreal, sub-centres in the U.K. and Guyana for teleprinter traffic to terminal users, and an extensive telephone network covering Ontario and Quebec with spurs to New York State.

4. Teleprinter messages are handled by store-and-forward method, computer-switched in Montreal over leased circuits operating at 45, 50 and 75 bauds. Telex and TWX provide the interface with points not connected to the network.

5. Apart from L.D. calling, voice communication is by private lines between company operated switchboards and, in general, these circuits are employed only for voice traffic.

6. Data transmission between Montreal and the data centres occupies only a small percentage of the available voice circuit time therefore the utility of voice circuits is increased by designing them for alternative data.

7. Because of the totally private, leased nature of the system intended solely for the use of the company, there is no interconnection problem of company owned computers and internal wiring via the leased switchboards on Alcan premises. Interconnection via company operated, leased switchboards with the public switched telephone network for company business is sanctioned.

8. Alcan does interconnect various computer systems, one to the other via leased interface equipment and private lines.

USER: BRITISH COLUMIBA HYDRO AND POWER AUTHORITY
970 Burrard Street
Vancouver 1, B. C.

1. According to BC Hydro the microwave network is an integral part of the power system, and they did not feel the desired reliability of 99.999% and system security could have been achieved if BC Hydro had to lease the transmission media for the power system protection signals from the telephone companies or other carriers.

2. Seventy-five percent of the operating circuits for BC Hydro are used to carry data and protection signals. Between 30 and 40 trunk voice channels are available for administrative use. DDD facilities are available throughout using PAX units leased from BC Tel. Outright purchase of PAX units was considered but was uneconomical.

3. There is no interconnection between BC Hydro Microwave System and the public telephone systems. Such interconnection was never contemplated as this was thought to be detrimental to the basic operating philosophy. However, leased extensions from various PAXs exist.

4. Interconnection with the Bonneville Power Communication System is available at Ingledow Substation.

USER: CANADIAN BROADCASTERS

Bushnell Communications Limited
Ottawa

Broadcasting Station CFAC
Calgary

1. Broadcasters make extensive use of common carrier wideband private line facilities for carrying signals from studio to transmitter sites and for network distribution.

2. In many cases the communication circuits between the broadcasting studio and common carrier premises are privately owned. These privately owned systems are interconnected with the common carrier networks in order to carry information to desired destinations.

3. Since broadcast circuits are special purpose circuits both broadcasters and common carriers co-operate with each other to achieve the desired operational standards.

4. No interconnection problems exist and all technical requirements for interconnection are well defined and agreed before the common carrier service is acquired.

USER: CANADIAN ELECTRICAL ASSOCIATION

(The following submission was made on 20 April, 1970 for the Canadian Electrical Association by A.C. Beresford, CEA representative on Telecommission Study 8(b). As will be noted these comments will appear in the sub-study 8(b)iii, Terminal Devices, as well as appearing here.)

The Canadian Electrical Association is the national association formed by the major electric power generating, transmitting and distributing utilities in Canada, together with associated manufactures and suppliers. The electric utilities of all ten provinces and Yukon are represented, including all eight provincially-owned organizations. Generating capacity of approximately forty million horsepower serves over six million customers in Canada and the capital investment of the utilities is over twelve billion dollars. Over225,000 circuit miles of telecontrol facilities are used to ensure reliable, low cost, electric power service to the public.

From the electical utilities' point of view, it is somewhat difficult to make a clear distinction between interconnections which fall under the terms of reference of Study 8(b)i and those that properly fall under 8(b)iii. Any attempt to separate the material will only result in an oversimplification of some rather basic user interconnection problems. Furthermore, in large measure, the majority of problems arise principally from tariff (and in some cases arbitrary) rulings

of the common carriers as to just what they will, or will not do, in various interconnection situations.

Historically, the common carrier attitude toward interconnections is based upon the fact that for many years no other organizations understood the problems associated with speech transmission. In many instances, this was used to restrict attachments and interconnections and perhaps the attitude was technically justified twenty-five years ago. Most assuredly this is no longer the case, and today many organizations, both manufacturing and operating outside the common carrier field, fully understand telephone theory and practices. These organizations have competent communications engineering staff, who are entirely capable of designing, installing, measuring and applying the equipment and parameters involved. Furthermore, as users they are in a much better position to appreciate and solve their own unique problems and needs. Today, measuring equipment and methods have become more precise and standarized throughout the whole communications and control industry, and both the user and the common carrier are talking the same language. It is, therefore, now possible to specify conditions in technical terms only and which may be measured and understood by both parties. An interconnection agreement can therefore be drawn up between the two parties clearly detailing the conditions of interconnection and the responsibilities of each.

There is nothing unique or mysterious about such an agreement, and in fact this is precisely what is done between the various members of the Trans-Canada Telephone System, and also the telegraph companies, where the telephone companies lease channels to and from the telegraph carriers.

There is, therefore, no reason today why this cannot be done between any common carrier and a properly engineered and maintained private communication system.

Leased facilities (as opposed to wholly owned circuits) have been used by power utilities for many years. The majority are used for telecontrol and protective relaying, and usually consist of short cable and direct wire circuits, where no other facilities are available. There are few, if any, relaying tone assistance channels on leased facilities in Canada.

Modern society has become completely dependent on reliable electric power. The primary consideration in the planning and design of any aspect of the network must always be one of utmost reliability. Telecontrol, including whatever medium is used to carry the intellignece, must always be considered an integral part of the modern power system. The utility must therefore be in a position to specify and control not only the technical requirements for the circuits, but also the day-to-day and long-term operation and management factors governing the supply, use, maintenance, operation and availability of the circuits. It is for this, and important technical reasons, that

utilities install and operate their own wholly-owned communications systems in the majority of cases. The privately-owned systems must for technical reasons equal the quality and reliability of circuits available from the common carrier. Common carrier systems are designed on the basis of average speech use, and could not tolerate the high duty factor of continuously operating tone and telecontrol equipment as required by electrical utilities. An example of this is the fact that a microwave system designed to handle 600 voice channels as installed by a telephone carrier, would in reality only be able to handle a total of 120 channels if subject to the duty factor requirements of the electrical utility equipment. This is not intended to imply that there is a fundamental weakness in the 600 channel system of the common carrier, but simply that the system is designed to satisfactorily handle speech, but not the specialized requirements of an electrical utility.

Having in mind the above background, the Canadian Electrical Association attempts to approach interconnection agreements from a purely objective point of view. We always ask ourselves the following question when negotiating an interconnection agreement. "How would we, as an electrical utility, react to the interconnection of unknown devices to our network having due regard for connected load and the possibility that incipient failure may cause system degredation?" Having asked the question, our reaction is generally one of acceptance of interconnection

provided that technical incompatibilities are eliminated, the device is engineered, installed and maintained by competent persons, and that each party clearly understands his responsibilities. In other words, we approach the interconnection from a purely objective engineering basis, and we sincerely believe that the same approach should be taken in negotiating interconnection agreements between private systems and the common carriers.

In preparing this submission, the Association circularized all utility members and the following are extracts from the survey:

(1) Existing interconnection agreements differ radically from one end of the country to the other, with the most restrictive interconnection practices appearing to exist in the mid-western part of the country and the most liberal being on the west coast. There are some indications that, in the event of possible future major interconnections on the east coast, here the common carriers might become excessively restrictive.

(2) Maximum system levels, as permitted by the common carrier, do not appear to present too much hardship to the utilities in most non-critical applications. Open wire leases do however present many problems due to poor signal-to-noise ratios and reliability.

(3) Terminal devices which interface the common carrier and the utility do not appear to present many problems. Where problems do arise, little difficulty is experienced in rectifying them as the necessary parameters are fairly easily verified.

(4) The terminal device (where it is the interface) should preferably be owned and maintained by the party that can most efficiently maintain it on the basis of rapid service and economics. Many utilities would prefer that the device be electrical utility owned where it is on utility property.

(5) Standardization and multiplicity of terminal devices do not present a selection problem to electrical utilities.

(6) (a) Where a channel of a defined bandwidth is leased from a common carrier, the user should be permitted to multiplex or subdivide the channel as he so desires, having due regard for composite levels specified by the common carrier.

(b) In some instances, common carriers exercise an additional 25% interexchange charge where the customer instals multiplex equipment. The utility position is that this charge is unreasonable and should be dropped.

(7) Leasing and rental charges elicited very little comment, although the point was made that circuits are leased on a

"zone" basis, which approximates a charge per mile, whereas in reality the charges are more nearly on a cost per terminal basis.

(8) (a) All utilities foresee the day where readings from residential customer metering installations will be performed automatically by way of the local public exchange telephone network.

(b) Similarly, many foresee the day when isolated stations will automatically report troubles via the D.D.D. network.

(9) Of necessity most utilities custom design their own dispatch consoles. These consoles invariably incorporate utility designed and owned telephone switching equipment for private circuit facilities. In many areas, the telephone company refuses to permit termination of the local public exchange line on the utility switchboard, despite the fact that measures may be taken to prevent deliberate or accidental interconnection of the two systems. Instead, the telephone company insists upon installation of a separate telephone instrument which is inefficient, invariably unharmonious and incompatible with the overall decor, and generally does not permit of even a separate panel mounting for the dial. This is considered to be a most unreasonable approach with the

situation being more the rule than the exception across the country.

(10) Most utilities report dissatisfaction with the frequent, unexplained, precipitate, and unannounced short interruptions which take place with leased facilities. Many utilities have resorted to installation of interruption counting and alarming devices upon their leased pilot wire channels because of this widespread problem. The problem is believed to be caused by telephone company personnel who are unfamiliar with the requirements for constant continuity of even an apparently insignificant pair of leased wires. An almost constant program of education, plus day-to-day contact with local telephone representatives has helped but unless continuity of personnel is maintained in the telephone regional organization, the problem immediately re-appears. It is worth noting that this problem, perhaps more than any other, forced electrical utilities, in both the U. S. A. and Canada, into their first privately owned cable and open wire facilities some thirty to forty years ago. It is interesting to note the apparent impossibility of solving this interconnection problem even after all these years.

(11) Many utilities expressed dissatisfaction with the vulnerability of telephone company cabling facilities in urban centres. The constant severing by contractors, finger trouble by telephone personnel, extremely small wire

gauge, high transmission loss, and the lack of any guarantee of priority of restoration in re-splicing damaged cables, is of extreme concern to many utilities.

The foregoing has outlined the historical background of the seeming reluctance of common carriers to interconnect with privately-owned utility communications systems, the reasons why the arguments are no longer valid today, the problems that arise where interconnections are made for even non-critical applications, the restrictive and non-uniform practices exercised by the common carriers at various points across Canada, and a brief summary of the reasons why utilities must own and operate their wholly owned and specialized communications systems, which constitute an integral part of the high voltage power system.

