SUMMARY RECORD OF THE ANIK-B USERS MEETING OTTAWA, ONTARIO June 5, 1980

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/ SUMMARY RECORD

of the

ANIK-B USERS MEETING

OTTAWA, ONTARIO /

JUNE 5, 1980

Coordinated and Prepared by

I. Bischof
P. Moffatt
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August 1980

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OVERVIEW OF THE ANIK-B USERS MEETING

The first meeting of the ANIK-B Users was held on 5 June, 1980 at the National Library and Public Archives Building in Ottawa, Ontario. The general purpose of the meeting was to exchange information and ideas concerning the ANIK-B Communications Program, learn of the progress of the individual pilot projects and discuss future plans. A copy of all written documentation provided by the ANIK-B Users at the meeting of 5 June or later forwarded to the Department of Communications for this summary record is included. This material appears in different formats including transcripts of the presentations made at the meeting, handouts, hardcopies of viewgraphs and overviews prepared by the Department of Communications. An attendee and distribution list of this summary record is also appended.

A major portion of the day was devoted to the project progress reports which were presented by representatives of each of the active ANIK-B pilot projects. A panel chaired by N.G. Davies, Director, Space Communications Program Office, and members H. Taylor of the Department of Indian and Northern Affairs, D.L. Martin of the Department of National Health and Welfare and J. Underhill of Telesat Canada, summarized and commented on the progress made since the Hermes experiments. A general discussion followed.

A second panel chaired by R. Breithaupt, Director, Communications Satellite Program and members N.G. Davies, Director, Space Communications Program Office, J. Palmer, ANIK-B Program Manager and E.D. Rainboth, Director, Extension of Services Policy Division discussed possible future Department of Communications activities.

Chairman, W.T. Kerr officially closed the meeting at 5:00 P.M., thanking all attendees for their participation and co-operation.

W.T. Kerr
ANIK-B Project Manager
Chairman

ANIK-B USERS MEETING

5 June 1980
Ottawa, Ontario

A G E N D A

Time	Item	Speaker(s)
0830-0900	1. Registration	
0900-0905	2. Meeting Convenes	Chairman
0905-0925	3. Introduction of Senior Management and Welcome	DOC
0925-0930	4. Meeting Arrangements	Chairman
0930-1000	5. Project Status Report	DOC
1000-1020	Coffee	
1020	6. Project Progress Reports:	
1022-1032	B-1 Program Delivery Pilot Project (East)	User Group
1034-1044	B-1 Program Delivery Pilot Project (West)	User Group
1046-1056	C-1 Alberta Government	Alberta Educational Communications Authority
1058-1108	C-2 The Inukshuk Project	Inuit Tapirisat of Canada
1110-1120	C-3 Project Naalakvik II	Taqramiut Nipingat Incorporated
1122-1132	E-1 Satellite Tele-Education Program	B.C. Institute of Technology
1134-1144	E-2 Tele-Education Academy	Ontario Educational Communications Authority
1146-1156	E-3 Tele-Education Project	Ministry of Education of Quebec
1158-1330	Lunch	

Time	Item	Speaker(s)
	6. Project Status Reports (continued)	
1330-1340	H-1 Telemedicine Project	Memorial University of Newfoundland
1342-1352	H-2 Telemedicine System, Montreal - LG-2	University of Montreal
1354-1404	P-1 Multi-Point Multi-purpose Satellite Network	Ontario Ministry of Government Services
1406-1416	T-1 Evaluation of 91 Mbps Digital Links	Telesat/Trans-Canada Telephone System
1418-1428	T-2 Slim Route TDMA	DOC/CNCP Telecommunications
1430-1440	T-3 Phase Coherent Long Baseline Interferometer	University of Toronto
1442-1452	T-8 12 GHz Propagation Study	DOC/Telesat
1452-1515	Coffee	
	7. Plenary Session	
1515-1540	Summary and Comment on Progress	Panel
1540-1600	General Discussion	All
1600-1620	Future DOC Activities	DOC
1620-1655	General Discussion	ALL
1655-1700	8. Closing Remarks	Chairman

OPENING REMARKS

Alex Curran
Assistant Deputy Minister
Space Program
Department of Communications

OPENING ADDRESS BY ALEX CURRAN,
ASSISTANT DEPUTY MINISTER, SPACE PROGRAMS,
DEPARTMENT OF COMMUNICATIONS
AT ANIK-B USERS MEETING
THURSDAY, 5 JUNE, 1980

It's a real pleasure for me to welcome you to this first meeting of the ANIK-B Users Group.

Two and a half years ago the seeds for this meeting were planted. At that time members of the Space Communications Branch unveiled the capabilities which ANIK-B would offer, and invited your participation in the definition of experimental services which would test and utilize those capabilities.

It's clear that at that initiating meeting there were people with very fertile imaginations. From it there emerged many suggestions for new valuable services. You have now had a year's operational experience with those ideas - and that experience must have been good. So good, in fact, that throughout my total career of 3-1/2 weeks in the Branch, I've been fed enticing hints about the value of your experiments. This meeting will give me the opportunity to hear your appraisal of the results, and to meet the owners of such active imaginations.

It's also a pleasure because as a newcomer, I can devote my attention to those aspects, while leaving to my colleagues with much greater seniority the responsibility to meet the real goals of the meeting - to review progress and to assess future directions for this program of experimental services.

But I trust the meeting will do more than review and plot. Some time must be spent in being a little more introspective. We must ask and answer questions along the line of how is this program contributing to the public good, and how and when can it be converted to a self sustaining entity?

Now I know that those are harsh questions to ask of an experimental service and I know they must not be asked prematurely. Nevertheless, as taxpayers, we have all rebelled against the overly extended continuation of some government programs. That rebellion has resulted in the adoption of a sunset type of program evaluation. In a nutshell, that simply means that a program will be renewed only if value to the public has been demonstrated.

In the case of ANIK-B, we face that appraisal as we decide whether, for how long, and how much of the transmission capacity we continue to lease on your behalf.

That's the defensive side of appraisal. On the positive side, we can all agree that whenever possible, we should place all services into the arena where continuous funding can be commanded. There the appropriate market will define the scope and form of service evolution, and public good will be clearly demonstrated by widespread acceptance.

So during the course of this meeting, we shall be seeking your support in making evaluations of the public good. I can think of no group better qualified to make that assessment in this area of services to remote areas.

Once again, welcome. I am really looking forward to meeting you and hearing of your favourite satellite based service ideas.

PROJECT STATUS REPORT

N.G. Davies
Director
Space Communications
Program Office
Department of Communications

PROJECT STATUS REPORT

N.G. Davies

Introduction

The purpose of this presentation is to review the overall status of the ANIK-B program. Detailed planning for the program really began at the Information Exchange Meeting on 25-26 October 1977 when the goals for the program and the technical characteristics of the planned communications links were discussed. We are now over half way through the planned projects and it is an attractive time to review the status.

ANIK-B Satellite

The ANIK-B satellite is owned by Telesat Canada. It has twelve 6/4 GHz transponders, which are used for commercial service to replace the aging ANIK-A satellites, and four 14/12 GHz transponders, which are leased to DOC for experimental services. A minimum of two transponders is provided under the lease. An artist's impression of the ANIK-B satellite in orbit in Fig. 1 shows the antenna systems for the two frequency bands of operation. The satellite was launched on 15 December 1978. Following placement in the geostationary satellite orbit and a thorough checkout by Telesat Canada, the ANIK-B satellite was made available to DOC on 12 February 1979 for check-out of the operation of ground terminals. Full-time use by DOC commenced on 18 March 1979. Pilot project operations commenced on schedule on 1 April 1979 and will be carried out until 17 February 1981, the end of the initially planned two-year lease period.

Figure 1

ANIK-B Ground Terminals

The ground terminals used in the pilot projects are owned mostly by the DOC. The DOC terminals and their purpose are listed in Table 1 and are shown in Fig. 2-7.

TABLE 1 - ANIK-B GROUND TERMINALS

TERMINAL DESIGNATION	PURPOSE	ANTENNA DIAMETER (METRES)	QUANTITY	FIGURE
9m	Communications Control Terminal	9	1	2
TVT	Transportable TV Uplink Terminal	3	2	3
TVRT	TV Receive and Telephony Terminal	3	16	4
TVRT-TM	TVRT with TV Transmit Module	3.4, 3.7	2	5
TVTX	TV Uplink Terminal	3.4, 3.7	2	5
TVRO	High Quality TV Receive Terminal	3	10	-
TVRO/LCET	Low Cost TV Receive Terminal	1.2, 1.8	100	6, 7