It is a fair statement to make, that Canada is probably blessed with the finest public telephone facilities in the world. With all due modesty one may make the same claim for the electrical utilities of our country. However, it is also fair to state, that the communications plant designed to handle public telephone traffic does not in any way, constitute the optimum design or medium for handling all of the major communications requirements of an electrical utility.

There are, and there always will continue to be, certain non-critical applications where it is to the mutual advantage of both parties to establish an interconnection of the two systems. A new, fresh approach is required in defining the ground rules

for establishment of these interconnections without reference to historical traditions, but based rather on a cooperative, objective, economic engineering approach and one which is uniform across the country.

USER: DEPARTMENT OF TRANSPORT (DOT)
Ottawa, Ontario

1. DOT operates a number of services for specific requirements classified as follows:

   - Air and Marine Traffic Control
   - Radio Aids to Air and Marine Navigation
   - Meteorological
   - International and Domestic Air-ground Communications

2. The major portions of the DOT systems are leased from common carriers, while the remainder is owned and maintained by the Department.

3. There is interconnection between DOT operated systems and common carriers switched public telephone network for the following purposes:

   - Air Traffic Control
   - Marine Traffic Control
   - Air to Ground Communications
   - Ship to Shore Communications

   For the last one, the role of DOT is similar to that of a common carrier and public service is offered when required.

4. Where interconnection is involved, DOT circuits and interface equipment are engineered to meet common carrier standards.

5. In spite of good working relations with DOT, common carriers do not always agree to provide facilities for public circuit interconnection to meet the Department's special needs. To quote an

instance, for operational convenience and economy, DOT has recently embarked on a program to remotely monitor the functions of its 287 lighthouses from convenient central locations. At most of these locations there are no reliable communication services and DOT is considering the installation of its own communication network to points where common carrier facilities are available and then route the information via the public switched network. The implementation of this program is held up since both Bell Canada and B. C. Telephone, who control most of the interconnection locations, have so far declined to agree to the required interconnection or any effective alternative.

6. For pollution control in the Lake Erie area DOT has proposed setting up an air patrol using VHF equipment and frequency synthesizer in one of its aircraft. The object is to detect and report any oil patches and probable offenders as and when necessary. To achieve an operational air to ground system DOT needs interconnection with Bell Canada VHF mobile base stations located along Lake Erie. Bell Canada has been approached on this matter in late 1969 but no satisfactory response has yet been received.

USER: FORD MOTOR COMPANY LIMITED
Oakville, Ontario

Ford Motor Company, like other large corporations, makes extensive use of communication for data on sales, ordering, production, flow of materials, etc. The following communication systems are in use:

Intercommunication System

This privately owned system, installed at Ford headquarters about 20 years ago, is still providing a good and reliable service. The maintenance is supplemented by a periodic system check by the manufacturer's representative. The intercom system is extended to the main plant about half a mile away via a Bell Canada cable but there is no interconnection with the switched public network.

VHF, UHF Radio System

This mobile radio system is used for the control of Ford vehicles operating in the plant area. Though this is a minor aspect of the company's business, reliable and continuous communication is considered essential for the continuity of work and the safety of men and materials.

Private Line and Computer Input Circuits

Private line circuits are leased from common carriers to form the bookkeeping and logistics network of the company.

Orders from dealers are sent to regional offices. The regional offices are connected by private line to Oakville. Here

the orders are received, sorted and routed by computer to the appropriate plant where this data is the basis of the production schedule. Orders for models not produced in Canada are automatically routed to Detroit.

The Ford operation for receiving and storing of parts, components and materials is tightly scheduled. Hence good communications is essential.

To achieve effective control over the entire operation, various suppliers and shippers are also linked to Ford headquarters by means of Telex and TWX.

Ford has private lines leased from both the telephone and railway common carriers but has no major requirements for interconnection of these circuits with each other or with the public switched telephone network.

USER: HOTEL ASSOCIATION OF CANADA

1. The hotelmen of Canada have been concerned for many years with the rising costs of their telephone departments and would like to see changes made which would provide relief in several areas.

2. The Hotel Association of Canada presented a brief to the Canadian Transport Commission in February, 1969. At that time the brief was submitted on behalf of about 3,500 hotels in Canada, and its purpose was to oppose the policy in respect to charges being made by the Bell Telephone Company in Eastern Canada, as well as to voice protest against the request of that company to obtain higher rates for certain services.

3. The major areas of complaint are as follows:

- The hotel industry, does a great deal of work on behalf of telephone companies without receiving adequate compensation.
- Hotels are charged a higher rate for extension service than private residences. Hotels feel that since they provide accommodation comparable to private residence, they should not have to pay more than the average householder does for private line service for its guests.
- There does not appear to be any consistency in some provinces in the contracts made between the hotels and the telephone companies. In some cases there are no contracts

but just a letter of intent to cover the equipment installed in the hotels, and these letters of intent differ widely from one area to another.

- Many hotels have paid rental charges on the same PBX as originally installed with no suggestion that it be removed and more modern equipment substituted. This applies in many instances to the telephones in the bedrooms.
- When a telephone directory is destroyed or taken away from a pay-booth, a new one is installed in its place. Some hotels are made to pay 75¢ for each additional copy to replace those destroyed or taken from a bedroom.

4. To ease the present burden of losses which the hotel industry is continuously sustaining, the Association feels that in addition to taking steps to redress the above grievances the following changes should also be considered:

- A choice to either purchase or lease equipment other than from the telephone company if better terms can be arranged.
- Telephone operators paid for by the telephone company to offset the unrecoverable cost* borne by hotels through telephone service.
- A commission of 15 percent on outgoing paid calls and incoming collect calls and a commission of 15¢ for each credit card call and each outgoing collect call and third-party charges.

* Hotel guests are normally charged between 15¢ and 50¢ for each local telephone call made from hotel rooms.

HOTEL ASSOCIATION OF CANADA
INCORPORATED
AFFILIATED WITH THE INTERNATIONAL HOTEL ASSOCIATION • INTER-AMERICAN HOTEL ASSOCIATION
OFFICIAL DIRECTORY: "WRIGLEY'S HOTEL DIRECTORY"

Hotels claim Bell charging too much

By TERENCE BELFORD

The Hotel Association of Canada says it is subsidizing the operations of Bell Canada in hotels and plans to ask the Canadian Transport Commission to end this practice. The CTC will convene to hear Bell's application for increased rates and tariffs May 20.

In a brief tabled yesterday the association, which represents about 3,500 Canadian hotels and motels, includes an example of the subsidization.

A survey of the telephone departmental operations of 42 Canadian hotels show that the hotels lost $772,000 on telephone sales of $3,322,000 in 1968. This compares with a loss of $616,000 on sales of $3,094,000 in 1967 and $476,000 on sales of $2,798,000 in 1966.

The average loss on telephone service for each available room was $46.42 in 1968. In Ontario the loss was $52.46, compared with $46.55 in Quebec and $37.83 in all other provinces.

Bell Canada charges 5 cents for an outgoing call and has asked this be increased to 10. It charges the hotel a monthly rental on equipment to handle incoming and outgoing calls and the hotel provides staff to handle the equipment.

The brief says Bell must prove it needs the rates increase and, in the association's opinion, there is not enough evidence presented by Bell to arrive at reasonable rates.

It adds that the burden of proof should also rest with Bell in the matter of charges to hotels.

According to the association, it should not have to pay more than the average householder does for private line service for its guests.

"Hotels are charged a higher rate for extension service than private residences . . . This contributes to the unrecoverable costs borne by hotels. Accordingly, Bell Canada is indirectly subsidized by hotels to the extent of such unrecoverable cost resulting in undue discrimination against hotels."

The submission says Bell does not equitably distribute revenue requirements through various classes of service. The value of service to a residence customer is as great as the value of service to a business customer. Bell has not weighed its objectives and effected a balance among them.

Hotels want the same status as private residences as far as telephone charges go, the association says.

Provision of telephone service to hotels and to hotel guests should be compared to the same rate structure as charged to residences since hotels provide accommodation comparable to private residences.

"The method of charging for calls on a per-message basis and the administration thereof by hotels is unjust and unreasonable."

The association feels it should receive an equitable commission on long distance calls and receive indemnity for uncollectible charges.

In addition, the hotels want:

—A choice to either purchase or lease equipment other than from Bell Canada if better terms can be arranged.

—Telephone operators paid for by Bell to offset the unrecoverable cost borne by hotels through telephone services.

—A commission of 15 per cent on outgoing paid calls and incoming collect calls and a commission of 15 cents for each credit card call and each outgoing collect call and third-party charges.

The brief follows one filed in March that did not offer Canadian figures but suggested that U.S. industry-wide losses absorbed by hotels amount to $25-million annually.

USER: HYDRO-QUEBEC
75 Dorchester Boulevard West,
Montreal 128, P.Q.

1. Hydro-Quebec has had its own telecommunications system for more than 30 years and installed its first microwave system about 15 years ago, as among other things, it was also the most economical solution to a major communications problem.

2. In the opinion of Hydro-Quebec, microwave and associated telecommunications systems carrying information necessary for the operation, control and protection of the power system form an integral part of the power network and should therefore be under direct control of the Hydro authority so that the required reliability and security can be maintained. The Hydro-Quebec microwave system, in addition to being used mainly for power system operation and protection, also carries administrative circuits.

3. No general interconnection facilities exist between the Hydro-Quebec telecommunications system and the public telephone network. Such interconnections are not favoured and are looked upon as leading to a lowering of system security and reliability. If "interconnection" is possible in the future, Hydro-Quebec would like to see "freedom-of-choice" available so that they could install the arrangement ("privately" owned or "interconnection") best suited to their particular requirements.

4. As a special case, at Rouyn, a few Hydro-Quebec telephone circuits have been made available (free-of-charge) to Northern

Telephone to extend public telephone service to generating stations and sub-stations in this area. In addition, during the construction stage of the Manicouagan Project, (Outardes 3, Outardes 4, Manic 2 and Manic 5) Hydro-Quebec is leasing approximately 40 voice circuits to Quebec Telephone at inter-telephone company rates so that public telephone including pay-phone service could be installed in the construction area catering to about 2,000-3,000 construction workers. It is understood that after the construction phase, Hydro-Quebec will allow Quebec Telephone to retain a few circuits (free-of-charge) in order to extend public telephone service to the new hydro stations. These telephones would be treated as local extensions of the Quebec Telephone Baie Comeau exchange.

5. Hydro-Quebec headquarters in Montreal has approximately 2,000 telephones and forms the nerve centre of the entire power system operation. DDD facilities connecting 35 regional offices are available. All power generating stations and sub-stations are equipped with public telephones. At the Montreal headquarters two large and separate exchanges are installed - one is dedicated exclusively to the Hydro system and the other to the public network.

6. Inter-company interconnection with the New Brunswick Electric Power Commission is made via power line carrier. This medium is also used to provide interconnection with Alcan by means of their Saguenay PBX.