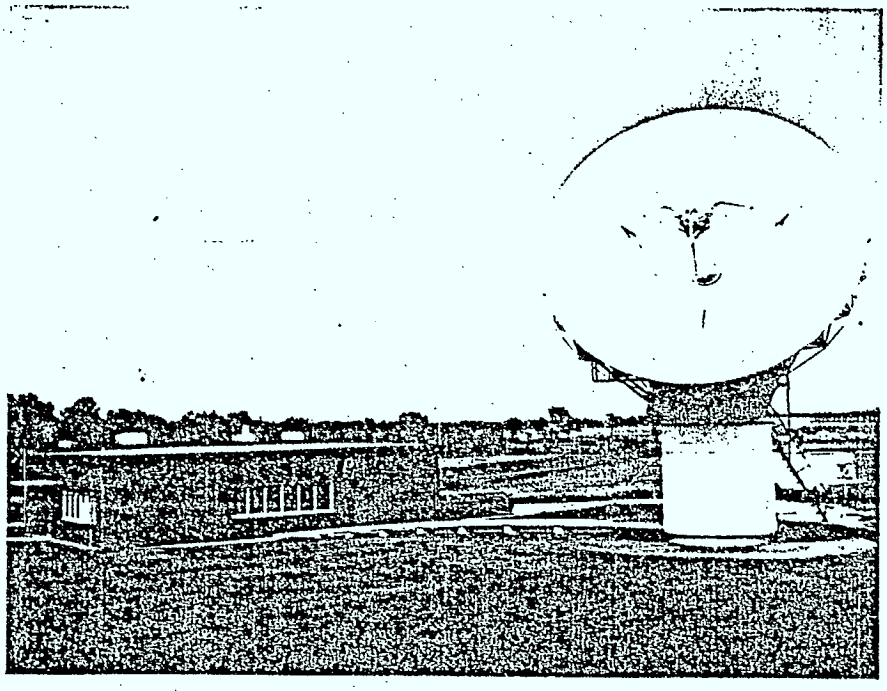


Figure 2

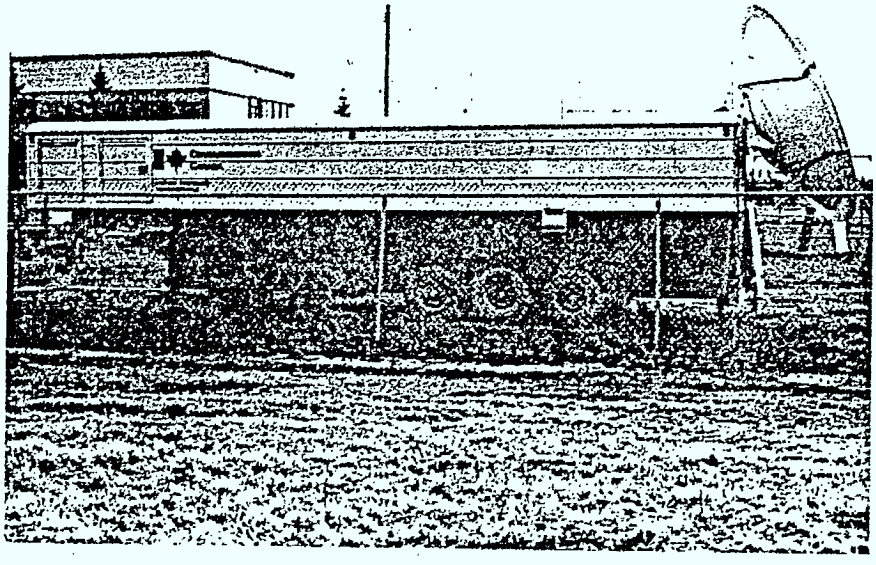


Figure 3

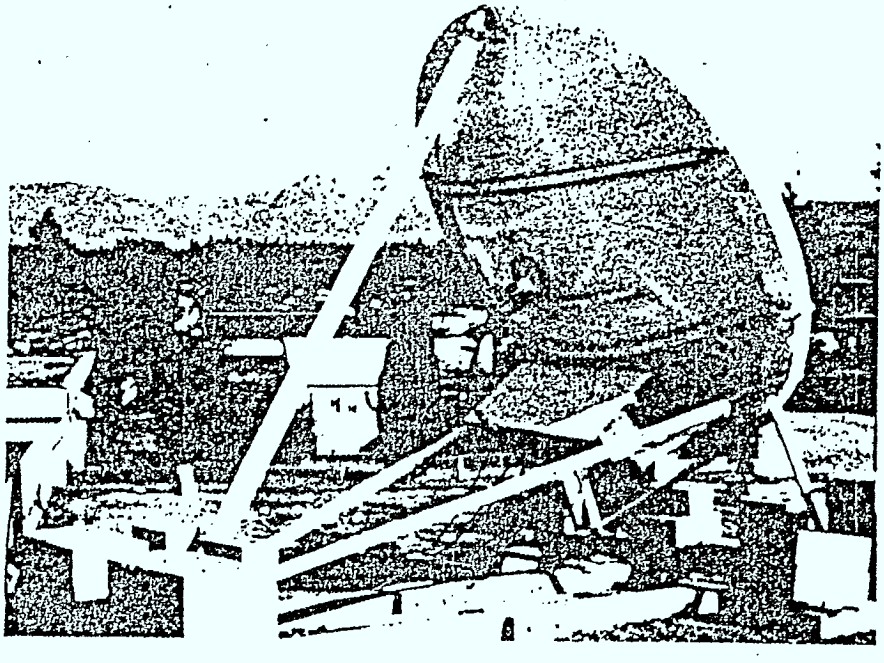


Figure 4

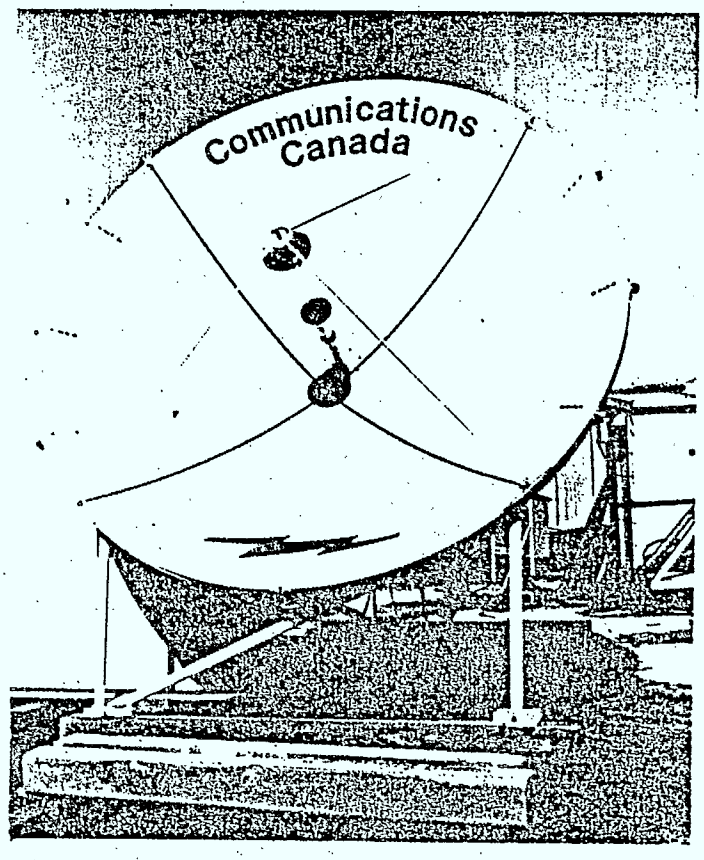


Figure 5

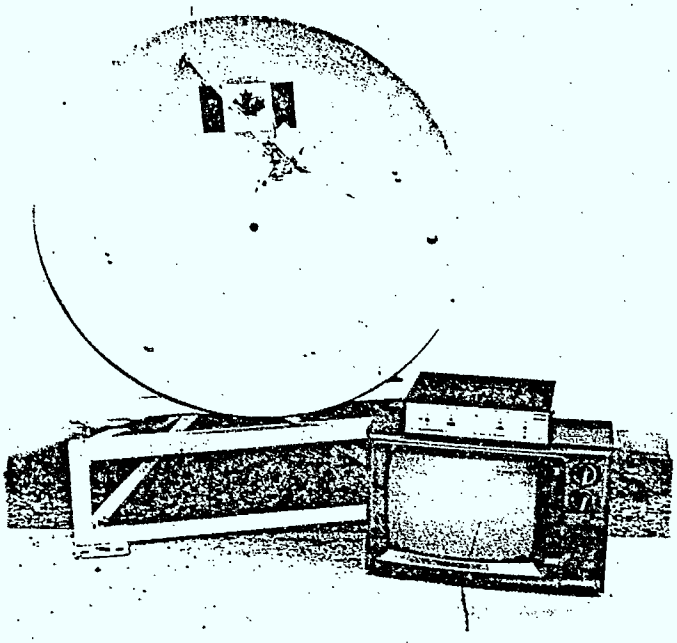


Figure 6

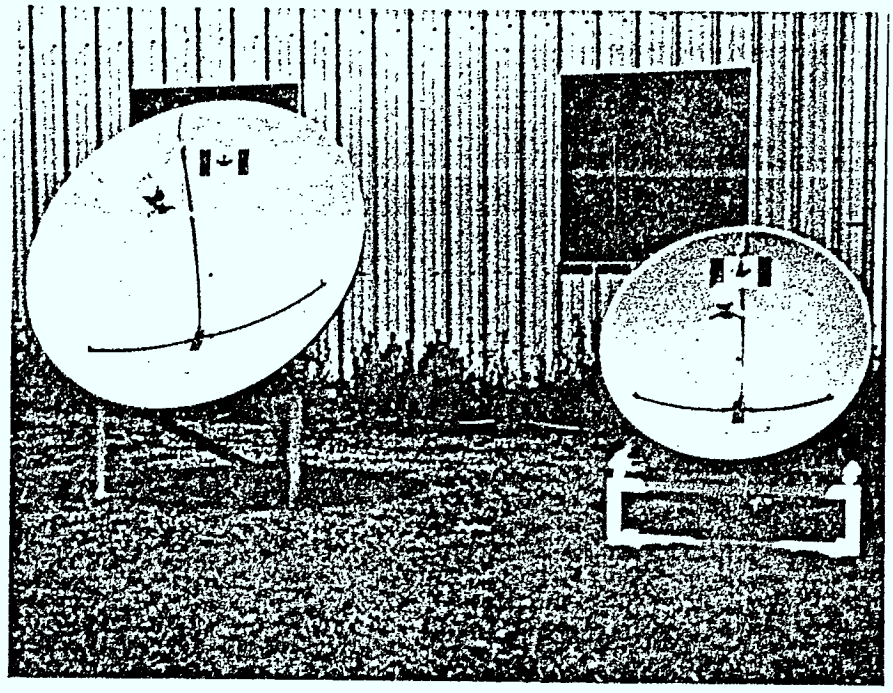


Figure 7

ANIK-B Pilot Projects

The goals established for the ANIK-B program are listed in Fig. 8. In contrast with the experimental Hermes program, the emphasis in the ANIK-B program has been to establish the viability of proposed new telecommunications services. There has therefore been a greater emphasis on the potential telecommunications costs and users have been required to assume a greater share of the costs of implementing the projects. Besides being responsible for interfacing with the ground terminals, users have taken full responsibility for some terminal installations, assistance with maintenance and, in some cases, for operation of uplink terminals. Commercial users have been required to share in the lease costs of the ANIK-B transponders. In general, operations have proceeded satisfactorily and user personnel have rapidly acquired the necessary skills.

ANIK-B COMMUNICATIONS PROGRAM

GOALS

1. TO DETERMINE THE VIABILITY, ON A PRE-OPERATIONAL BUT CONTINUING BASIS, OF TELECOMMUNICATIONS SERVICES DESIGNED TO MEET IDENTIFIED REQUIREMENTS;

2. TO DEVELOP THE KNOWLEDGE AND EXPERTISE TO BETTER UTILIZE 12/14 GHZ SATELLITE COMMUNICATIONS TECHNOLOGY; AND

3. TO DEVELOP EXPERTISE AND CREATE AWARENESS IN USER INSTITUTIONS OF THE POTENTIAL OF TELECOMMUNICATIONS TO DELIVER NEW SERVICES.

Figure 8

The conduct of the program of pilot projects has strained the satellite and ground terminal resources. In total, 36 proposals for projects were received. 19 projects were approved in principle. Of these, at this time, there are 14 active projects (one has been completed), 2 are in a hold category until they are better defined and 3 have been withdrawn. The 16 projects are listed in Table 2 and a schedule of operations is shown in Figure 9. The areas in Canada where the pilot projects are being conducted (except the advanced technology projects) are shown in Figure 10. The locations of the ground terminals, up until the end of May 1980, are shown in Fig. 11 and Fig. 12, the latter showing the location of the TVRO/LCET terminals used for the Program Delivery Pilot Project in satellite direct broadcasting.

Concluding Remarks

We recall that Hermes was the first satellite to operate at 12 GHz and hence a significant effort had to be made to prove that telecommunications operations in the 14/12 GHz band were feasible. Many of the experiments were vehicles to prove out the technology. A total of 21 terminals was employed. As mentioned, with ANIK-B we are seeking to establish the viability of some of the new services. A total of 132 ground terminals are being used. In 1982, ANIK-C will be available to provide commercial services. If DOC extends the ANIK-B service lease, the program will provide a transition to operational services. It is clear that requirements for the use of ANIK-B will exceed the available capacity and we will need to focus on those projects that have the greatest potential. It is very likely that the trend to require greater participation by the user will continue. The capability to bear a significant fraction of the costs is one test of the ultimate viability of the proposed service.

We have obviously progressed at a very rapid pace over the past years. I would like to thank the users for their cooperation and considerable efforts as we sought to develop new ideas in telecommunications.

ANIK-B PILOT PROJECTS
(MAY, 1980)

TV BROADCASTING DISTRIBUTION

B-1 PROGRAM DELIVERY

COMMUNITY COMMUNICATIONS

C-1 ALBERTA EDUCATIONAL COMMUNICATIONS AUTHORITY/ACCESS
C-2 INUIT TAPIRISAT OF CANADA
C-3 TAQRAMIUT NIPINGAT INC.

TELE-EDUCATION

E-1 BRITISH COLUMBIA MINISTRY OF EDUCATION
E-2 ONTARIO EDUCATIONAL COMMUNICATIONS AUTHORITY
E-3 MINISTRY OF EDUCATION OF QUEBEC
E-4 QUEBEC UNIVERSITIES

TELE-HEALTH

H-1 MEMORIAL UNIVERSITY OF NEWFOUNDLAND
H-2 UNIVERSITY OF MONTREAL

PUBLIC SERVICE

P-1 ONTARIO MINISTRY OF GOVERNMENT SERVICES

ADVANCED TECHNOLOGY

T-1 TELESAT CANADA/TCTS
T-2 DEPARTMENT OF COMMUNICATIONS/CNCP
T-3 UNIVERSITY OF TORONTO
T-5 UNIVERSITY OF LAVAL
T-8 TELESAT CANADA/DOC