USER: IBM Canada Ltd.
Don Mills, Ontario

1. IBM has a large leased telecommunication network for administrative and data processing purposes. Twenty-three IBM Datacentres from Victoria to St. John's are linked by common carrier telecommunication facilities. The networks are entirely composed of circuits provided by telephone companies and CN-CP Telecommunications.

2. The network has grown at a rapid rate over the past few years.

3. The IBM Datacentre offers a wide range of remote data processing services available from a number of locations in Canada.

4. For remote data processing services the customer, through a terminal in his office, can communicate directly with the desired computer via a public or leased telecommunication link.

5. In some cases the customer does not have much freedom in choosing the communication facilities for certain remote data processing services since the carriers will not allow interconnection of their telecommunication services. In this environment the customer may not be able to obtain the most efficient and economical service depending upon his existing network facilities.

6. Interconnection, by using privately-owned equipment, of telecommunication carriers' leased line services with switched services, and interconnection between these services and privately-owned telecommunication facilities would be helpful in encouraging expansion and new developments of data processing applications

and services. Users of data processing would benefit from the expansion of applications and economies which would result.

IBM recognizes the importance of maintaining the integrity of the telecommunication carrier's system. IBM believes, however, that a more liberal policy toward interconnection should be considered and that suitable technical specifications can be determined to permit this.

USER: INTERPROVINCIAL PIPE LINE COMPANY
10015 103rd Avenue
Edmonton, Alberta.

1. Interprovincial Pipe Line Company and its U.S. subsidiary, Lakehead Pipe Line Company, operate a multiple system of 5,100 miles of pipeline from Edmonton to Toronto and Buffalo, N.Y. The majority of the pump stations are controlled from Edmonton with the assistance of a central on-line System 360 computer. All pump stations thus controlled are equipped with PDP-8S computers.

2. The operation of the pipeline is controlled via a leased telephone and data network provided by AGT. The system basically consists of:

   a) One 300 baud data circuit for data transmission

   b) One party line teleprinter circuit

   c) One broadband party line data channel currently being used for voice transmission.

   d) Public telephone service to all pipeline stations.

3. The service provided by AGT is considered satisfactory though problems do exist to bring about fast, coordinated reaction from the various participating telephone companies, particularly those in the U.S. section of the pipeline, during system failures or faults. Overall reliability is claimed to be 97%.

   Lease rate on the Canadian portion of the circuit is approximately $4.00 per month for voice grade circuits.

4. There is no interconnection between the leased circuits and

the public systems and Interprovincial does not want this type of interconnection at present.

5. AGT has intimated to Interprovincial that the latter can use its own data modem (Spec. by AGT) though AGT will carry out installation and interconnection.

USER: ONTARIO HYDRO
480 University Avenue
Toronto

1. Ontario Hydro has leased a large complex of telephone circuits and associated equipment mainly from Bell Canada to meet all of its administrative communication needs (Bell Canada-Hydro agreement is based on 30-day termination).

2. A frequency diversity microwave radio system is now under construction to be used primarily for power system protection and control. Barring a few operational voice channels no other voice circuits are contemplated.

3. Some power line carrier telephone circuits exist but these are gradually being phased out in areas being served by microwave radio.

4. By special agreement with Bell Canada, Ontario Hydro can dial out over the leased circuits to the public exchange. However incoming calls from outside are barred from access to the leased channels.

5. Power line carrier telephone circuits and leased circuits are terminated at the same PBX and Bell Canada has agreed to allow Ontario Hydro to interconnect these private circuits with the public network under emergency conditions via associated PBX.

6. Ontario Hydro is reasonably satisfied with the administrative telephone service it gets from Bell Canada, both in terms of

quality and reliability and has no present plans to replace existing leased facilities with its own communications system.

7. Points of interconnection with other utilities are:

Manitoba	-	Seven Sisters Generating Station	
Quebec	-	Beauharnois	Bryson
		Masson	Rouyn
		Val Tetreau	Kipawa
		Paugan	Rapide des Iles
U.S.A.	-	Niagara Falls,N.Y.	Detroit, Mich.
		Lewiston, N.Y.	Marysville, Mich.
		Massena, N.Y.	St. Clair, Mich.

THIS SERVICE AND INTERCONNECTION AGREEMENT

made in duplicate the 1st day of January 1967.

BETWEEN:

THE BELL TELEPHONE COMPANY OF CANADA

hereinafter called "the Telephone Company"

OF THE FIRST PART

- and -

THE HYDRO-ELECTRIC POWER COMMISSION OF ONTARIO

hereinafter called "the Power Commission"

OF THE SECOND PART

WHEREAS the parties hereto entered into an Agreement dated the 25 day of November, 1952 whereby the Telephone Company agreed to provide services and facilities to the Power Commission for its communications needs and also to interconnect certain facilities of the Power Commission with the facilities of the Telephone Company; and

WHEREAS the said Agreement has been extended from its formal expiry date by mutual agreement, as evidenced by correspondence dated the 9 day of October and the 11 day of October, 1957; and

WHEREAS the communication services and facilities listed in Schedule A of the aforesaid Agreement have been substantially

retired or disposed of; and

WHEREAS the parties hereto desire to enter into a new Agreement superseding and replacing the existing Agreement as extended as foresaid; and

WHEREAS the Power Commission undertaking includes the operation of stations and power lines which may be erected on properties between or beyond the areas served by the exchanges operated by the Telephone Company; and

WHEREAS interruptions in the continuity of the Power Commission's operations may endanger the public welfare and safety; and

WHEREAS satisfactory communication services and protection and control circuits are essential for the Power Commission's operations and also for the prompt restoration thereof in the event of breakdown; and

WHEREAS the Power Commission intends to continue to secure the bulk of its communication services and certain of its protection and control circuits from the Telephone Company and desires to interconnect certain of its facilities with facilities of the Telephone Company; and

WHEREAS the Power Commission has established and will continue to extend, operate and maintain, a supplementary network of communication services, hereinafter in this Agreement referred to as "the Supplementary Network", to provide diversity between locations where temporary interruptions of the service

being provided on Telephone Company facilities would cause a serious disruption to Power Commission operations;

WITNESSETH that in consideration of the terms, conditions and agreements hereinafter contained, the parties hereto mutually agree as follows:

1. In this Agreement:

"Communication services" mean telephone communication services for transmitting messages between persons, and

"Protection and control circuits" means circuits utilized for the purpose of providing protection to, control of, or information pertaining to the operation of, the Power Commission's works, whether the terminal equipment is automatic or manually-operated.

2. The Telephone Company, within the operating territory within which it now provides or may hereafter provide communication services to the public, will furnish, install and maintain, communication services and protection and control circuits as requested by the Power Commission for use in the operation of its undertaking, which may include the provision of such services and circuits from or to a point on a right-of-way, or a station, outside the aforesaid operating territory, upon and subject to the terms and conditions, rates and charges contained in the Telephone Company's tariffs from time to time established and in force, except where there is no applicable tariff, in which case the terms and conditions, rates and charges shall be established by negotiation with the Power Commission and shall

generally be equivalent to those rates and charges applicable to other customers securing similar services from the Telephone Company; provided that the services and facilities supplied shall meet or exceed the generally accepted current practices of the telephone industry in respect to noise, band width, and transmission level.

3. Where the Power Commission maintains and operates a supplementary network or any other communication services, the Telephone Company shall interconnect such network or services with Telephone Company terminal equipment, by means of channel facilities, which shall be provided by the Telephone Company, extending from a terminal of the Power Commission's circuits, within or near a telephone exchange or local service area, to the Telephone Company's said terminal equipment within an exchange or local service area, provided that where connection is required into the general telephone network, clauses 8 and 9 will apply.

4. Where the Power Commission is providing its own protection and control facilities, circuits in such facilities may be utilized as voice circuits for part of the Power Commission's supplementary network and shall be interconnected with the Telephone Company's terminal equipment in accordance with clause 3.

5. Where protection and control circuits are provided by the Telephone Company, the required terminal equipment will be provided by the Power Commission unless otherwise agreed upon by the parties hereto.

6. Where the Power Commission desires interconnection of the communication services and protection and control circuits, provided by the Telephone Company pursuant to clause 2, with terminal equipment of the Power Commission, such interconnection shall be made in accordance with mutual agreement between the Power Commission and the Telephone Company.

7. Communication services provided by the Telephone Company in accordance with clause 2, and connected with facilities of the Power Commission, shall be made available by the Power Commission, only to its own personnel or to persons using such facilities for Power Commission business.

8. The supplementary network and any other communication services derived from equipment provided by the Power Commission, may be used by the Power Commission in conjunction with facilities of the Telephone Company, for connection into the general telephone network, subject to the provisions of paragraphs (a) and (b) below:

(a) Facilities of the Power Commission that meet the generally accepted current practices of the telephone industry with respect to noise, band width, and transmission level, may be so used, while other facilities of the Power Commission may be so used only in cases of emergency involving safety of life or property;

(b) When the facilities of the Power Commission are con-

nected to the Telephone Company's general network, they will not at the same time be connected elsewhere to the privately-owned communications facilities of others, except where such connection is made for the conduct of Power Commission business, or in cases of emergency involving safety of life or property, and the Power Commission will take such measures as in its opinion are effective to restrict such connections as aforesaid.

9. The Telephone Company assumes no responsibility for the quality of service nor for failure of transmission from any cause whatsoever resulting from the emergency conditions referred to in paragraphs (a) and (b) of clause 8 above.

10. Facilities of the Power Commission connected with facilities provided by the Telephone Company will be so constructed, maintained and operated as to work satisfactorily with the facilities of the Telephone Company, and each party hereto will take all reasonable precautions to ensure that its circuits which may be connected pursuant to this Agreement will not cause hazard to any person or property; upon written notice by either party that circuits of the other party cause or are likely to cause such hazard, the other party at its own expense will promptly make such changes in its facilities so connected as are reasonably necessary to remove the hazard.

11. Where either party deems special protection devices to

be necessary, such devices as are approved by both parties shall be installed and maintained by one of the parites hereto. Where, at the request of either party, additional expense over and above normal installation and maintenance cost is incurred by the other party in so doing, such additional expense shall be apportioned between the parties hereto in accordance with mutual agreement reached between them.

12. As of the 1 day of January, 1967 this Agreement shall supersede and replace the aforesaid Agreement dated the 25 day of November, 1952 as extended by letters dated the 9th day of October and the 11 day of October, 1957 and shall continue in force and effect for an original period of five years from the 1 day of January, 1967 and thereafter from year to year unless and until terminated by either party upon six (6) months written notice to the other prior to the end of said original period, or any such yearly period.

USER: TRANS MOUNTAIN OIL PIPE LINE COMPANY
400 East Broadway
Vancouver, B. C.

1. Trans Mountain Oil Pipe Line Company uses a communications system for its pipe line operation which is entirely leased. Existing facilities include:

   a) A high grade voice circuit consisting of a microwave channel.

   b) 300 baud party line data circuits operating at 150 baud for digital telemetering and digital remote control.

   c) Full voice channels for multiplexed analog telemetering and control.

   d) Private wire teleprinter circuit.

   e) D. C. loop telegraph circuits.

   f) Telex facilities.