TABLE 2

ANIK B COMMUNICATIONS PROGRAM

SCHEDULE OF PILOT PROJECT OPERATIONS

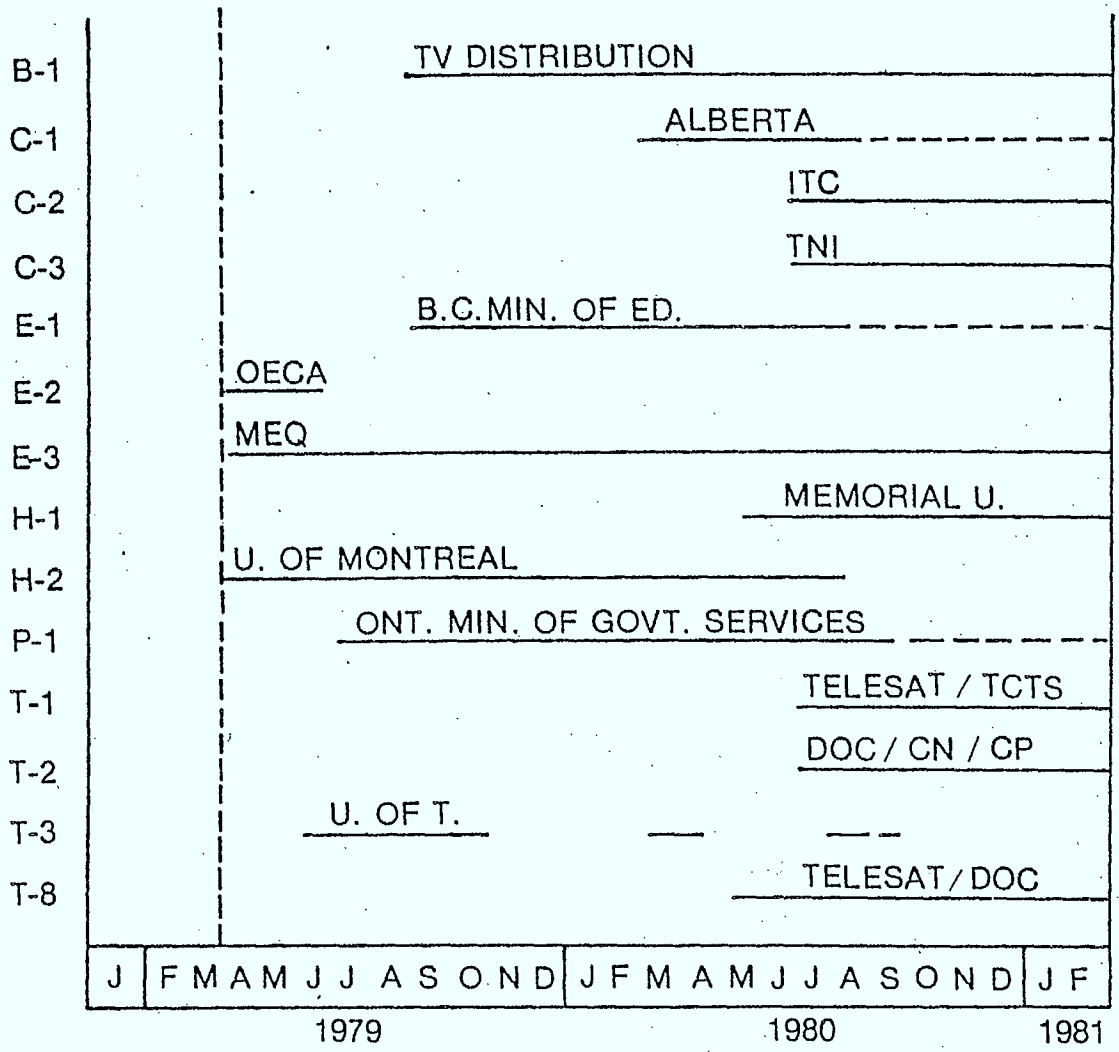


Figure 9

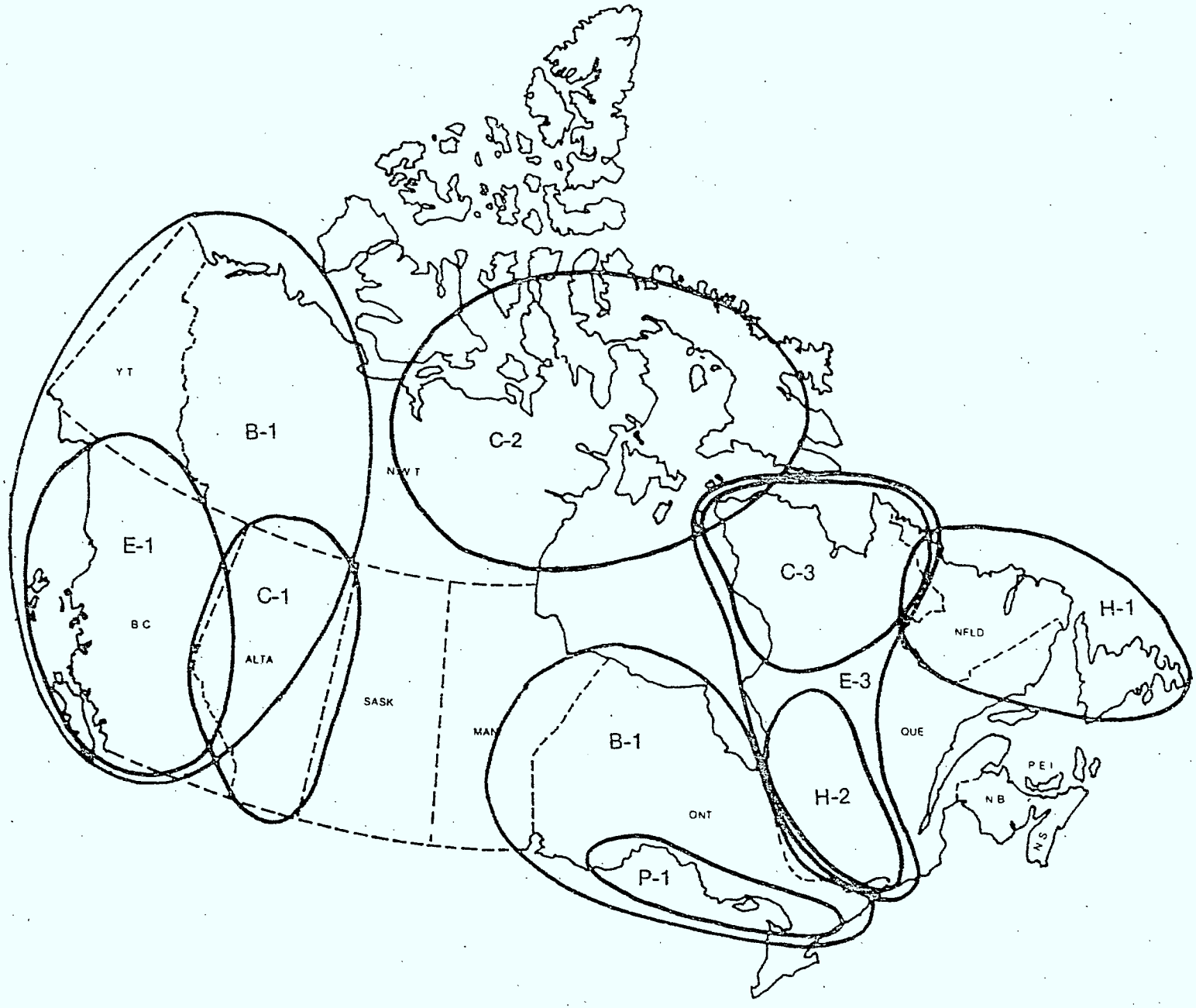
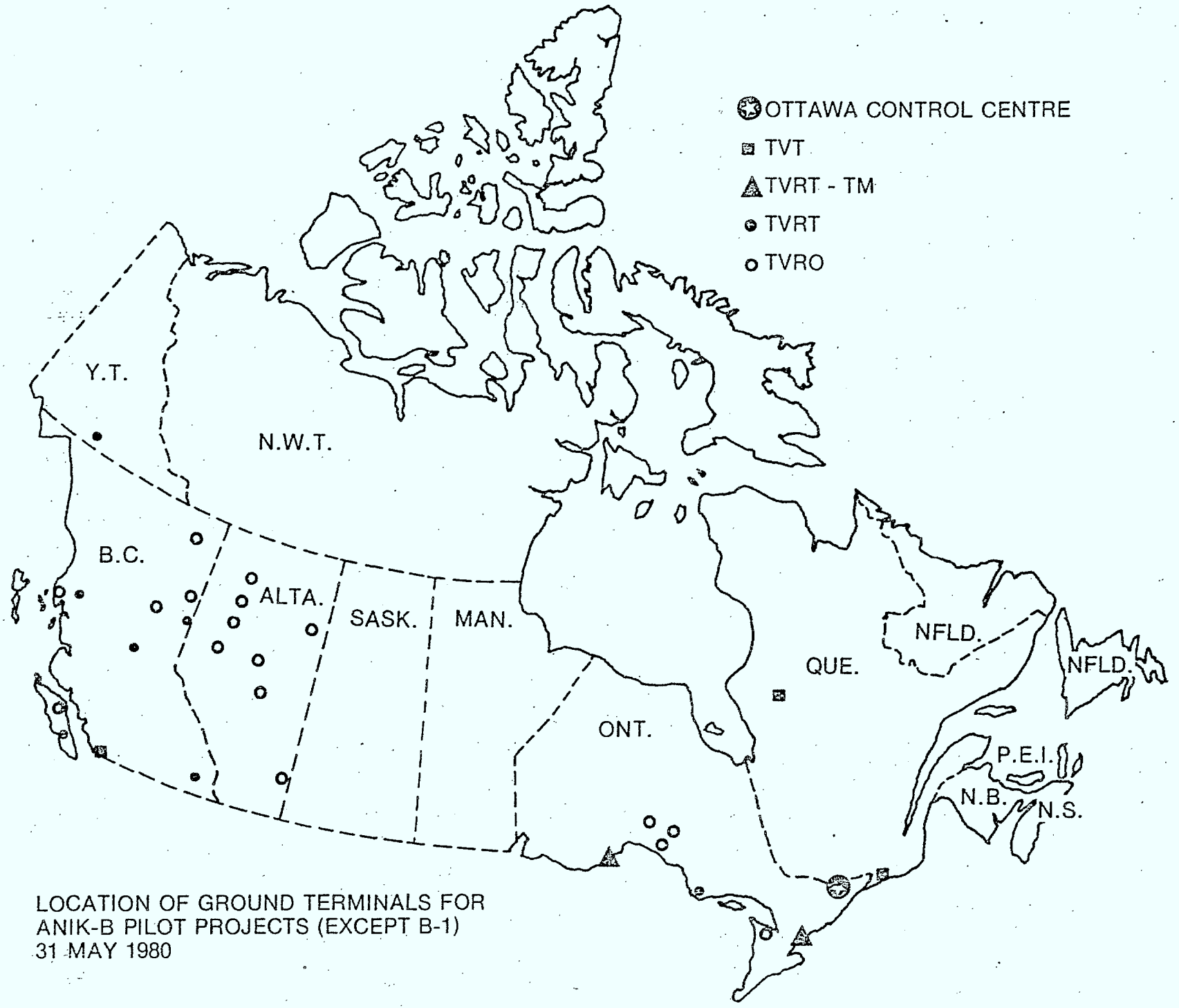
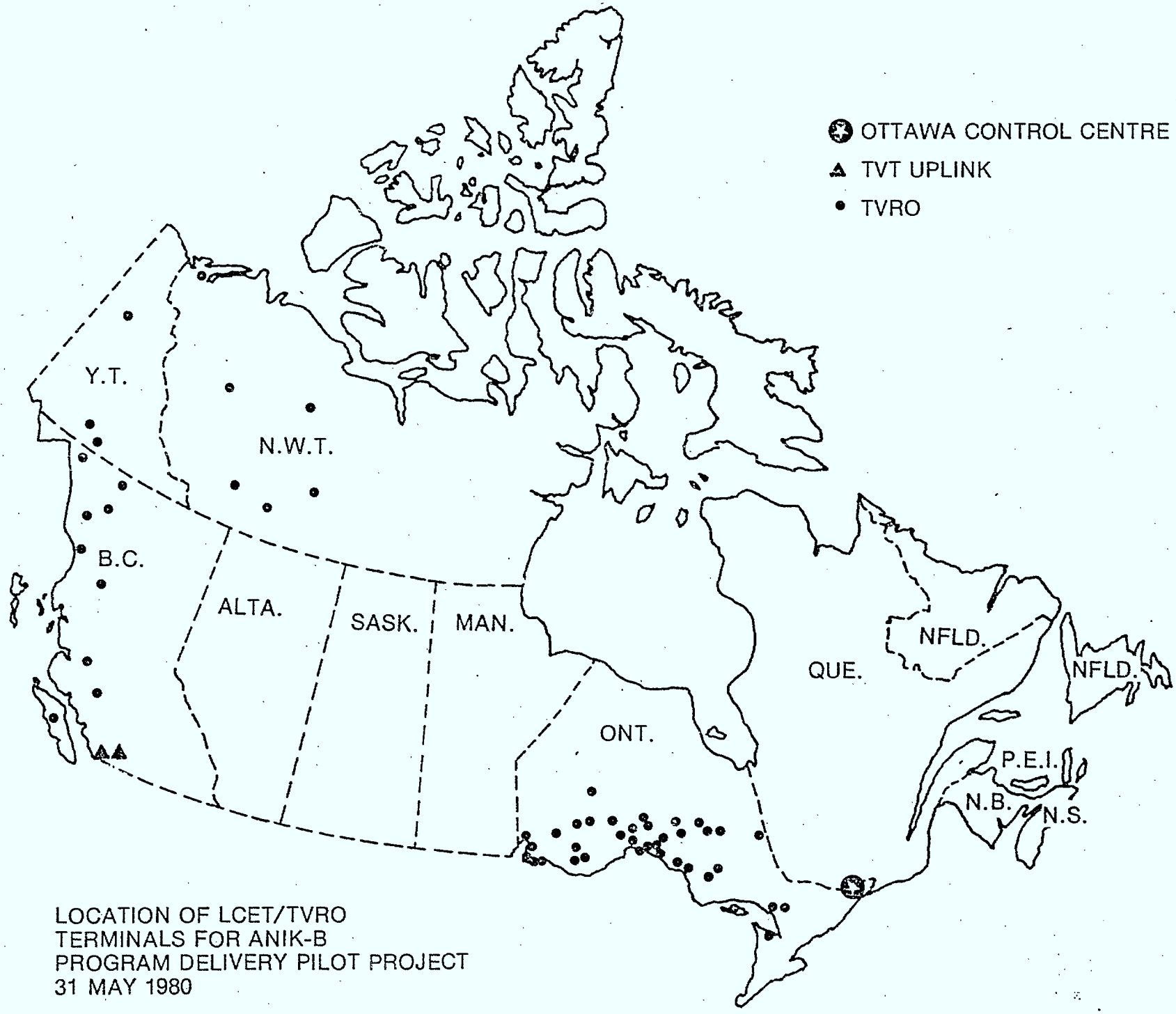