   Annual rental for the above dispatch, control and telemetering facilities is in the order of $100,000.

2. Communications required for administrative and maintenance functions are carried out via the public telephone network, telex, private wire teleprinter or VHF radio facilities. All pump stations, administrative centres, maintenance centres and central warehouse facilities are provided with separate telephones, teleprinters and/or VHF radio facilities for this purpose.

3. The private line circuits are leased from the common communications carriers as shown below:

a)	Edmonton-Edson-Jasper-Kamloops-Sumas-Vancouver (Voice Dispatch)	CNR Microwave
b)	Edmonton-Gainford (Telemetering and Control)	CNT
c)	Niton-Edson-Jasper-Red Pass (Telemetering and Control)	AGT
d)	Albreda-Blue River-Black Pool-Kamloops-Kingsvale (Telemetering and Control	BCT
e)	Hope-Chilliwack-Sumas (Telemetering)	CNT
f)	Sumas-Sumas Mountain (Telemetering and Control)	BCT
g)	Sumas-Laurel (U.S.) (Telemetering and Control)	BCT
h)	Vancouver-Sumas (Telemetering)	CNT
i)	Vancouver-Burnaby-Sumas-Laurel-Ferndale-Anacortes (private Line Teleprinter)	BCT

4. There is no interconnection between the leased systems and the public switched networks and in the pipe line company's point of view such an interconnection is not necessary.

5. It is understood that Trans Mountain has only minor difficulties with regard to the telephone companies and the leased facilities.

APPENDIX B

CARRIERS

CARRIER: CANADIAN NATIONAL-CANADIAN PACIFIC TELECOMMUNICATIONS

1. With the exception of Newfoundland, Yukon and Northwest Territories, CN-CP does not provide switched telephone service to the general public. Excluding Telex services, its role in other provinces resembles that of an entrepreneurial system, offering telecommunication services for hire.

2. CN-CP has already established a 960 voice channel capacity microwave network mainly intended for data transmission. Circuits derived from this network are presently used at speeds up to 4,800 baud in our broadband switching service. Fifty percent of broadband circuits provide voice communication capabilities in terms of hot lines, conferences, rapid dialling, broadcast facilities, etc.

3. There is not general interconnection facilities between CN-CP and the public telephone networks. However, on the basis of a past agreement interconnection facilities are available for a limited number of CN-CP circuits for intra-company usage.

4. CN-CP is currently negotiating with TCTS to establish a general interconnection agreement between the CP railway network and the Bell switched network. So far the negotiations have not been fruitful. As interconnection facilities do not exist between the CN-CP broadband and the telephone companies' local telephone switching system, difficulties are often experienced in selling broadband service to the customer.

5. With regard to interconnection between the railways and private systems, CN-CP will allow such interconnections with the reservations that

a) CN-CP will not be responsible for the operation and performance standards of the private systems if affected by interconnection.

b) Private systems should in no way interfere with other circuits carried by the CN-CP network.

c) CN-CP will have the right to disconnect any interconnected private system without any notice if, in the carriers' opinion, the private system is considered to be degrading the performance of the CN-CP network.

CARRIER: NORCOM TELECOMMUNICATIONS LIMITED
Kenora, Ontario

1. In the early 1950s a small private company (Norwesto Communications Kenora Ontario) started operation in North Western Ontario providing telephone services to a large number of fishing, hunting and mining establishments from Kenora as far north as Hudson's Bay, pioneering the use of transportable HF and VHF radio equipment in that area. The central facilities in and around Kenora were interconnected with the Northern Telephone system which provided long distance trunk service throughout Northern Ontario. Norwesto later merged with Northern Telephones.

2. Subsequently in the early 1960s under the same management and ownership as Norwesto, Norcom Telecommunications Limited was formed and incorporated by Federal Charter. Norcom owned and operated a private microwave network connecting the major centres in North Western Ontario (Fort Frances, Atikokan, Kenora, Dryden, Red Lake) carrying telephone channels between these centres under contract with Northern Telephones Ltd., and television under contract with the CBC. For TV the network was interconnected with the transcontinental CN-CP microwave system which carried the CBC program from Winnipeg to the interconnection point (private line service). For telephones the Norcom network was interconnected at many places with the

Northern Telephone trunk line system (public switched network) which in turn was interconnected with the municipal telephone systems of the various centres.

3. The Norcom network did not carry any traffic of its own, except for maintenance channels. It was therefore a pure form of "entrepreneurial system" based on the concept of carrying TV and a relatively small amount of telephone traffic on one and the same system. Thereby it was possible to offer services at a price substantially below that which was being asked by the common carriers for providing the services separately on common carrier facilities. Without the concept of combining traffic it would have been many years before the CBC could have afforded TV service in locations such as Red Lake and Atikokan, and it would also have taken much longer before those communities were provided telephone service to the extent and quality available by microwave links.

4. After Norcom had been in successful operation for several years control of Northern Telephones Ltd. passed to Bell Canada and subsequently in 1968 Bell bought the Norcom microwave system which it still operates. Norcom itself is now working in the cable television field.

5. All interconnection arrangements were worked out directly between Norcom and the common carriers (Northern Telephones for telephony, and CN-CP for television) and no difficulties were encountered in this respect.

CARRIER: PAGETTE AIR SIGNALS LIMITED
Toronto, Ontario

1. Pagette Air Signal Limited is a Restricted Common Carrier (RCC) operator which provides radio paging service and radio land mobile service to a wide cross-section of private users across Canada.

2. The paging system uses either one-way tone paging or voice paging, of which the latter is more popular. A home office wishing to contact a field representative calls the central paging office and identifies his party by code number. The operator pages either by tone or voice (in which case a message can be delivered). The paged party then communicates with his home office via the normal telephone system.

3. Paging systems using dial access interconnection through the public switched telephone network to paging units in the field, and employing a 20-second time element cut-off to prevent holding the system, are in use in the United States. Pagette Air Signals Limited is in favour of this type of interconnection if an appropriate policy were established for their use through government and the common carriers. The only apparent danger to overloading the system exists if the individual reveals his page number indiscriminately. This is considered a matter of company or personal discipline. It is not a consideration in the present configuration since the central paging operator responds only to dedicated callers.

4. Regarding the radio land mobile service the company is interested in an acoustically coupled patching system which would allow the operator access to the public telephone system without actual physical connection. The acoustically coupled patching system would be as an option to the physical interconnection which is the better method.

CARRIER: TRANS-CANADA TELEPHONE SYSTEM

The following paragraphs contain the request for information and the response made by TCTS. Because policies are individual to particular companies and vary across the country, no response has been provided in certain cases.

1. TCTS policy regarding interconnection of switched telephone network with

   a) private telephone systems (owned or leased)
   b) private teletype and data sets
   c) computers
   d) private voice frequency equipment.

   a) Private Telephone Systems

   Customer provided (leased or owned) systems are not generally permitted access to the switched telephone network. Policy allows for exceptions to this provision for certain economic and or public interest reasons.

   b) Private Teletype

   Customer owned devices of this type are permitted access to the switched telephone network via a telephone company provided interface. Terms and conditions are covered in detail in material submitted to the Telecommission Study 8 (b) (iii).

   c) Computers

   Access to computers from customer provided terminals, via the general switched network is accommodated by TCTS policy

under terms and conditions which are detailed in material submitted to the Telecommission Study 8 (b) (iii).

d) Voice Frequency Equipment

This category is broad in scope. Voice frequency equipment functioning in a terminal mode is covered under the policy applying to devices. (See b) and c) above.) These equipments functioning as an integral part of a system would be treated under policy applying to systems (1a). For example, multiplexers functioning on a point-to-point, private line system, with no network access are permitted. However, multiplexers functioning within a system which is accessed over the general switched network so that they become an integral part of the switched network capability and design will be provided by the telephone company.

2. TCTS policy regarding interconnection between

a) a privately owned telephone system

b) broadband interconnection (TV and data) between a privately owned system and a leased system.

c) broadband interconnection between two or more leased systems (possibly leased from different carriers).

a) Privately Owned Telephone Systems

Systems such as PBX's will be interconnected by facilities of the T.C.T.S. Companies between the same user or different users,

provided there is no access to the switched telephone network. Carrier systems owned by or leased by customers will not be interconnected under current policy to the facilities or equipment of the telephone companies. Policy in this regard allows for exceptions which are determined on a case by case basis. Private systems constructed by right-of-way companies serving their own needs in remote areas, and public service organizations such as police, fire, broadcasters, etc., are typical of those special situations that dictate the public interest is best served by interconnecting a private system.

b) Broadband Interconnection TV and Data Between a Privately-owned System and a Leased System

TCTS companies will interconnect their facilities to those of a TV network operator. Data interconnection would be treated on a case by case basis.

c) Broadband Interconnection Between Two or More Leased Systems (possibly leased from different carriers)

Regarding switched data broadband interconnect, the TCTS companies do not offer such a service at this time. Regarding private line broadband interconnection, the policy is the same as that pertaining to today's private line services.

3. TCTS opinion and reaction regarding interconnection between two or more privately owned systems.*

No response provided.

* Refer to official T.C.T.S. submission on Telecommission Study 8 (b)(i), Section A, page 8, attached.

4. TCTS policy regarding multiplexing a number of data channels on a leased telephone channel using user's own equipment meeting TCTS required specifications.

TCTS companies permit users to supply their own multiplexing facility on voice grade private line systems. Multiplexing of the switched network has been maintained as a function of the carriers.

5. TCTS policy regarding amateur radio operator's practice of patching circuits via telephone handset.

Patching of radio systems by any radio operator to the switched telephone network is not generally permitted.

6. TCTS policy regarding interconnection between public switched networks with emergency private systems used by services like police, fire, hospital, etc. (both fixed and mobiles). *

No response provided.

7. Comments and details of interconnection facilities made available to major private users like Alcan and Ontario Hydro.

Special agreements with power companies such as Ontario Hydro, and Alcan in B.C., are discussed in the response to question 2 a).

When right-of-way companies serving remote areas, provide their own communications facility and it is not economical for the carrier to duplicate the facility, interconnection agreements are established. Additionally, requests from public service agencies such as the government, broadcasters, military, police and fire, etc. have been accommodated by interconnection agreements when it has been in the public's best interest to do so.

* Refer to official T.C.T.S. submission on Telecommission Study 8 (b) (i), Section A, page 8, attached.

8. a) TCTS telecommunication rates and tariffs for public and private telecommunication services (including broadband).

Rates for public and private services including Telpak are attached.

b) A resume of the basis used to develop rates and tariffs for given systems.

In developing rates for quotation to a customer a salesman determines the airline mileage between the terminating points and locates the applicable charges on the attached rate schedules for quotation.

Details of rate making procedures will be discussed in detail in Telecommission Study 7 (a), (b).

TWO-POINT SERVICE

RATES - Typical Trans-Canada Schedule

CLASS OF SERVICE		STATION-TO-STATION						PERSON-TO-PERSON			
		Day		Night and Sunday		Late Night (w)		Day		Night and Sunday	
RATE DISTANCE (MILES)		Weekday 6:00 a.m. to 6:00 p.m.		Weekday 6:00 p.m. to 6:00 a.m. and Sunday		Every day Midnight to 6:00 a.m.		Weekday 6:00 a.m. to 6:00 p.m.		Weekday 6:00 p.m. to 6:00 a.m. and Sunday	
Over	Up to and Including	Initial 3 Minutes	Each Additional Minute	Initial 3 Minutes	Each Additional Minute	Initial 3 Minutes	Each Additional Minute	Initial 3 Minutes	Each Additional Minute	Initial 3 Minutes	Each Additional Minute
0	8	$ .10	$ .05(x)	$ .10	$ .05(x)	$ .10	$ .05(x)	$ .30	$ .05	$ .30	$ .05
8	12	.15	.05	.15	.05	.15	.05	.35	.05	.35	.05
12	16	.20	.05	.20	.05	.20	.05	.40	.05	.40	.05
16	20	.25	.05	.25	.05	.25	.05	.45	.05	.45	.05
20	25	.30	.10	.30	.10	.30	.10	.50	.10	.50	.10
23	30	.35	.10	.35	.10	.35	.10	.55	.10	.55	.10
30	36	.40	.10	.35	.10	.35	.10	.65	.10	.60	.10
36	42	.45	.15	.35	.10	.35	.10	.70	.15	.65	.10
42	43	.50	.15	.40	.10	.40	.10	.80	.15	.70	.10
43	56	.55	.15	.45	.15	.45	.15	.85	.15	.75	.15
55	64	.60	.20	.45	.15	.45	.15	.95	.20	.80	.15
64	72	.65	.20	.50	.15	.50	.15	1.00	.20	.85	.15
72	80	.70	.20	.55	.15	.55	.15	1.10	.20	.95	.15
80	90	.75	.25	.55	.15	.55	.15	1.15	.25	1.00	.15
90	100	.80	.25	.60	.20	.55	.15	1.25	.25	1.05	.20
100	110	.85	.25	.65	.20	.55	.15	1.30	.25	1.10	.20
110	120	.90	.30	.65	.20	.60	.20	1.40	.30	1.15	.20
120	132	.95	.30	.70	.20	.60	.20	1.45	.30	1.20	.20
132	144	1.00	.30	.75	.25	.60	.20	1.55	.30	1.30	.25
144	156	1.05	.35	.80	.25	.65	.20	1.60	.35	1.35	.25
155	168	1.10	.35	.85	.25	.65	.20	1.70	.35	1.40	.25
168	180	1.15	.35	.85	.25	.65	.20	1.75	.35	1.45	.25
180	196	1.20	.40	.90	.30	.70	.20	1.85	.40	1.55	.30
196	212	1.25	.40	.95	.30	.70	.20	1.90	.40	1.60	.30

(v) Includes service between Iles de la Madeleine and any other rate centre

(w) Applies only to customer-dialed calls, except, for message toll calls originating or terminating in exchanges in which equipment is not provided that permits customers to dial their own message toll calls or receive customer-dialed message toll calls, these rates apply to those calls that are the equivalent of customer-dialed calls.

(x) Rate is for 2 minutes.

TWO-POINT SERVICE

RATES - Typical Trans-Canada Schedule

CLASS OF SERVICE		STATION-TO-STATION						PERSON-TO-PERSON			
		Day		Night and Sunday		Late Night (w)		Day		Night and Sunday	
RATE DISTANCE (MILES)		Weekday 6:00 a.m. to 6:00 p.m.		Weekday 6:00 p.m. to 6:00 a.m. and Sunday		Every Day Midnight to 6:00 a.m.		Weekday 6:00 a.m. to 6:00 p.m.		Weekday 6:00 p.m. to 6:00 a.m. and Sunday	
Over	Up to and Including	Initial 3 Minutes	Each Additional Minute	Initial 3 Minutes	Each Additional Minute	Initial 3 Minutes	Each Additional Minute	Initial 3 Minutes	Each Additional Minute	Initial 3 Minutes	Each Additional Minute
212	228	$1.30	$ .40	$1.00	$ .30	$ .70	$ .20	$2.00	$ .40	$1.65	$ .30
228	244	1.35	.45	1.05	.35	.75	.25	2.05	.45	1.70	.35
244	260	1.40	.45	1.10	.35	.75	.25	2.15	.45	1.80	.35
260	290	1.45	.45	1.10	.35	.75	.25	2.30	.45	1.95	.35
290	320	1.50	.50	1.15	.35	.80	.25	2.40	.50	2.05	.35
320	360	1.55	.50	1.20	.40	.80	.25	2.55	.50	2.15	.40
360	400	1.60	.50	1.25	.40	.80	.25	2.70	.50	2.30	.40
400	440	1.65	.55	1.30	.40	.85	.25	2.85	.55	2.40	.40
440	480	1.70	.55	1.35	.45	.85	.25	2.95	.55	2.50	.45
430	540	1.75	.55	1.40	.45	.85	.25	3.20	.55	2.70	.45
540	600	1.80	.60	1.45	.45	.90	.30	3.30	.60	2.80	.45
600	630	1.85	.60	1.50	.50	.90	.30	3.45	.60	2.90	.50
630	769	1.95	.65	1.55	.50	.90	.30	3.65	.65	3.10	.50
760	840	2.05	.65	1.60	.50	.95	.30	3.80	.65	3.25	.50
840	920	2.15	.70	1.65	.55	.95	.30	3.95	.70	3.40	.55
920	1000	2.25	.75	1.75	.55	.95	.30	4.10	.75	3.50	.55
1000	1200	2.35	.75	1.80	.60	1.00	.30	4.40	.75	3.70	.60
1200	1450	2.45	.80	1.85	.60	1.00	.30	4.65	.80	3.90	.60
1450	1675	2.55	.85	1.90	.60	1.00	.30	4.85	.85	4.10	.60
1675	1900	2.70	.90	1.95	.65	1.00	.30	5.10	.90	4.30	.65
1900	2200	2.85	.95	1.95	.65	1.00	.30	5.35	.95	4.50	.65
2200		3.00	1.00	1.95	.65	1.00	.30	5.60	1.00	4.70	.65

(v) Includes service between Iles de la Madeleine and any other rate centre

(w) Applies only to customer-dialed calls, except, for message toll calls originating or terminating in exchanges in which equipment is not provided that permits customers to dial their own message toll calls or receive customer-dialed message toll calls, these rates apply to those calls that are the equivalent of customer-dialed calls.

MILEAGE CHARGES

VOICE-GRADE CHANNELS

3. Inter-Exchange Mileage

(b) Monthly Charge

(1) The monthly charge for each channel and for each leg of a multi-point channel

SCHEDULE A 83 Miles or Less						SCHEDULE B Over 83 Miles					
Rate Distance (miles)	Monthly Charge	Rate Distance (Miles)	Monthly Charge	Rate Distance (Miles)	Monthly Charge	Rate Distance (Miles)	Monthly Charge	Rate Distance (Miles)	Monthly Charge (Y)	Rate Distance (Miles)	Monthly Charge (Y)
¼	$1.40	6	$28.70	13	$79.50	84-91	$371.00	587-622	$1774.00	2126-2265	$2942.00
½	2.50	6¼	27.80	19	83.90	92-100	394.00	623-680	1848.00	2200-2415	2976.00
¾	3.00	6½	28.90	20	88.30	101-110	419.00	681-700	1920.00	2416-2575	3010.00
1	4.70	6¾	29.00	21	92.70	111-121	447.00	701-742	1990.00	2576-2745	3041.00
1¼	5.80	7	31.10	22	97.10	122-133	478.00	743-786	2058.00	2746-2925	3078.00
1½	6.90	7¼	32.30	23	101.50	134-146	512.00	787-832	2124.00	2926-3115	3112.00
1¾	8.00	7½	33.30	25	106.90	147-160	549.00	833-880	2188.00	Over 3115	3116.00
2	9.10	7¾	34.40	25-26	110.00	161-175	589.00	881-930	2250.00		
2¼	10.20	8	35.50	27-29	119.00	176-191	632.00	931-984	2310.00		
2½	11.30	8¼	36.00	30-32	132.00	192-208	673.00	985-1012	2368.00		
2¾	12.40	8½	37.70	32-35	145.00	209-226	737.00	1043-1104	2424.00		
3	13.50	8¾	38.80	36-33	158.00	227-245	779.00	1105-1170	2478.00		
3¼	14.60	9	39.90	39-41	171.00	246-265	834.00	1171-1240	2530.00		
3½	15.70	9¼	41.00	42-44	185.00	266-286	892.00	1241-1315	2580.00		
3¾	16.80	9½	42.10	45-48	195.00	287-308	953.00	1318-1395	2628.00		
4	17.90	9¾	43.20	40-52	215.00	309-331	1017.00	1396-1480	2674.00		
4¼	19.00	10	44.30	53-56	233.00	332-355	1034.00	1481-1570	2718.00		
4½	20.10	11	48.70	57-60	251.00	356-380	1154.00	1571-1665	2760.00		
4¾	21.20	12	53.10	61-66	268.00	381-406	1227.00	1666-1765	2800.00		
5	22.30	13	57.50	66-70	290.00	407-433	1303.00	1766-1875	2888.00		
5¼	23.40	14	61.90	71-76	312.00	434-461	1381.00	1876-1995	2874.00		
5½	24.50	15	66.30	77-83	330.00(x)	462-490	1481.00	1996-2125	2908.00		
5¾	25.60	16	70.70			491-520	1541.00				
		17	75.10			521-552	1620.00				
						553-580	1695.00				

(x) A maximum monthly charge of $871.00 applies. This maximum monthly charge includes the local channel, as required, in each associated exchange.

(Y) Includes the local channel and drop-service charge, as required in each associated exchange.