YT
B-1
N.W.T.
C-2
E-1
C-1
BC
ALTA
SASK
MAN
B-1
ONT
C-3
E-3
H-1
NFLD
QUE
H-2
PEI
NB
NS
P-1

Figure 10



LOCATION OF GROUND TERMINALS FOR
ANIK-B PILOT PROJECTS (EXCEPT B-1)
31 MAY 1980

Figure 11



LOCATION OF LCET/TVRO
TERMINALS FOR ANIK-B
PROGRAM DELIVERY PILOT PROJECT
31 MAY 1980

Figure 12

PROJECT PROGRESS REPORTS

B-1 PROGRAM DELIVERY PILOT PROJECT (EAST)

- USER GROUP -

Presentation by Peter G. Bowers
General Manager
Operations Division
Ontario Educational
Communication Authority

B-1 PROGRAM DELIVERY PILOT PROJECT (EAST)

Project Title: Northern Ontario Hybrid Direct Broadcast Operational Trial

Project Sponsor(s): Department of Communications (DOC)
Ontario Ministry of Transportation and Communications (MTC)
Ontario Ministry of Northern Affairs (MNA)
Ontario Ministry of Culture and Recreation (MCR)
Ontario Educational Communications Authority (TV Ontario (TVO))

Project Managers: Robert Bulger MTC
Peter Bowers TVO

Project Objectives:

1. To demonstrate the feasibility of a medium power regional beam 12 GHz satellite to deliver television programming to a combination of urban, rural, and remote area locations.

2. To gain operational experience in the provision of educational television via direct broadcast satellite to remote locations.

3. To examine the demand for alternative television service in remote areas of Northern Ontario.

4. To examine the need for contextualization of educational programming when delivered to isolated and remote areas.

5. To examine the subjective acceptability of varying technical signal quality in remote areas.

Outline of Activities:

The trial commenced on September 25th, 1979 and will continue until at least February 1981. Transmission amounts to 87 hours per week of TV Ontario network programming commencing at 1 p.m. weekdays and 8 a.m. weekends and continuing until sign-off each day (approximately 12 midnight). The programming is designed for both in-school use, as well as for viewers at home, including pre-school, elementary and secondary, teacher education, family viewing and continuing adult education.

The program will be delivered to 46 locations, 43 of which have been installed and are operating. Receivers are low cost earth terminals with 1.2 metre and 1.8 metre antennas costing in the order of $3600 to $4000 in limited production runs. In addition there are 4 - 3.0 metre antennas at locations at the edge and beyond the satellite foot print service area. The receivers feed a variety of local distribution systems including 20 individual homes, 15 cable television systems, 10 institutions such as senior citizens homes, recreation centers, schools, motels, and a prison, and one receiver is feeding a low power television broadcast transmitter.

The program has been a masterpiece of co-operation between the various participating agencies which has greatly expedited the efficient implementation and operation of the undertaking. For example, selection of sites was a joint undertaking with final qualification and site inspection undertaken by TVO personnel. MTC provided transportation of equipment to the sites. DOC regional staff undertook installation and maintenance with some assistance from TVO. Liaison with users is maintained by field officers from MNA, MTC and DOC. Research activities are a joint undertaking by MTC, DOC, and TVO.

TV Ontario's interest in direct broadcast satellites is based on the premises that they can be an economic alternative to terrestrial microwave for purposes of feeding conventional transmitters in a region the size of Ontario, that DBS service is the only economic way to reach the last 5 to 10% of the population living in isolated areas where terrestrial broadcast or cable is uneconomic, and that a multi-beam satellite is potentially a vehicle for interprovincial and interregional sharing and exchange of programs. In this hybrid mode of operation, the choice of local distribution systems is determined by the economics of the situation, and may be conventional broadcast transmitters, cable television systems, master antenna systems, or individual receivers. The cost of providing satellite service to remote areas is ameliorated by utilizing the satellite to replace microwave services in urban areas.

Progress to Date:

The evaluation involves extensive field interviews both before and after the service is introduced. At the time of this report, the pre-test has been completed, but not analyzed, and the post-test has not yet started. 166 Northern Ontario residents were interviewed, half of them receiving the service directly from the satellite, the other half receiving it via cable. In order to deal with the problem of raising expectations before the continuity of the service can be assured, receivers were only located where people were receiving at least one other television signal.

The survey investigates over 150 variables with adults and 100 variables for children under 16 years of age. The survey delves into viewing habits, demands for additional programming, attitudes towards available television programs, and perceptions about the social impact of television. The results of the evaluation will be reported fully and rigorously in due course. Some of the preliminary indications are: that there is a demand for alternative television, that demographics are not a predictor of viewing habits, demands, attitudes, or perceptions of television. There is a perceived "Northern" identity but their viewing preferences do not differ appreciably from others in the North, or from the national average. "Northerners" feel strongly that the quality of television signals is poor in northern areas. It must be stressed that these observations are only preliminary indiciations and may be superceded when the evaluation is complete.

In the area of contextualization, which is still to be fully investigated, it appears that it is not necessary for remote areas per se, but that there is a significant demand in communities in the satellite and broadcast service area for resource materials via television that can be utilized at the local level. (Refer to the TV Ontario report on Tele-academies.)

The technical signal quality acceptability investigation is being undertaken by DOC with TVO co-operation and support. Essentially it involves subjective ratings of varying signal qualities and program content.

At the present time, the signal is originated in Toronto, microwaved approximately 250 miles to Ottawa, broadcast on CICO-TV-24 Channel 24 (UHF) in Ottawa, received off-air at the Communications Research Centre at Shirley Bay approximately 10 miles from the Channel 24 transmitter, demodulated to video, and then uplinked from Shirley Bay to the satellite.

It is expected that in July an uplink will be installed on the roof of the TV Ontario building in Toronto which will enable TVO to get first hand experience in the effectiveness, efficiency, and quality of direct on-site uplinking to the satellite.

The operating results have been surprisingly good. It was recognized that the low cost earth terminals, which are essentially prototypes of mass production technology might experience 'shakedown' problems in the field. Similarly it was feared that antennas installed on frozen ground in the fall, would require reorientation after the spring thaw. There have been a significant number of failures of the receiver (IDU) which appear to be manufacturing problems rather than design defects, and the process of returning units under warranty is onerous. However, as of this date, all installed sites are operational.

The over-riding impression is that the demand for alternative, consistent quality television is so great that temporary disruptions are tolerated, and overall satisfaction with the service is high.

Future Plans:

Notwithstanding our attempts to control the "expectations" problem and a clear understanding that continuity could not be assured, the service is greatly appreciated, and concerns are already being expressed about any interruption of the service. The feeling is that Northerners are entitled to alternative television and that the technology exists to provide it.

TV Ontario projects a transition to operational service on ANIK-C and has submitted a request to the Minister of Culture and Recreation for the necessary support to do so. Our existing microwave contracts include a provision for conversion to satellite service.

TV Ontario has submitted proposals to DOC for continuation of the trial as part of the ANIK-B Phase II planning process.

All, of the Ontario participants feel that, based on the reaction of the users, ways must be found to maintain the continuity of the service until ANIK-C is available for operational service.

B-1 PROGRAM DELIVERY PILOT PROJECT (WEST)

- USER GROUP -

Presentation by D. Currie, Regional Engineer
(Pacific)
CBC, Vancouver

and

T. Negoro
Assist. Vice President
Engineering
BCTV, Vancouver

Note: Mr. Negoro closed his presentation with an entertaining videotape of a Jack Webster Show which was broadcast over ANIK-B.

B-1 PROGRAM DELIVERY PILOT PROJECT (WEST)

Project Sponsor(s): Department of Communications
British Columbia Television Broadcasting System Ltd.
Canadian Broadcasting Corporation
Province of British Columbia
Yukon Territory
Northwest Territories

Prepared by: T. Negoro, P. Eng.
Assist. V.P. Engineering
BCTV, Vancouver

D. Currie, P. Eng.
Regional Engineer (Pacific)
CBC, Vancouver

1.0 Introduction

Since 1972, the Canadian Broadcasting Corporation has been distributing its network television programming via the ANIK satellites, operating at the 6/4 GHz band to regional centres and to the Northern reaches of Canada. However, the relatively high cost of receiving terminals for this system means that this method for the extension of multichannel service to the whole population is not economically viable.

The Program Delivery Pilot Project (PDPP) was structured to test the level of performance of the ANIK-B 14/12 GHz transponders in combination with the Low Cost Earth Terminal (LCET) receivers for the reception of television signals; the concept is more commonly referred to as the Direct Broadcasting Satellite (DBS). Two programs were sent: one on the ANIK-B East-central beam, with the television program of the Ontario Educational Communications Authority; the other on the West beam, with the full broadcast schedule of the "Pacific Net" of the CBC and the "Interior Feed" of BCTV. Through this project, Canada achieved distinction as the first country to install earth receiving stations in private homes to test direct-to-home satellite service.

2.0 Project Outline

2.1 Project Participants:

2.1.1 Department of Communications (DOC)
2.1.2 British Columbia Television Broadcasting Systems Ltd. (BCTV)
2.1.3 Canadian Broadcasting Corporation (CBC)
2.1.4 Province of British Columbia (B.C. Gov't)
2.1.5 Yukon Terriroty (Y.T. Gov't)
2.1.6 Northwest Territories (NWT Gov't)

2.2 Project Location:

West footprint of ANIK-B (see attached map), covering British Columbia, Yukon Terrirority, and the western portion of the Northwest Territories.

2.3 Television Signals:

The full broadcast programming of:

2.3.1 "Interior Feed" of BCTV, an average of 22 hours per day, which would include sporting events "blacked out" in the Lower Mainland.

2.3.2 "Pacific Net" of the CBC, a regional format distributed outside the Lower Mainland.

2.4 Receiver Locations:

LCET locations are scattered within the west footprint to assess their performance through various climatic conditions. As the 12 GHz downlink is susceptible to rain attenuation and to the thickness of cloud cover, the wider range of operating conditions from the Coast to the Plains is testing the acceptability of the 1.8 meter dishes. A list of the receiver locations is appended. To date, some 22 LCET's have been installed.

A committee of the participants selected these sites based on criteria laid out, as well as individual experimental requirements.

The provincial government of British Columbia and the territorial governments of the Yukon and the Northwest Territories assisted in the logistics of delivering the LCET's. The installation was conducted by DOC personnel.

2.4.1 In the case of Whitehorse, the cable system is licensed by the CRTC to carry the program service of BCTV on a tape-delay basis. Temporary authority has been obtained to carry the BCTV signal live via the PDPP. Therefore, some 3000 subscribers are enjoying News and sporting events on a real-time basis.

2.4.2 In Yellowknife, the cable system has authority to carry the CTV Network programming of CFRN-TV, Edmonton, on a tape-delay basis. During this pilot project, temporary authority has been received to supplement that service with the carriage of the BCTV signal on real time.

2.4.3 The DBS aspect of this program called for a majority of LCET's to be located in private homes. The installations were carried out on that basis, but when one understands the feeling of isolation of the north, as well as the drive of communal co-operation, the signal is now being transmitted over-the-air in many instances on unlicensed transmitters.

2.4.4 The LCET of Courtenay is being utilized as a "pick-up" of the CBC signal to feed the rebroadcasting station, CBUT-1, to determine the improvement in the reliability over the "off-air" method.

2.5 Objectives:

2.5.1 The stated objectives of this DBS project are:

2.5.1.1 To demonstrate, evaluate, and gain field experience with a direct-to-home and small community program delivery service, using the ANIK-B Satellite 14/12 GHz transponders.

2.5.1.2 To provide a prototype testing ground and a small initial market to help stimulate the industrial sector to develop a line of internationally competitive products for this service.

2.5.1.3 To provide information to the Government which will contribute to policy development and plans respecting the future operational use of broadcasting satellites.

2.5.1.4 To provide information to the various agencies, institutions and corporations interested in satellite broadcasting to help them formulate plans for their future activities in this field.

2.5.2 Though unstated, on the West Beam, there is an objective, a technical one, which makes this pilot project unique. The objective is to test the transmission of two TV signals (two video and two audio) over one transponder on the satellite. This would reduce the transponder rental cost proportionately.

3.0 Project Details

3.1 Schedule:

The project started on December 14, 1979. Present plans call for termination August 31, 1980. Negotiations are presently under way to extend this in some form or variation into next year, since only about 50 per cent of the LCET's are delivered, and subsequently, the assessment on system capability is only partially known.

3.2 The Unique Experiment:

3.2.1 Two TV signals are being transmitted over one transponder on the satellite, This is accomplished by frequency division multiple-access, in that two separate uplink transmitters operate at $\pm$ 15 MHz from the centre of the channel. The Effective Isotropic Radiated Power (EIRP) is kept balanced in order that the 20 watts of power of the retransmitted signal from ANIK-B is divided equally between the two signals.

3.2.2 Originally, the uplink units were two Television Transmit (TVT) trailer terminals, one belonging to the DOC, Communications Research Centre (CRC) and the other to Telesat. Both units were co-located on the parking lot at BCTV. The CBC signal was microwaved from the studio to this site.

3.2.3 In April, a decision was made to test the access to the satellite by uplinks at different locations. The CBC building was chosen for the site of the portable TVT hut unit, which would eliminate the need for the CBC microwave link. The concern was the monitoring for the balance of EIRP, with the minimal monitoring equipment that was available. However, there has been no undue effect on the service to the LCET's and the Telesat trailer was returned May 30.

3.2.4 If the approach of two TV signals through one transponder is proven feasible utilizing the present model of LCET, then the broadcast of signal can be accomplished at a proportional cost saving of rental rates of transponders for any future commercial venture.

3.2.5 Results have shown that, within the footprint, an acceptable level of signal is receivable for direct-to-home broadcast service. Within the centre of that footprint, a subjective evaluation of signal-to-noise of 40 dB was expressed.

3.3 Reliability:

At the outset of this pilot project, there was some concern about the continuous use of the transmission facilities, particularly the TVT uplink trailers, which in the case of the BCTV signal, meant sign-on at 6:00 a.m. and sign-off after the late-late movie, sometimes at 6:00 a.m. the next morning.

Results have shown the TVT uplink trailer units can operate continuously on a 24-hour day basis for an indefinite period.

3.4 Feedback:

In order to assess the quality of reception and to correlate anomalies with known transmission factors, such as climatic conditions, it was agreed that some form of tabulation (log) was required by the recipient of the LCET. A draft of such a form was presented to DOC, who in turn had these forms finalized and printed. The DOC is acting as co-ordinator for the collection of these forms. BCTV is collecting the daily weather information of satellite photos released by the Meteorological Service of Environment Canada.

3.5 Professional Discussions:

A number of discussions have been conducted on a professional basis to fulfill objective 2.5.1.4 above.

3.5.1 Institute of Electrical and Electronics Engineers (I.E.E.E.) - At a regular meeting of the Vancouver Section of the IEEE, a symposium and tour of facilities on "Direct Broadcast Satellite" was conducted on February 25, 1980 at BCTV. Participating in the symposium included:

Mr. J. Thwaites, DOC, Vancouver
Mr. D. Currie, CBC, Vancouver
Mr. T. Negoro, BCTV, Vancouver
Mr. B. Robertson, BCIT, Vancouver

The DOC made available an LCET unit in order that the downlink segment may be viewed as well as the on-site TVT's. Attendance was approximately 55.

3.5.2 Society of Motion Picture and Television Engineers (SMPTE) - A meeting of the Northwest section of the SMPTE was convened at BCTV for February 29, 1980, to coincide with the availability of the above set-up. Attendance was approximately 70 - drawing interest from as far as Edmonton, Seattle and Portland.

3.5.3 Western Association of Broadcasters (Engineering) (WABE) - At the annual convention of the WABE, held in Calgary, May 6 - 8, 1980, T. Negoro of BCTV presented a paper on "Direct Broadcast Satellite". This presentation was well received by an audience of approximately 150.

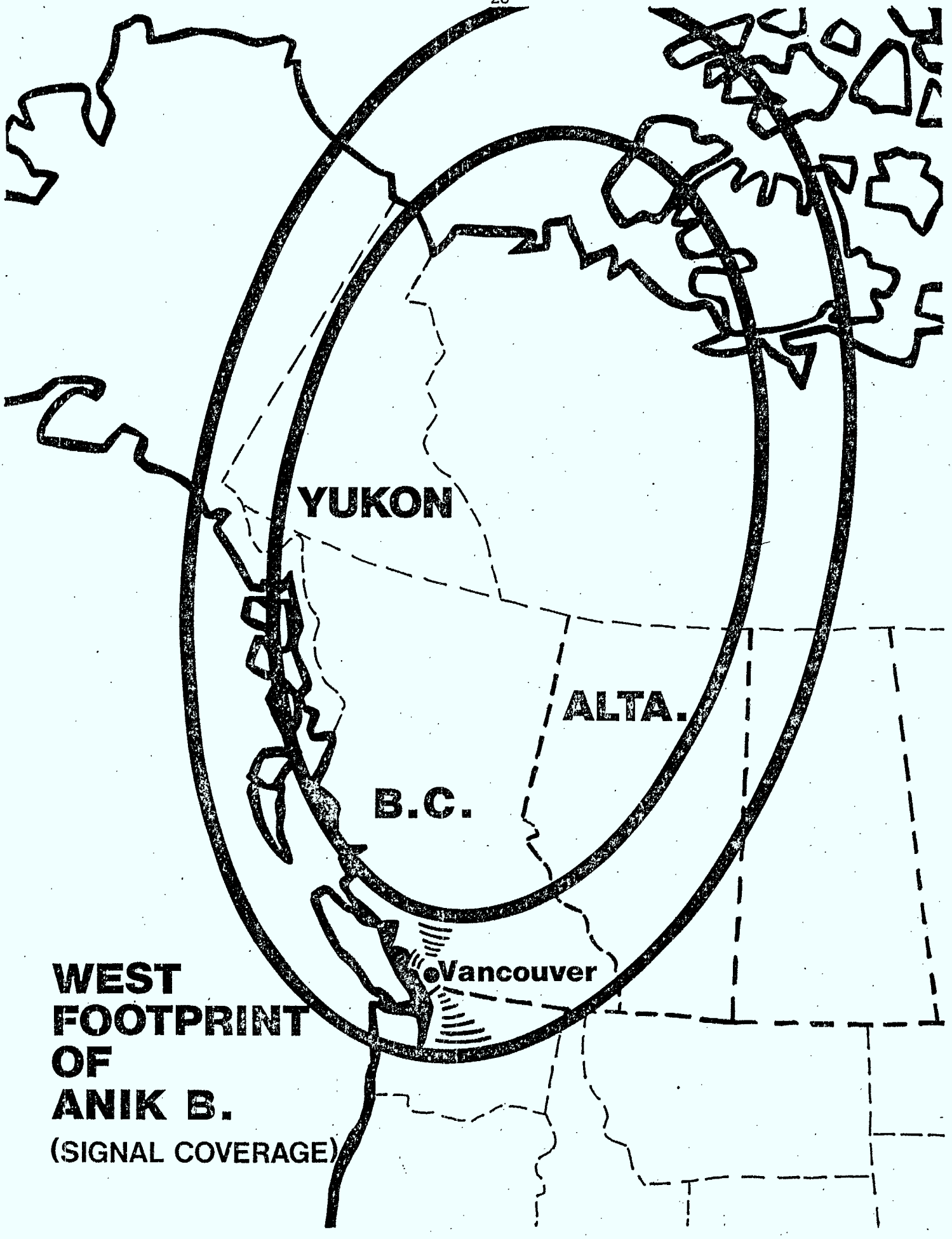
4.0 Observations

4.1 Pilot Project:

Although the rate of installation of LCET's is drastically behind schedule, the perceived response to this project is highly favorable. Whenever a new LCET installation is known, BCTV has contacted the recipient, usually by telephone, on-air, and of course, the reaction is invariably of ecstacy. Subjectively, the signal is usually much clearer than they are accustomed to, and the fact that an alternative program fare is now available adds to the bias.

4.2 DOC/Canadian Radio-television and Telecommunications Commission (CRTC) Liaison:

The special committee of the CRTC has held hearings to find a solution to the need for varied television service to the remote and Northern areas of Canada, and at its own volition, had implicated the need of pay television to cross-subsidize the cost of satellite transmission to these areas. In this interim period, this PDPP is meeting part of the need of the people in Canada's remote areas. If illegal satellite receivers, watching the U.S. Satcom, are to be replaced, an alternative must be available to these people. Extension of this pilot project should be sufficient incentive to mobilize the electronic industry to mass-produce the LCET's, one of the other objectives of this pilot project.



WEST FOOTPRINT OF ANIK B.
(SIGNAL COVERAGE)

LCET LOCATIONS

Yukon

1.)	Whitehorse*	Cable System
2.)	Eagle Plains*	
3.)	Mayo	
4.)	Haines Junction	
5.)	Silver City/Beaver Creek	
6.)	Faro	
7.)	Watson Lake	
8.)	Johnsons Crossing*	

NWT

1.)	Yellowknife*	Cable System
2.)	Norman Wells*	
3.)	Inuvik*	
4.)	Fort Smith*	
5.)	Port Radium*	
6.)	Fort Simpson*	
7.)	Talston River Dam	
8.)	Fort Providence*	

B.C.

1.)	Cassiar*	
2.)	Dease Lake*	
3.)	Telegraph Creek*	
4.)	Atlin*	
5.)	Tatla Lake*	
6.)	Anahim	
7.)	Hazelton*	
8.)	Stewart*	
9.)	Courtenay*	CBC rebroadcast feed
10.)	Bull Harbour	
11.)	Strathcona Lodge*	
12.)	Port Hardy	
13.)	Juskatla*	
14.)	B.C. Rail	
15.)	West Kootenay	
16.)	Mackenzie	
17.)	Bella Bella*	
18.)	Grand Forks	
19.)	Loos/Valemont	
20.)	Premier Lake*	

*Installed and operating

C-1 ALBERTA GOVERNMENT

- Alberta Educational
Communications Authority -

Presentation by H.G. Kratz
Director
Alberta Educational
Communications Authority

and

I.R. James
Director
Special Projects
ACCESS Alberta

C-1 ALBERTA GOVERNMENT

The following outline indicates Alberta's participation in the ANIK-B Experiment for the period March 4 to May 15, 1980.

Project Title: Distance Education in Alberta: ANIK-B Experiment

Project Principals:

Project Sponsors: Alberta Educational Communications Corporation (ACCESS)

Project Manager: Mr. J.R. Mann, Technical Manager

Project Co-ordinator/Principal Contact: Mr. I. James

Mailing Address: Mr. J.R. Mann, General Manager,
Technical Services
ACCESS Alberta,
16930 - 114 Avenue
Edmonton, Alberta
T5M 3S2
Telephone: (403) 451-3160
Telex: 037-3948

Mr. I. James, Satellite Project Co-ordinator is located at ACCESS Alberta (address as above)

Project Objectives:

1. To gain first hand experience with satellite technology as it applies to educational television programming within the Province of Alberta.
2. To assess the practicality of the service within the Province of Alberta.
3. To identify the segment of population which is best served with this technology.
4. To examine both the quality of the programs available and further determine if additional support material is necessary.
5. To evaluate the costs associated with such a service.
6. To develop awareness of the potential of satellite technology in selected post-secondary institutions.