TELPAK CHANNELS

RENTALS AND CHARGES

1. Base Capacities

   (a) Monthly rentals apply as follows for each mile or remaining fraction:

Telpak A	$25.00
Telpak B	$40.00
Telpak C	$55.00

   (b) Monthly rentals apply as follows for each mile or remaining fraction for each additional telephone-grade channel in excess of the base capacity:

Telpak A	1/12 of $25.00
Telpak B	1/24 of $40.00
Telpak C	1/60 of $55.00

2. Duplex Operation

   (a) Monthly rentals apply as follows for each mile or remaining fraction for duplex operation on channels within Telpak:

	TELPAK A	TELPAK B	TELPAK C
Voice Grade.....	$0.50	$0.40	$0.25
Over 82.5 bauds up to and including 180 bauds..	$0.14	$0.10	$0.06
Up to and including 82.5 bauds.....	$0.07	$0.05	$0.03

TELPAK CHANNELS

RENTALS AND CHARGES - Continued

3. Channel Terminals

(a) A channel terminal is required for each channel or service arranged for use by the lessee or for each connection of such channel or service to station equipment, or for termination of such channel in a wire centre of the Company to establish a channel for foreign-exchange service. The monthly rental for the exchange service associated with foreign-exchange service is included in the monthly rental for the channel terminal. When a channel-switching arrangement is provided, each station at the switching point requires a channel terminal for each of the services or channels to which it is connected and which can be operated as a separate service or channel. Wideband terminals are charged for as special assemblies of equipment. Rentals for channel terminals other than wideband terminals are as follows:

	Monthly Rental for Each Station in an Exchange, for each Channel Terminal			
	Simplex		Duplex	
	First	Each Additional(x)	First	Each Additional(x)
Telephone	$45.00	$10.00	$55.00	$15.00
Signal, Class A, B and C	45.00	10.00	55.00	15.00
Teletype	45.00	10.00	55.00	15.00
Telephotograph	(y)	(y)	(y)	(y)
Data				
Schedules 1,2&3	45.00	10.00	55.00	15.00
Schedule 4				
Type 4	45.00	10.00	55.00	15.00
Type 4A On a 2-point channel not arranged for switching	55.00	30.00	65.00	35.00
On a 2-point channel arranged for switching or on a multi-point channel	80.00	30.00	90.00	35.00
Type 4B On a 2-point channel not arranged for switching	80.00	35.00	90.00	40.00
On a 2-point channel arranged for switching or on a multi-point channel	105.00	35.00	115.00	40.00

(x) applies to terminals on the same channel or service, except that no rental applies to such additional terminals on the same premises as the first terminal.

(y) Special-assembly of equipment.

TELECOMMISSION STUDY 8b(1)

INTERCONNECTION OF PRIVATE SYSTEMS

Trans-Canada Telephone System July 1970

TABLE OF CONTENTS

TELECOMMISSION STUDY 8b(i): INTERCONNECTION OF PRIVATE SYSTEMS

This study will be divided into six parts as follows:

A. BACKGROUND

B. INTERCONNECTION OF PRIVATE SYSTEMS TO THE PUBLIC TELEPHONE NETWORK

C. INTERCONNECTION OF PRIVATE SYSTEMS WITHOUT NETWORK ACCESS

D. INTERCONNECTION OF PBX (PRIVATE BRANCH EXCHANGES)

E. TECHNICAL ASPECTS OF INTERCONNECTION OF SYSTEMS AND TERMINAL EQUIPMENT

F. NATIONAL ACADEMY OF SCIENCES REPORT - A SUMMARY

Throughout this report, a private system will be considered as any system of facilities, other than those of common carriers, which is capable of two-way communications. Interconnection will be discussed, not only in terms of the effects on Canadian telephone service, but also in terms of the effects on the users of private systems and the attainment of desirable regional and national objectives.

A. BACKGROUND

1. PRIVATE SYSTEMS AND THE EXTENT OF INTERCONNECTION TODAY

a) Private Mobile Radiotelephone Systems

Mobile radiotelephone service is designed to serve customers whose needs cannot be satisfied by landline telephone systems. The telephone companies offer public radiotelephone service which is an extension of the public telephone network. In addition, they provide private mobile radiotelephone systems to customers whose needs do not necessitate connection to the telephone network.

At the present time, there are very few private systems which have access to the public telephone network. The Department of Communications is responsible for the licensing of private mobile radiotelephone systems today. Its predecessor, the Department of Transport, discouraged the general interconnection of mobile radiotelephone systems. Their policy was explicitly stated in a letter to the Western Canada Telecommunications Council on May 12, 1966. An excerpt from that letter is quoted below:

> It was concluded, at least for the present, that the unrestricted connection of private mobile radio systems to general telephone networks would not be consistent with the Department's objectives concerning efficient spectrum management.
>
> On the other hand, it was recognized that in certain special cases such interconnection might be essential to the efficient functioning of certain "safety" services, e.g., police, fire, etc. It was therefore decided to consider proposals of this nature on a case by case basis and to permit interconnection only where the merits of the individual proposal warranted such action.

The Trans-Canada Telephone System members have operated within this framework.

b) Hydro-Electric Power Systems

The hydro authorities and companies in every province, except Newfoundland and Prince Edward Island, have either their own powerline carrier or microwave system. Examples of these are briefly described below:

i) New Brunswick Power Commission - powerline carrier

ii) Hydro-Electric Board (Manitoba) - microwave and powerline carrier.

iii) Calgary Power (Alberta) - microwave

iv) Nova Scotia Light and Power Co./Nova Scotia Power Commission - powerline carrier

v) Saskatchewan Power Corporation - powerline carrier

vi) British Columbia Hydro and Power Authority - microwave

vii) Quebec Hydro Electric Commission - microwave

viii) Hydro Electric Power Commission of Ontario - microwave

These systems are primarily used for highly specialized control functions. However, they also provide voice communication and are capable of transmitting other forms of information. In some provinces they have access to telephone company-supplied PBX's. These arrangements do not generally include public telephone network connection. Similar treatment is extended by special agreement to some other right-of-way companies (i.e., pipelines, and railways) who have specialized communication needs.

c) National Defence Systems

Since 1952, the Department of National Defence and the telephone companies have had an agreement relating to interconnection of DND owned or leased facilities with the public telephone network. The telephone companies agree to interconnect DND owned or leased facilities provided "that the defence of Canada requires connections or interconnections of communications facilities." (Agreement, P.2) The agreement states that DND facilities and equipment must be maintained and protected according to standards approved by the telephone companies. The telephone companies are permitted to inspect facilities for this purpose.

The DND recognized its responsibility to ensure that its circuits are not used "for purposes other than national defence" or "in such a way as to reduce, derogate from or minimize the revenues which the telephone company would receive from its general and/or toll system." In addition, the DND "will, if requested by the Telephone Company, pay... a sum or sums equal to the amount of tolls which the Telephone Company has lost by reason of such improper use." (Agreement, P.6)

d) Other Private Systems

The systems described in this section are simply representative of some of the Canadian private systems.

i) Air Tel

Air Tel is a Toronto based company that is licensed to provide a private microwave system from Windsor to Trois Rivieres. The company provides private mobile radiotelephone systems and paging services to the public. Air Tel has requested network interconnection in the past. However, there has been no interconnection to the public telephone network.

ii) Canadian Western Natural Gas Co. Ltd.

This company owns and maintains its own private line facilities between Lethbridge and Calgary.

iii) Federal Government - National Parks

Circuits owned and maintained by the Federal Government are interconnected at Banff and Jasper with the Alberta Government Telephone facilities through a special switching arrangement.

iv) The Granduc Operating Company

The Granduc Operating Company owns and maintains its own microwave system running from Stewart to Tide Lake, B.C. The system is interconnected with the public telephone network owned by the B.C. Telephone Company at Stewart. In its agreement with B.C. Tel, Granduc is responsible for maintaining its system according to the accepted standards of the Canadian Telephone Industry.

v) Pacific Great Eastern Railway/Quebec North Shore and Labrador Railway

The Pacific Great Eastern Railway in British Columbia and the Quebec North Shore and Labrador Railway both own and maintain large microwave systems which generally follow their rail routes. There is no network interconnection with the PGE. The Quebec railway, however, provides telephone service to several towns along the railway route, and these towns have access to the public telephone network.

vi) Canadian National and Canadian Pacific Railways

The communications systems of the CNR and CPR serve two purposes. They meet the internal communications needs of the railways and they provide facilities for their common carrier operation. A discussion of the TCTS policies pertaining to interconnection of CN/CP common carrier services with those of the telephone companies is contained in our response to Telecommission Study 8b(ii).

The CNR and CPR erected pole lines, mainly adjacent to their rail rights of way, to carry telegraph facilities which were used for internal purposes and for their public telegraph business. Some of the circuits were used for voice communication. To use these voice circuits more efficiently, and for other mutual considerations, the railroad companies and some of the major telephone companies

entered into agreements which permitted CN/CP intercity voice circuits to be terminated on Private Branch Exchange switchboards provided by the telephone companies. These voice facilities were intended for use in the conduct of railroad business only. Over the years, the communications facilities of the railroad companies have expanded greatly, particularly on structures that are not adjacent to rail rights of way.

While, undoubtedly, the majority of traffic carried by these facilities is between CN/CP personnel in the conduct of railroad business, traffic for other than railroad business is possible. Such traffic represents a by-passing of the telephone industries' public message voice service and was not intended in the original agreement. Both CN/CP and the Telcos recognize that this traffic exists today.

If growth is limited on telephone industry structures through interconnection of CN/CP facilities and the subsequent erosion of available voice message services, the telephone companies cannot achieve the optimum benefits of economy of scale. In addition, the introduction of new types of transmission systems will require a large usage base in order to be economically feasible.

The telephone industry is prepared to serve the local and intercity voice requirements of all businesses, including the railroad companies and their subsidiaries on a non-discriminatory basis, by supplying services which have full access to the switched telephone network.

e) Emergency Interconnection of Private Systems

The telephone companies generally permit network interconnection of customer owned and maintained facilities if it is essential to the effective operation of certain agencies providing emergency services to the public. Law enforcement, fire prevention, and railway emergencies are examples of cases where network interconnection has been permitted. Public safety has been the overriding consideration in each case. Existing arrangements are, in most cases, covered by separate agreements. The telephone companies provide the equipment necessary for implementing the arrangement and for protecting the public telephone network.

2. INTERCONNECTION POLICIES IN THE UNITED STATES

The events leading to the liberalized interconnection policy in the United States have been widely publicized. The views of communications suppliers, users and regulatory agencies in that country are well documented. This section will briefly describe the interconnection policies and some industry developments in the United States.

The interconnection policies of the telephone companies in the United States were closely scrutinized during the much-publicized Carterfone case. As a result, the American Telephone and Telegraph Company (AT&T) made significant changes to its interstate tariffs affecting interconnection. Similar changes have been made by the Bell System companies and by many of the Independent Telephone Companies in the U.S.

These tariff revisions represent a major change in the policies of United States telephone companies. The new tariffs permit interconnection of private systems, provided that an interface, designed to safeguard the public telephone network, is incorporated. In addition, provision is made whereby the telephone company will provide entrance facilities into urban centres for private systems.

AT&T has made many minor tariff changes since the original interconnection policies were announced and interconnection continues to be actively discussed in both industry and government. The ultimate economic and technical effects of these policies are still uncertain. In an effort to obtain an objective analysis of the problems, the FCC commissioned the National Academy of Sciences to research the technical aspects of interconnection and its effects on the public telephone system. Their report was published in June, 1970. A summary of this report is contained in Section F.

In July, 1967, President Johnson appointed a Task Force to review U.S. communication policy. The final report (Rostow Report) of this Task Force was issued in December, 1968. This report recommended a greater degree of competition in many communications services and favoured interconnection as long as certain criteria were met. However, this report has not been formally embodied in legislation and continues to be a controversial issue.