System Description

a. Up-link Facility

A two-hour block of programming is packaged by ACCESS Alberta and relayed to the Western up-link at BCIT. The lack of direct access to a nearby up-link has constrained our experimentation with interactive programming.

b. Earth Stations

Eight earth stations are deployed as follows:

Six 1.2 metre earth stations have been installed in selected locations and all report good reception. A map of locations is attached as an appendix to this section.

i) High Level

This is a small isolated rural community and the high school is being used to receive the signal.

ii) Peace River

This community has a population of approximately 7,000 and the station is located in the newly-established Adult Learning Centre. This Centre is adjacent to the high school and is already being used for a number of adult education courses being offered by the Consortium of Northern Colleges.

iii) Grouard

This small Indian community of some 700 people is significant because of the location of an Alberta Vocational Centre in the town. The earth station is located at the student residence building.

iv) Grande Prairie

Alberta's major city in the far North with a population approaching 15,000 and growing. The earth station here is located at the regional college and is fed into the Cable Consortium's educational programming.

v) Edmonton

The Alberta Vocational Centre in downtown Edmonton receives the satellite programming and has internal cabling which permits distribution to all teaching areas. VTR equipment is also available for storage and retrieval of programs after primary distribution.

vi) Edmonton

The remaining 1.2 metre earth station is sited at the headquarters building of ACCESS Alberta in order to monitor signal strength as closely as possible. It also serves as a back-up for deployment in cases of special need.

Two 3-metre TVRO's are deployed in fringe areas to test reception under marginal conditions.

vii) Fort McMurray

For technical reasons this station is sited at the local cable company's offices and studio. The signal is fed into the local educational consortium's channel and is sponsored by the local learning centre of our distance education university.

viii) Medicine Hat

A medium-sized market and industrial town remote from large urban centres. The station is located at the community college.

NB: In addition, the two-hour program package is being carried by Calgary's educational consortium channel. This facilitates the participation of the Southern Alberta Institute of Technology in offering a photography course.

Program Description

Programming of the two-hour block was based on the expressed interests of the participating institutions. The attached schedule for the period March 3 to May 30 indicates the breadth of program offerings available in the first programming phase. Highlights of this schedule are:

a. Library Course

In the absence of qualified instructors to teach the library technical course in Northern Alberta, this experiment has already produced co-operation between two of our post-secondary institutions. Grant MacEwan Community College has produced 13 TV programs that provide direct teaching of their library technician's course through distance education techniques.

Satellite transmission of 13 TV programs is accompanied by printed material, telephone tutorials, and personal visitations by the instructor to the 13 students enrolled in the North. Telephone contact is maintained to provide interaction between instructor and students. Recently, the CRTC approved our use of SCMO broadcast from our Grande Prairie and Peace River transmitters. Unfortunately, this approval came too late to allow SCMO communication in this first phase. Programs are produced by Grant MacEwan Community College in their studios and a rigorous evaluation of this mode is planned.

b. Coping With Stress

Another specific outcome of this experiment is the production of 10 one-hour TV programs by ACCESS Alberta and Athabasca University on teaching how to cope with stress. (ACCESS Alberta provided approximately $45,000 in direct and indirect program production costs.)

c. Other series are more speculative in nature in order to test the appropriateness of existing materials and the need for production of specific materials for distance education.

A number of participating institutions are investigating the potential of programming via satellite but require more lead time in order to finalize their plans. It is anticipated that the high degree of interest in distance education technologies will be a catalyst for more specific programming ideas for the immediate future. Details on specific programs can be obtained from the Director, Special Projects. (A program schedule is appended).

Evaluation

An evaluation of this experimental phase is underway. It has three components:

a. Users' Meeting

A one-day meeting is to be held on June 9, 1980 to receive reactions and advice from educational users.

b. Detailed program evaluations are being conducted by Grant MacEwan Community College and Athabasca University on their specific projects. Further project-specific evaluations may occur.

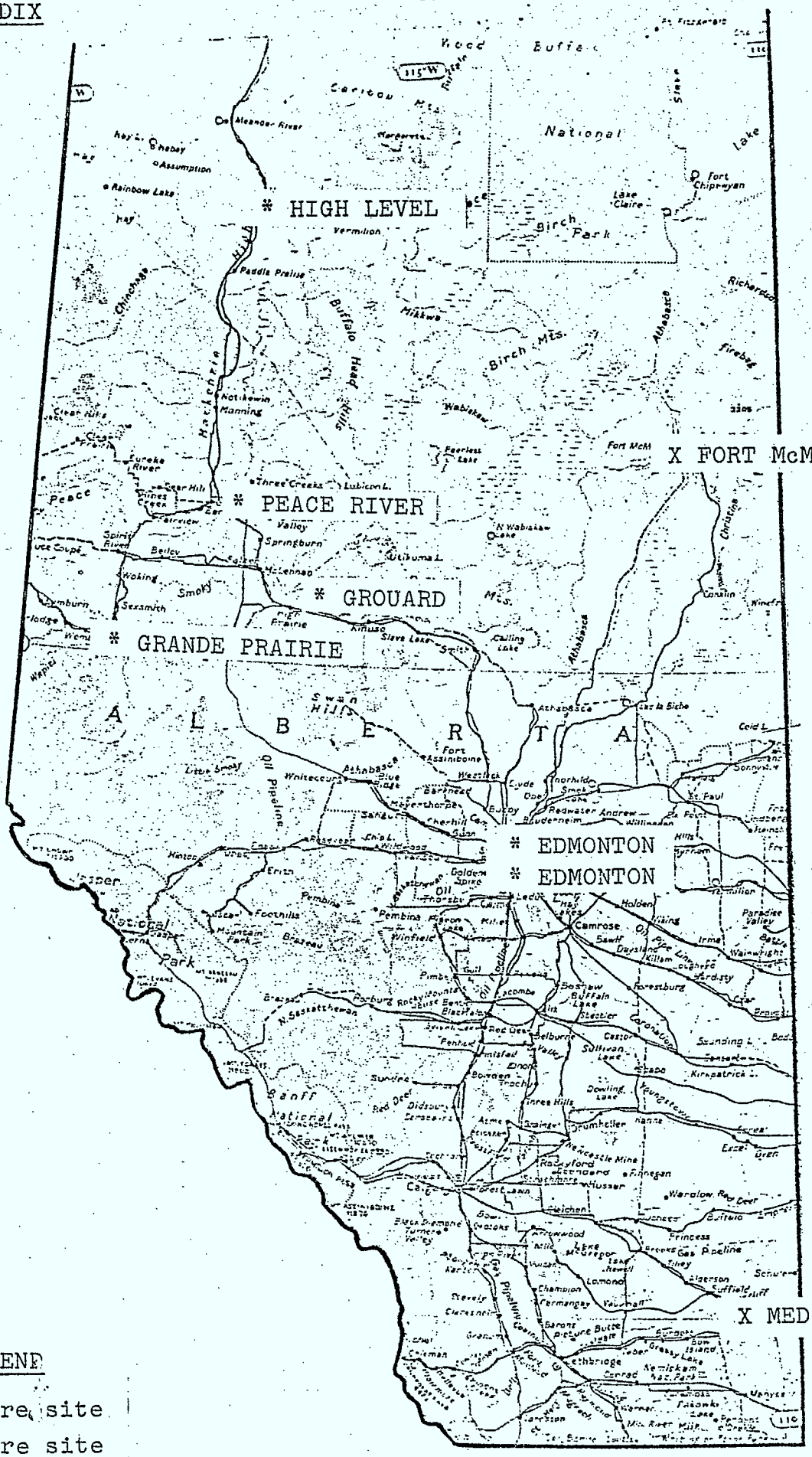
c. A formal evaluation of the project by participating sites is currently under way. (A copy of the evaluation instrument is attached).

Because these activities will not be completed until mid-June, it would be premature to comment at this time.

Future Plans

Future plans are so highly dependent on availability of satellite facilities that it is inappropriate to designate our intentions as "plans". We have however, already made a significant commitment to further satellite projects. This commitment is matched by selected participating institutions who are prepared to allocate staff and budget to more intensive experimentation. A high degree of inter-institutional co-operation has been a major feature of first phase experimentation. We have had several inquires about programming from neighbouring provinces and territories. It is our belief that a second phase experimental period would produce very considerable progress in the uses of technology for educational purposes.

APPENDIX



LEGEND

* 1.2 metre site

X 3 metre site

APPENDIX

13-Week Satellite Programming Schedule
Commencing March 3, 1980 to May 30, 1980

	MONDAY		TUESDAY		WEDNESDAY		THURSDAY		FRIDAY	
1800	FOCUS ON CHILDHOOD* March 3, 1980 to May 12 inc.	NO TIME TO LOSE* May 19 to May 26 inc.	LIBRARY COURSE - Technical Processing Program Lengths From 24 minutes to 75 minutes.		RENEWABLE SOCIETY* March 5 to April 30 inc.	WORLD IN YOUR KITCHEN May 7 to May 28 inc.	IN THE SHADOW OF THE GIANT March 6 and 13	COPING WITH STRESS March 20 to May 29 inc.	RENEWABLE SOCIETY* March 7 to April 25 inc.	WORLD IN YOUR KITCHEN April 25 to May 30 inc.
1830	PLANET OF MAN* (12 Programs In Series) May 26 Repeat Of Program No. 1				OLYMPIC PROFILES				ADVENTURES IN HISTORY March 7 to April 25 inc.	EPISODES & ISSUES IN CANADIAN HISTORY April 25 to May 30 inc.
1900	THE ASCENT OF MAN*		FINDING MY OWN WAY*		THE AGE OF UNCERTAINTY* May 28 Repeat Of Program No. 1		CAR OWNERS MAINTENANCE GUIDE*		FAMILY AND THE LAW* March 7 to May 9 inc.	EXPLORATIONS IN THE NOVEL May 16, 23 & 30
1930			BASIC HORSE CARE March 4, 11 & 18	BASIC PHOTOGRAPHY March 25 to May 27 inc.			CLASSICS DARK AND DANGEROUS* March 6 to April 3 inc.	Athabasca University FIRST YEARS OF LIFE April 10 to May 1 THE PRESCHOOL CHILD May 8 to 29	BASIC HORSE CARE March 7, 14 & 21	BASIC PHOTOGRAPHY Repeat of Tuesday Program, March 28 to May 30 inc.

*SUPPORT MATERIAL AVAILABLE FROM ACCESS

February 26, 1980

C-2 THE INUKSHUK PROJECT

- Inuit Tapirisat of Canada -

Presentation by L. Green
Operations Manager
Inuit Tapirisat of Canada

Note: Following her presentation, Ms. Green showed an 8 minute videotape explaining the Inukshuk Project.

C-2 THE INUKSHUK PROJECT

PRESENTATION OF INUIT TAPIRIST OF CANADA

David Simailak, Project Director of ITC's ANIK-B Project wants me to convey his regrets that he is unable to be here today. He has asked me to speak to you on his behalf.

I have an 8 minute videotape to show you that will explain the Inukshuk project in some detail but I'd like to begin with a general introduction.

ITC's ANIK-B Project is called the Inukshuk project. This name was selected from Northern-wide submissions to a name-the-project contest. The winner won a trip to the launch of the ANIK-B satellite donated by Telesat Canada. Inukshuk means "in the likeness of man" and is the name of the stone markers that you'll find scattered across land of the Inuit. These "stone men" were used traditionally as directional aids to mark the route and were one of the first communication aids.

The Project Sponsor is ITC which is a non-profit organization representing all 22,000 Canadian Inuit. ITC was founded in 1971 when a committee of Inuit decided it was time for the native people of the Arctic to speak with a united voice on the issues concerning the North. One of ITC's organizational aims is to improve communications among Inuit settlements.

The Inukshuk Project began November, 1978 with the hiring of David Simailak as Project Director and the establishment of the Project headquaters in Baker Lake, N.W.T. The Project Director reports directly to the ITC President and the ITC Board of Directors. The President, Vice-President and Treasurer of ITC are elected in a general election in which all Canadian Inuit are eligible voters.

Project Funding

The Department of Indian Affairs and Northern Development signed an agreement with ITC to provide $1.9 million to support the three year Inukshuk Project. The funding is paid to ITC in quarterly installments after approval of the budget by the ANIK-B Project Liaison Committee. This Committee is comprised of representation from ITC, the Department of Indian and Northern Affairs and the Department of Communications.

The Liaison Committee monitors the progress of the Inukshuk project and reviews evaluation reports submitted by ITC's evaluator.

Project Objectives

1. To assess the usefulness and cost of instruction and information exchange for adults by satellite.

2. To test the usefulness and cost of conducting educational classes for children via satellite.

3. To test the efficiency of decision-making and the efficacy of meetings held via satellite and to examine the cost-benefit of these services.

4. To test the economic viability of an Inuit television broadcasting service.

Project Description

I'd like to turn now to the videotape to describe the project. This videotape was prepared for use by the community co-ordinators that we have working in each of the six communities where there are ground stations. The videotape was prepared to be shown to Inuit audiences and for that reason the video was edited to the Inuktitut sound track.

The Inuktitut sound track is one third longer than the English sound track and for that reason you'll find long pauses in the English version of the tape.

Activities

The programming is being developed in consultation with the six communities. A community co-ordinator is working in each community for five months prior to the start-up of the project to assist community groups in program development. The community co-ordinators are using this information booklet and videotape to inform community groups about the ANIK-B system.

We think that principal uses of the system will be land claims committee, education committees, Hunters and Trappers Associations and senior citizens, as well as national Inuit organizations like ITC, IDC, INPHC, ICI and the Co-op Federation. The local schools will be participating in programming for Inuit teachers and for classroom instruction in Inuktitut.

Programs produced by Inuit production centres will be broadcast from the Frobisher Bay studio with other videotapes or films of interest to Inuit.

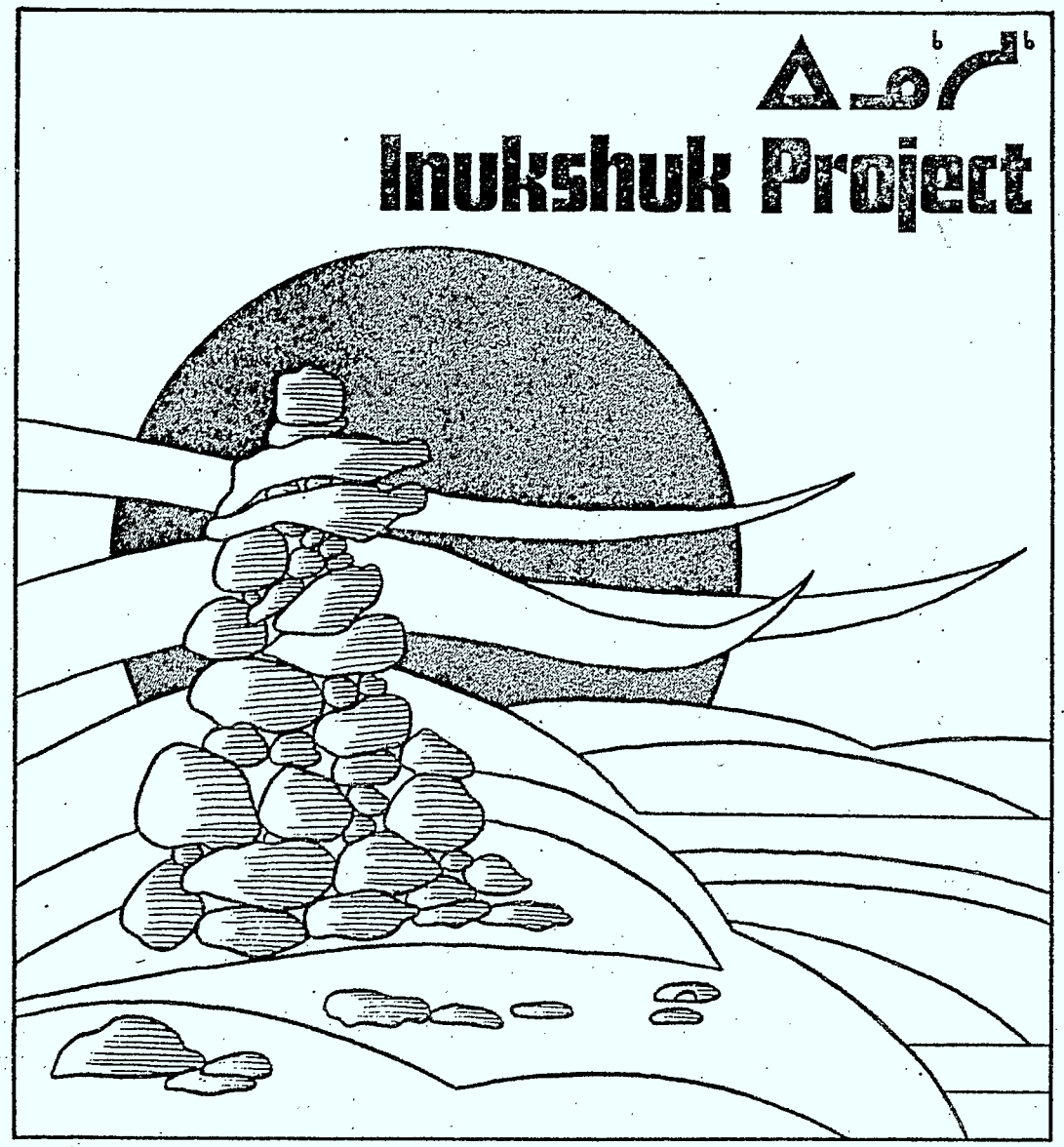
Inuit Programs are being produced by the independent production centres, Nunatsiakmiut in Frobisher Bay and PIC-TV in Pond Inlet. Inukshuk has a fully functional production centre in Baker Lake employing three full-time film-makers. There are also a team of Inukshuk film-makers working in both Eskimo Point and Cambridge Bay.

We will begin using the ANIK-B satellite on September 1 but the first month of use will be spent fine-tuning the equipment and training the Inukshuk staff in methods for assisting users to get the most out of the system. The community use of the system will begin September 29 with a grand opening.

In addition, a videotape distribution system has been set-up among 25 communities to assess the cost and effectiveness of circulating videotapes by mail among communities as compared to live satellite distribution. This is a copy of the videotape catalogue that is being circulated in the North. At this moment we have 59 videotapes in our library.

We're very interested in your comments and advice about our plans. One specific area that we'd like more information on is signalling devices. We know there has been mixed success with signalling devices. Len Petrie who is our engineering consultant is here with me today and we'd like very much to talk to people about this.