The decisions in the United States have increased the demand for interconnection in Canada. This has resulted partly from the wide press coverage given to the U.S. changes. However, a more significant factor has been familiarity with the U.S. situation by Canadian subsidiaries of American firms - both those marketing products for connection to the telephone system and those seeking interconnection of their systems.

There is a clear danger in applying the U.S. interconnection policies to the Canadian situation without fully studying its implications. For this reason alone, it would be wise for Canada to observe the outcome of the interconnection policies in the United States and learn from their experience.

The next sections of this paper will attempt to analyze some of the implications of interconnection in Canada.

B. INTERCONNECTION OF PRIVATE SYSTEMS TO THE PUBLIC TELEPHONE NETWORK

1. ECONOMIC EFFECTS

The implications of interconnecting private systems to the public telephone network* must be viewed with respect to the unique

* For simplicity, the term "interconnection" will be used instead of "network interconnection" unless otherwise stated.

characteristics of the Canadian telecommunications market.

Canada is a large country with a relatively small population. The population is concentrated along the Canada - United States border. As a result, an extremely large investment is needed to serve the basic requirements of underdeveloped areas as well as those of the highly developed major centres. Therefore, in order to obtain reasonable rates, high quality service, and development of communications throughout Canada, it is necessary to use facilities as economically as possible; to avoid duplication of scarce resources; and to ensure that the overall operations of the telephone companies are economically viable.

In order to understand the economic effects of interconnecting private systems, it must be appreciated that a private system is usually a substitute for the services of the telephone companies. Each private system removes a segment of the market since the owner and his employees are, to a degree, no longer customers of the telephone companies. Network interconnection of these systems would automatically increase the degree of substitution for telephone company services.

The unit cost of telephone service decreases with volume in certain areas of operation. This is particularly applicable to intercity transmission facilities. Extensive use of such facilities enables the telephone companies to realize economies of scale which not only reduce the cost of providing intercity service but also provide support for local services which do not experience similar economies of scale. In the past, these

economies of scale have contributed to stabilizing costs and rates during an inflationary period for telephone service and other communications services. These economies of scale will continue to be important in developing economical and reliable communications throughout Canada.

Excessive competition through permissive interconnection policies and a consequent proliferation of private systems, will divide the overall Canadian market for communications. Each time the market is so divided, the opportunity for achieving the optimum scale of operations is reduced. Considering the nature and extent of the Canadian market, the number of competitors does not have to be large before adverse effects become noticeable. The Minister of Communications addressed himself to this problem in his policy statement of February, 1970. This statement is quoted below:

> In recent years, licences for such systems (microwave relays) have been granted mainly on technical grounds even though earlier broader criteria had been applied. However, the growing social and economic importance of this form of telecommunications requires that more attention be placed on other criteria if we are to assure an orderly growth of the Canadian communications system which will assure maximum social benefits and a minimum of wasteful duplication of investment in a field where resources are both scarce and essential to the development of a full potential of all segments of Canadian society. The use of a system's approach in the granting of licences for microwave relays implies that applicants will have to demonstrate:
>
> a) that there is some public interest and need to be served by the creation of the new facility;

b) that existing communications facilities cannot properly satisfy this interest and need; and

c) that the applicant will conform to the standards of service and the technical requirements of the existing network so that the most effective and economical use of the radio spectrum is assured.

The rationale for minimizing interconnection to the telephone network is, we submit, similar to that underlying system licencing.

In general, the regulated telephone companies have accepted the responsibility to serve both higher and lower cost areas. In order to supply service in all areas at reasonable rates, it is necessary for revenue from lower cost areas to help pay for service in higher cost areas. There is little doubt that if unrestricted interconnection is allowed, the demand for new systems will be greatest on the economical high-density routes leaving hard-to-reach areas to the common carriers. This type of "competition" could necessitate reducing rates on high-density routes and raising rates on others. At the present stage of Canadian development, it would seem inadvisable to hinder growth by jeopardizing a rating technique (system-wide pricing) which was designed especially to promote communications service at reasonable rates.

2. TECHNICAL EFFECTS (See Part E)

More detailed discussion of these effects is contained in Part E of this paper. There are many benefits to the user and the supplier of telecommunication services when the control and design of the network and/or systems connected to that network are the responsibility of the common carriers.

The quality of service can be assured only when all interconnected systems are technically compatible and quality standards of equipment are controlled. Consider for a moment what happens when the operation and transmission quality of a private system is different from that of the public telephone network. As long as the system is accessible only to the owner and his employees, then these differences are not important considerations. However, connection of this system to the public telephone network could seriously affect the quality of service supplied to telephone company customers and, in some cases, to the users of the private system.

Fast and efficient maintenance is more likely to result when the technical relationships of all interconnected systems are known. Maintenance becomes more complicated when private systems are interconnected, since different standards and procedures must be co-ordinated. At the present time, maintenance of public systems is the responsibility of the Canadian common carriers. Dispersing this responsibility would seem unwise at a time when new equipment and services are placing even higher demands on the technical integrity of the network.

New technology can be developed and made widely available sooner when the ownership of the total system is not fragmented. The existing common carriers have the resources necessary to apply new technology for the benefit of the total consumer group. The greater the number of interconnected private systems, the more difficult it is to co-ordinate the change from one type of technology to another (e.g., electro-mechanical to electronic switching).

Multiple ownership tends to retard change since, in many cases, equipment must be replaced. The common carriers have worked towards common objectives, thus overcoming the resistance to change which would exist if the control of the system was fragmented.

The cost of providing service to the general body of consumers will be minimized when system ownership is with the common carriers. Engineering design, research and development activity can work to common and known parameters creating cost efficiencies. The training of employees will be shorter in duration and less costly. In addition, the safety of employees and users can be more efficiently supervised and controlled when the characteristics of the overall system are known.

Liberalizing interconnection policies would reduce many of the advantages described above and would require a complicated system of checks and standards. It is doubtful that the majority of consumers would benefit from such policies.

3. ADMINISTRATIVE EFFECTS

An analysis of the administrative effects of interconnection must start from the assumption that all private systems are allowed access to the public telephone network. It is difficult to predict all of the potential problems. Nevertheless, it is obvious that difficulties would exist in defining maintenance responsibilities and in establishing efficient billing and settlement procedures.

Trouble-shooting and repair may create problems especially at the point of interconnection. When troubles arise it is difficult to determine which system has failed. In addition, union difficulties may arise from overlapping labor jurisdictions. The varying technical characteristics of a private system also produce problems where specialized training of maintenance personnel is required. It may be possible to overcome these problems but not without a more complicated and less efficient maintenance arrangement.

The costs and benefits of interconnection must be considered in light of these potential administrative problems. Their importance should not be underestimated.

4. SUMMARY

The Telephone Industry in Canada is reluctant to permit the interconnection of customer provided systems to the public telephone network. This is not to infer that the Industry has not made some special arrangements in this regard. Each company has, in its Tariffs, the freedom to negotiate special agreements where circumstances indicate that such treatment does not jeopardize the economic or technical integrity of the system and is not unreasonably discriminatory.

The Canadian Telephone Industry has studied the advantages and disadvantages of interconnection of private systems from a Canadian viewpoint. The following statements summarize the present thinking of the Trans-Canada Telephone System members:

1. At the present time, the telecommunication common carriers provide good quality, reasonably priced service in Canada. Although interconnection can be technically accommodated, there are important aspects such as cost, quality, speed of innovation, and maintenance which would be jeopardized if existing interconnection policies were radically changed.

2. The economic implications of unrestricted interconnection and the associated effects on common carrier rates appear detrimental to the overall development of communications in Canada.

C. INTERCONNECTION OF PRIVATE TRANSMISSION SYSTEMS WITHOUT NETWORK ACCESS

Interconnecting private transmission systems with private line facilities of the telephone companies extends the area covered by the customer's system. The economic effects of this interconnection depend on the size of the customer-owned network. For example, joining two telephones together with a dedicated private line creates a private system. Extending a privately owned intercity transmission system with facilities of the telephone companies is the same concept only on a greater scale. Both help the customer to by-pass the long distance telephone network.

A prime concern of the Trans-Canada Telephone System is the effect which private systems have on the long distance revenues of the telephone companies and ultimately on the price averaging rating concept, which has contributed greatly to communications development in Canada. The greater the number of private systems, the more serious are the effects. Furthermore, we believe that intercity private systems may unnecessarily duplicate transmission facilities and prevent the achievement of the lowest supply costs for all customers.

However, under current conditions, the members of the TCTS do not generally interconnect transmission systems owned by or leased by customers with the facilities or the equipment of the telephone companies. There are exceptions to this policy which are determined on a case-by-case basis. Private systems constructed by right-of-way companies serving their own needs in remote areas, and public service organizations such as police, fire, broadcasters, etc., are typical of those special situations where the public interest is best served by interconnection.

D. INTERCONNECTION OF PBX's

1. Interconnection to the Public Telephone Network

The PBX (private branch exchange) functions as an integral part of the public telephone network. PBX's serve essentially the same purpose as the telephone companies' central office switching equipment. They connect extensions of the PBX to each other and, when Telco-supplied, to the multiple address telephone system. The Trans-Canada Telephone System members firmly believe that the PBX function should be owned and maintained by the telephone companies when access to the public telephone network is desired. The justification for this policy is as follows:

a) Control over total system design is maintained.

The co-ordination of innovations in overall system design and operation is made more difficult when the component parts are spread among many owners, each trying to protect his own investment. For example, computerized electronic switching, located in the central offices of the telephone companies, is an efficient and economical method in satisfying the demands of many large businesses. This new

technique can eliminate the PBX as a desirable switching method. If customer ownership of PBX's increases - a result of permissive interconnection policies - then the use of electronic switching for such a purpose may be unnecessarily retarded.

b) Maintenance can be accomplished quickly, since technical specifications are known and one labour group is responsible. The assignment of maintenance responsibility in multiple ownership situations is a difficult, although not unsolvable, problem. There may be overlapping labour union jurisdictions which may hinder the efficient maintenance of customer-owned and telephone company owned equipment located on the customers' premises. Training of employees is simplified when the design characteristics of the overall system are known.

c) The desirability of providing PBX service to all parts of the country on a non-discriminatory and equitable basis is recognized.

Under existing regulations, the telephone companies are required to supply and maintain PBX service at standard rates throughout their service areas. If the telephone companies were requested by their regulatory authorities to interconnect customer-owned PBX's to the telephone network, the market for customer-owned PBX's would expand. As a result, competitive suppliers would concentrate their efforts on the highly populated business centres in order to keep their maintenance and overhead costs at a minimum. If the telephone companies were to continue to be subject to the same regulation as before, then their overall costs would rise, since, in all likelihood, they would be the

only supplier in those areas where maintenance costs were higher. This would give an unfair competitive advantage to other suppliers. If, however, the telephone companies were to compete on the same basis as unregulated suppliers, then PBX prices would undoubtedly fall in lower-cost areas and rise in higher-cost areas. We believe that this practice would not be consistent with the goal of maximizing service development throughout the country and that it would adversely affect users in remote areas.

2. Interconnection Without Network Access

Most telephone companies will interconnect a local one or two-way paging or intercommunication system and a one base-station private mobile radiotelephone system to a PBX for internal use only. Exposure of the overall public telephone network to incompatible systems is thus largely avoided and most of the requirements of the private system owners are satisfied.

The members of the TCTS will generally interconnect two PBX's owned by the same or different customers, as long as there is no access to the public telephone network.

This policy is consistent with the private line offerings of the telephone companies and the previously expressed views on privately-owned transmission systems, including the effects of interconnection on erosion of public telephone network revenues and rate structures.

3. Summary

In considering any change of the interconnection policies described above, the overall integrity of the public telephone network and the long term welfare of all subscribers to the service should be fully considered.

E. TECHNICAL ASPECTS OF INTERCONNECTION OF SYSTEMS AND TERMINAL EQUIPMENT

F. NATIONAL ACADEMY OF SCIENCES REPORT - A SUMMARY

I. Principal Findings

a) Uncontrolled interconnection to the network can cause harm to personnel, network performance and property.

b) Tariff protection criteria are technically based, valid and, if exceeded, can cause harm by interference to other users.

c) Present tariff criteria with telephone company-provided connecting arrangements are acceptable basis of assuring necessary protection.

d) Present criteria with properly authorized and enforced program of standards development, equipment certification and controlled installation and maintenance are also acceptable basis for achieving protection and direct user interconnection.

e) Innovation by carriers need not be impeded by certification program. User innovation opportunity would be increased.

f) Mechanisms are needed to promote exchange of information among carriers, users and suppliers.

II. Harmful Effects of Uncontrolled Interconnection

a) Voltages dangerous to human life

b) Signals of excessive amplitude or improper spectrum

c) Improper line balance

d) Improper control signals

III. Present Carrier Practices

a) Present carrier approach is technically acceptable.

1. Some connecting arrangements may be redundant and duplicate users' equipment and functions. May cause loss in performance and reduction in reliability. However, if well designed, overall reliability and performance not affected.

IV. Establishment of Standards and Enforced Certification of Customer-Provided Equipment and Personnel Also Provide Adequate Protection in Conjunction with Present Criteria

a) Standards should not include standards for user equipment performance except as they would relate to network protection such as personnel safety, signal levels, transmission and network control signalling.

b) Standards, including interface specifications, can be written

c) Customer-provided equipment must be adjustable to recognize the "customization" aspect of each installation.

d) Equipment type certification by Government or independent testing labs. Could include couplers and protective section of larger pieces of equipment.

e) Equipment certification must be accompanied by installation and maintenance by certified technicians.

f) Network protection must be maintained by documented periodic inspection.

g) Federal agency responsible for tariffs must be responsible for certification program.

V. Enforced Certification Program Must Be Taken As A Whole To Be Effective.

a) Standards development or equipment certification without certified testing, installation and maintenance will be ineffective in obtaining necessary network protection.

b) Certification must be by independent effort since self-certification by manufacturers or users will not ensure protection.

VI. There Is No Justification For Exemption Of Whole Classes Of Users From Interconnection Requirements

a) Rights-of-way companies, government, etc., should all be eventually caused to conform to whatever plan is finalized.

VII. Many Misunderstandings Exist And A Mechanism To Promote Exchange Of Information Among Carriers, Users and Suppliers Should Be Developed

VIII. Network Control Signalling Is A Critical Element And High Order Of Reliability Is Necessary To Avoid Loss Of Network Performance And Excessive Costs To Both Carrier And User

a) Touch-tone signalling by customer-provided equipment is less of threat than rotary dial.

IX. Conclusions With Respect To Telephone Company - Furnished Protective Devices

a) Existing connecting arrangements protect against hazardous voltages, excessive signal amplitudes and longitudinal imbalances.

b) Existing protective devices provide minimal protection against faulty network control and signalling.

c) Present connecting arrangements present no concern with respect to increased potentials for service failures.

d) Telephone company-provided connecting arrangements introduce redundancies of functions of user-provided equipment.

e) Telephone company couplers are not "transparent."

f) Some present couplers are dependent on commercial power - significant and undesirable disadvantage.

g) No significant performance degradation is introduced by telephone company couplers.

h) Central office protection cannot provide same degree of protection as customer-site protection.

X. The Certification Program

a) Program should be under final authority of federal regulatory commission having jurisdiction over carriers.

b) Customer should be required to affirm acceptance and understanding of provisions governing the interconnection.

c) Uniform treatment must exist nationwide and not be divided among various regulatory agencies - all certifying organizations should derive powers from federal regulatory agency.

d) A step-by-step program to ensure successful implementation of certification program should be undertaken by F.C.C.

e) Self-certification should not be permitted.

XI. Improved Information Exchange Is Necessary and Organizational Mechanism Should Be Established To:

a) Promote two-way exchange among all parties concerning interconnection problems. Exchange is vital to possible interconnection liberalizations and protection of network integrity.

b) Promote and establish working groups concerned with standards development, certification programs for equipment, licensing programs for installation and maintenance,and data gathering and analysis of technical interfacing problems. Common, authoritative form for reception of data is necessary.

c) Develop recommendations to a federal regulatory agency as to timing of phase-in of certification program, if adopted.

d) Promote good atmosphere concerned with innovation problems in interconnection.

CARRIER: LA COMPAGNIE TELEPHONE UNGAVA
LABRADOR TELEPHONE COMPANY

1. La Compagnie Telephone Ungava and the Labrador Telephone Company are independent companies provincially chartered in Quebec and Newfoundland respectively and which operate the Quebec North Shore and Labrador Railway communication system.

2. The major trunk system, leased from Quebec North Shore and Labrador Railway runs between Sept Iles, Shefferville and Labrador City and is utilized to develop communication services in and around Labrador City area, Shefferville area and along the railway.

3. Under the provisions of the public utility acts interconnection with Bell Canada is made at Labrador City for extended area service and at Sept Iles with Quebec Telephones for long distance services. All interconnection circuits will meet DDD standards.

4. The companies have no serious objection to offering interconnection facilities to private systems provided the requisite, technical, operating and maintenance standards are met by private users. In fact, instances of interconnection between private systems and the switched public telephone networks is made available for the emergency systems operated by the police and fire departments in Labrador City and Schefferville.

5. The companies see no reason why major, private companies

operating a complex communication system should not be allowed to interconnect exchanges provided they can meet the technical and maintenance requirements.

6. However, it is felt that any legislation pertaining to interconnection should have safeguards against interconnection with rudimentary systems operated by non-professionals. Without these safeguards the integrity of the switched public network could be seriously affected.

APPENDIX C.

MANUFACTURERS

MANUFACTURER: AUTOMATIC ELECTRIC (CANADA) LIMITED
Brockville, Ontario

1. The existing policy of Automatic Electric does not favour catering for private customers. A private organization operating other than an extensive communication system cannot normally provide the degree and quality of maintenance required to keep a telephone exchange operational within specified limits. Inadequate maintenance invariably reflects on the equipment manufacturer and causes operational problems. These factors, coupled with the fact the AE is closely associated with the telephone companies, have influenced the company to remain out of the private telephone system market except for isolated systems not connected to the national network.

2. No instances of interconnection between private (hotel systems) and public systems are available from AE's records.

MANUFACTURER: CANADIAN MOTOROLA ELECTRONICS COMPANY
Willowdale, Ontario

1. The company feels that the benefits of a radio paging service to both commercial and non-commercial users, in the form of improved efficiency in day-to-day operations would be further enhanced if the paging terminal facilities of the user could be interconnected with the public switched network.

2. The company attitude toward interconnection of these services with the facilities of the common carriers is based on overall improvement of service and efficiency which present and potential users would obtain from their equipment, as typified in the following:

   a) Interconnection of in-plant or in-company radio paging systems with the facilities of the common carriers would increase plant/company efficiency.

   b) RCC services, approved by the DOC to offer a paging and dispatch service to the public, cannot interconnect because of policies of the common carriers. These restrictive policies prevent the RCC from offering a better service than would otherwise be the case and force potential users to obtain service from the common carriers.

   c) Users of two way radio systems would benefit if phone patching facilities providing interconnection with the public switched network were permitted.

d) In-house data services could be expanded and improved if int interconnection, based on known standards of performance between the interconnecting systems, and the provision of adequate maintenance on the part of the public switched network.

MANUFACTURER: L. M. ERICSSON LIMITED,
Montreal, P.Q.

1. Ericsson's largest customers are common carriers such as Manitoba Telephone System, Maritime Tel. & Tel., New Brunswick Tel. Co., and Bell Canada. Thus the company has a preference for not drastically changing the situation in Canada.

2. Basically, Ericsson prefers to sell quality equipment on the basis of its good reputation. In fact the present policy of the Company discourages selling systems if there is any suspicion that equipment supplied would not be maintained properly.

3. The other aspect of Ericsson business is communication systems and other private systems that are not normally interconnected.

4. Ericsson's position can be summarized as:

   (a) Common carriers provide the bulk of the company business.

   (b) The company produces high quality, highly reliable systems and equipment and therefore prefers closer ties with the common carrier.

   (c) If unlimited forced interconnection became a policy, lower quality and lower priced competitors would enter the field in which case Ericsson would prefer to continue dealing with the common carriers wherever possible, in order to protect their reputation. Alternatively, Ericsson

would consider forming their own sales organization for areas where they are unable to supply equipment directly to the common carriers.

5. Even though a great deal of company income is from sales to common carriers it is by no means a captive supplier and has other markets for its products.

6. Regarding maintenance and quality control the company position is as follows:

(a) A properly installed system does not require routine maintenance for perhaps the first two years. The main problem is therefore proper installation.

(b) Installation technicians must know the equipment and the system if proper function is to be expected.

(c) Maintenance must be carried out by similarly highly skilled people.

(d) Regular maintenance is not needed on Ericsson installations It is generally sufficient to troubleshoot faults as they arise.

7. Ericsson is concerned about the future and is extremely interested in the recommendations of the Telecommission.

MANUFACTURER: NORTHERN ELECTRIC COMPANY LIMITED,
Ottawa, Ontario

1. Northern Electric (NE), like other major manufacturers of telephone equipment in Canada, prefers to deal only with the telephone companies for the sale and installation of its telephone exchanges.

2. At present the company is not fully geared to enter the private telephone system market. However, if the situation arises and if it chooses to, NE does not foresee any major problem in orienting its activities to meet private user requirements.

3. In NE opinion, any legislation allowing uncontrolled interconnection of private systems to the public telephone network would adversely affect the telephone system integrity mainly through substandard installation and poor maintenance.

4. NE, as a major supplier of telecommunication equipment in Canada has development programs to meet the communication needs of the future. It considers that the prevalence of uncontrolled interconnection may alter telephone companies' thinking and jeopardise major programs for the modernisation of their plant.