To conclude, I'd like to thank the many people in this room who have given us advice in the setting-up of our project. We've learned a great deal from you. We will probably have even greater need of you as we get into the live phase of this project.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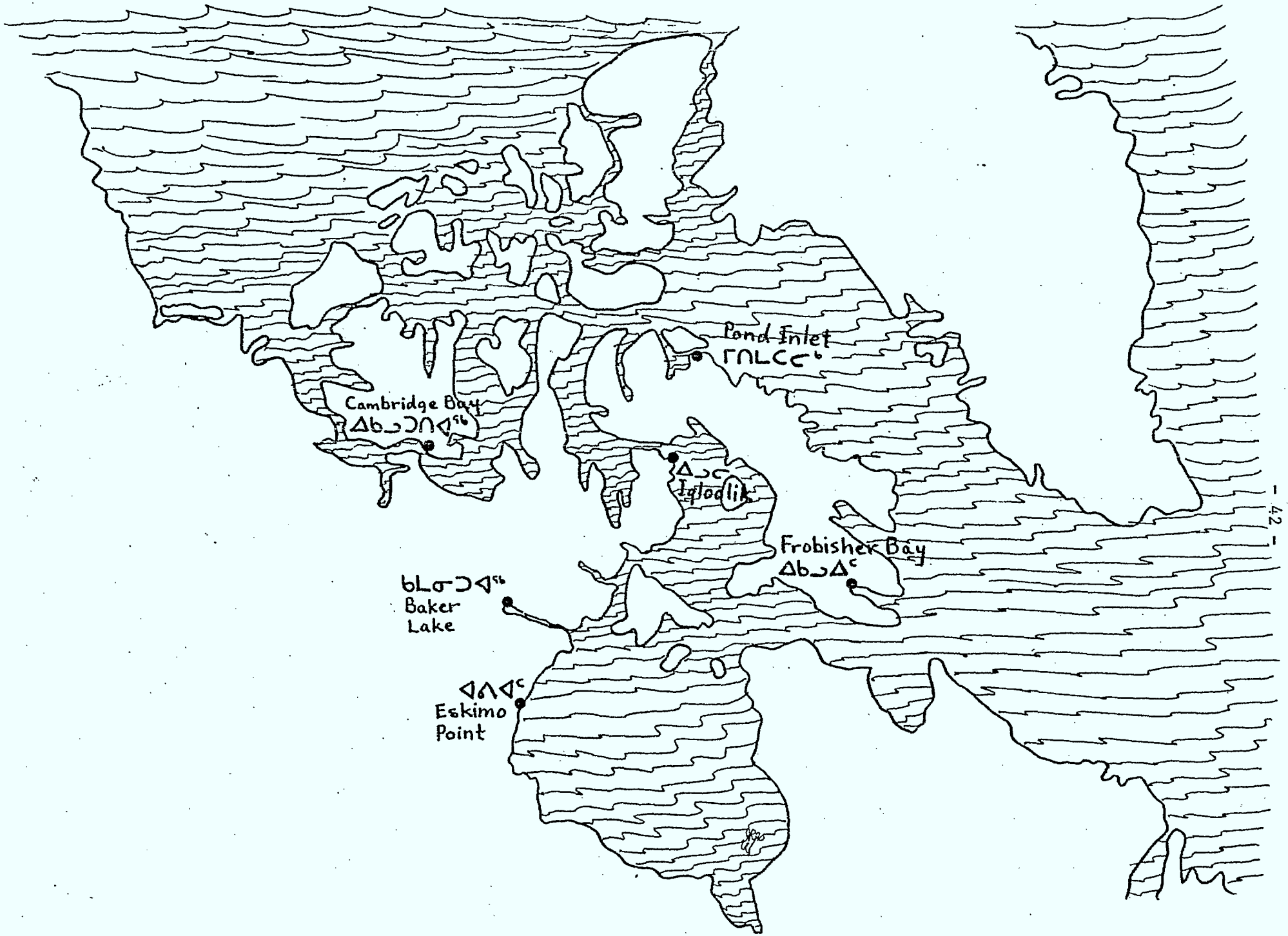
Inukshuk Project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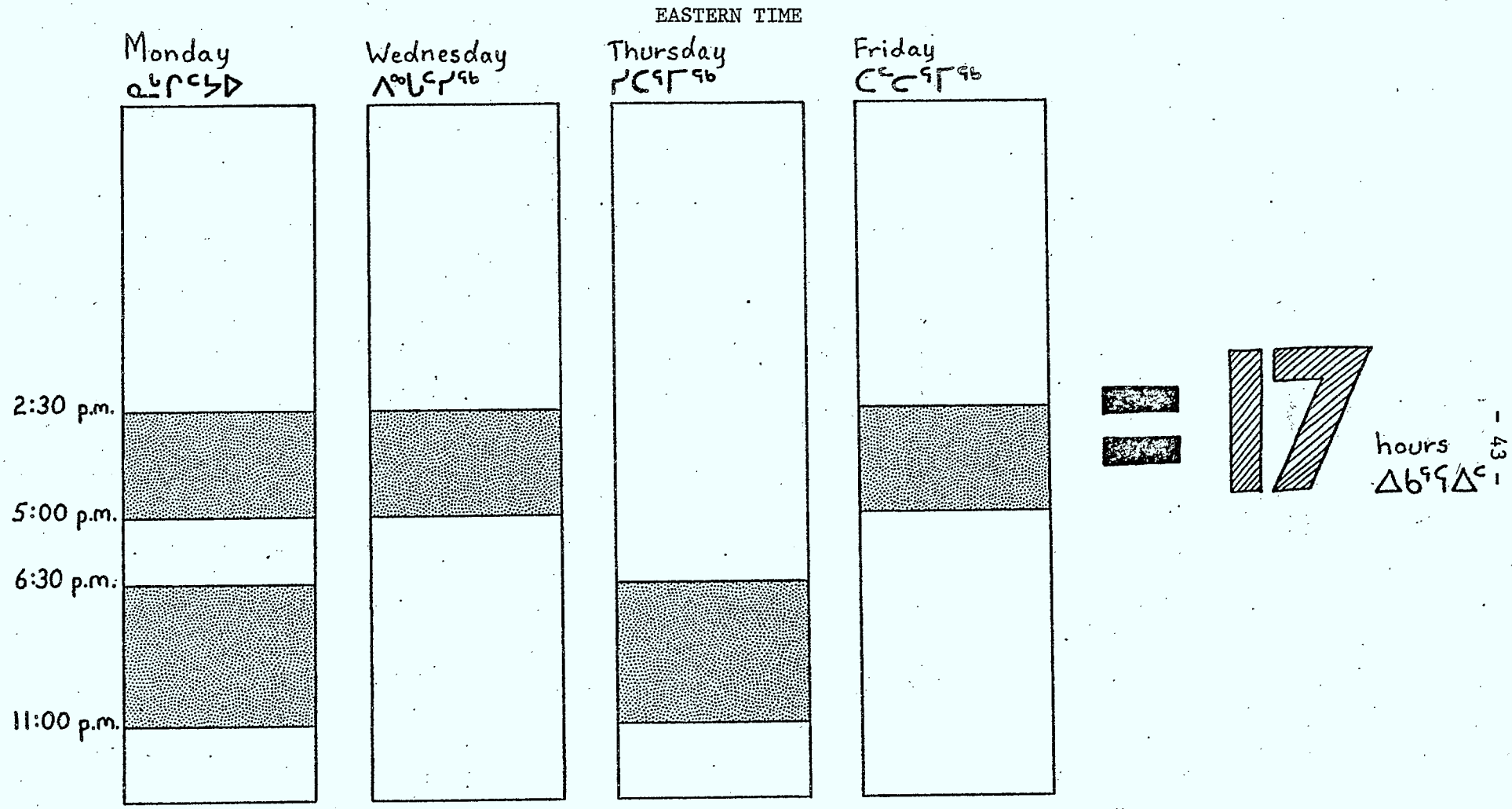
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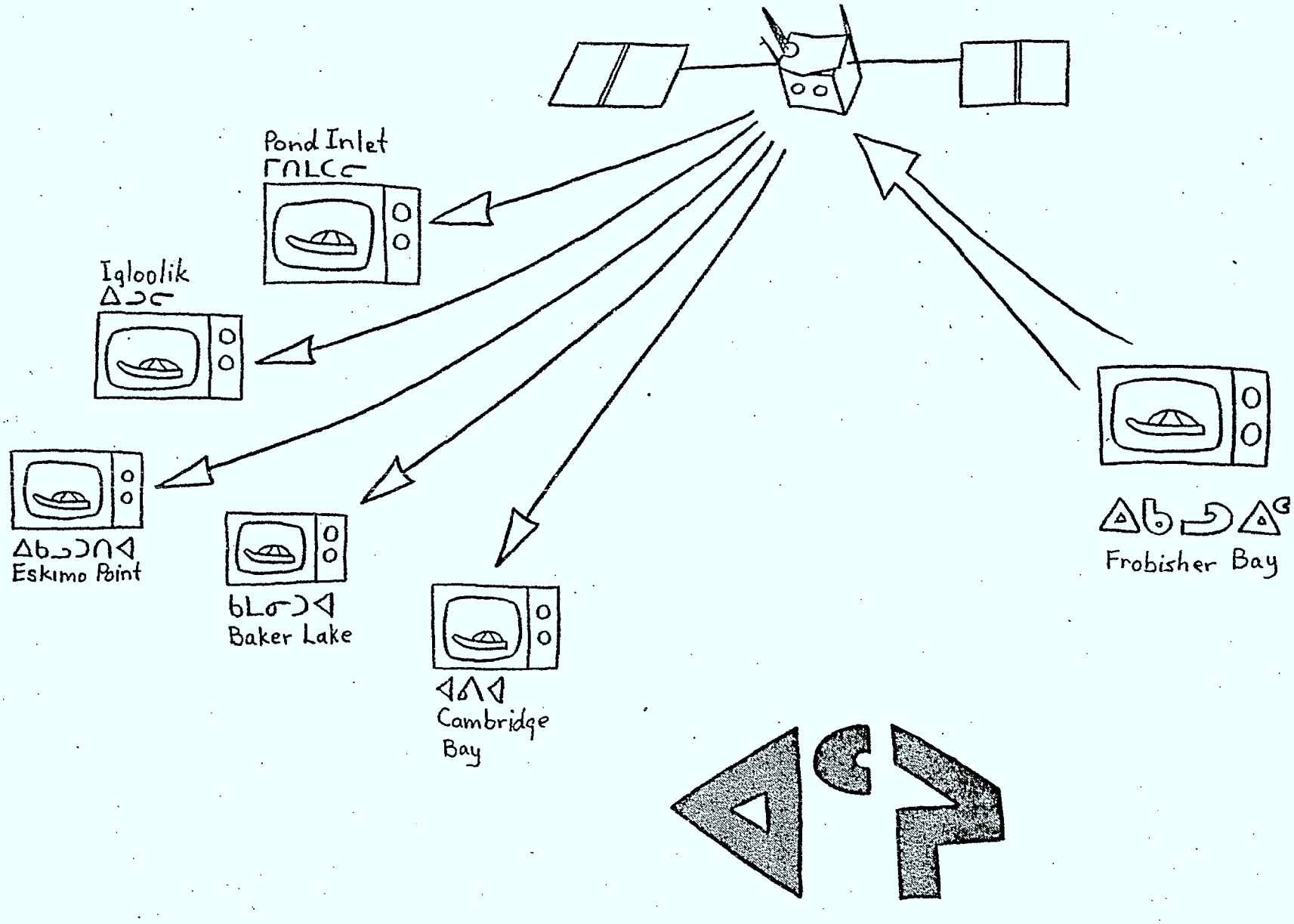
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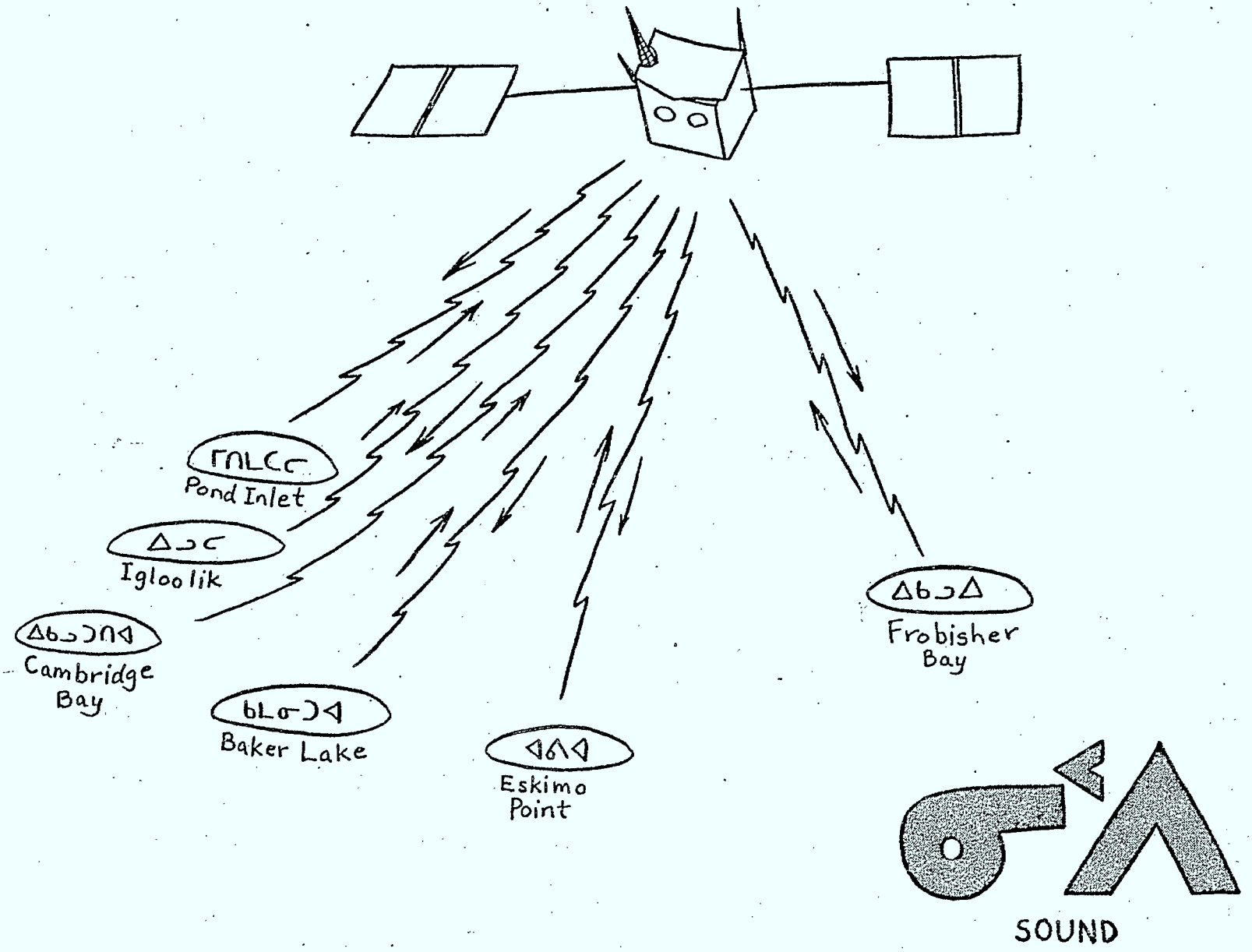
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C-3 PROJECT NAALAKVIK II

- Taqramiut Nipingat Incorporated -

Presentation by Josepi Padlayat
Project Director
Taqramuit Nipingat Incorporated

C-3 PROJECT NAALAKVIK II

Project Sponsor: Taqramiut Nipingat Incorporated

Presentation by: Josepi Padlayat, Project Director
Taqramiut Nipingat Incorporated

I would first of all like to say that its a pleasure for me being here today and to describe to you the project which my organization is now operating in Northern Quebec.

You have already heard from Inuit Tapirisat of Canada regarding their Inukshuk Project and you will find many similarities between our project, which is called Naalakvik II, and the I.T.C. project. This is not unusual given the fact that we are all Inuit and share many of the concerns among ourselves.

The organization which I represent, Taqramiut Nipingat Incorporated, was founded in 1975 to help solve some of the unique communications difficulties which the Inuit of Northern Quebec were suffering from.

There aren't too many people who know that almost one out of every four Inuit in Canada live in the Province of Quebec, but that is a fact. We live in thirteen communities varying in size from about 1,000 Inuit down to around 70 in our smallest settlement.

One of the first jobs my organization undertook was the establishment of a good quality HF radio link. At that time there was no Canadian satellite, the only way to connect between communities and from Arctic Quebec to the outside was by HF radio. We also installed a system of trail radios which are loaned to hunters and fishermen going out to hunt and fish and this system is still in use. My organization has been active in lobbying on behalf of the Inuit and I think it is in part because of this activity that we now have complete satellite telephone service in all of our communities of Northern Quebec. We have, moreover, been active in establishing small low-powered FM community broadcast stations in all the communities except one. These stations operate from 16 to 18 hours per day, and of course programming is all in our own language. Moreover, at our head office in Salluit we operate a Radio Production Unit which produces radio programs which are duplicated onto cassette tapes and sent out to the FM community radio stations. Some two years ago my organization operated an experimental satellite project using the Hermes satellite when we tied together a number of these low-power radio stations into a radio network. The project was quite successful and I believe our success in that project has led to our being selected as a participant in the ANIK-B project.

The relationship between the Inuit of Quebec and television is an interesting one and from what I have heard it is almost unique in the western world. In 1973 the CBC applied for permission to broadcast network colour television in two of our thirteen communities. The Inuit refused that service and from that day until January of this year there has never been any television service whatsoever provided in the thirteen communities in Northern Quebec. The only other settlement I am aware of that has ever refused television service in Canada is the community of Igloolik, also another Inuit community in the N.W.T. The concern we had was that we felt that television would be destructive of our culture and of our language and that the entertainment value that it offered would not offset the losses. The Inuit said that the only way that the television service could be introduced to our land was that if we had some control over the programming and also some programming in our own language.

Our Naalakvik II Project has allowed the Inuit to meet these conditions and now I am happy to report there is a television service in five of our communities. We have established low-power television transmitters and are sending six hours of taped programming on a regularly-scheduled basis to each of the five communities every day. All commercial announcements have been eliminated. This service started in January of this year. We have also established what we believe to be the first specially constructed television studio built for exclusive use by the Inuit in the North. This studio is fully operational at this time. We have also set out what we believe to be one of the largest and most expensive training projects ever undertaken for Inuit. We have fifteen Inuit students in a year-long training project in Sugluk where they are learning the skills of television production. But these trainees are themselves becoming trainers and television producers. Each of these trainees are going to their home communities and inviting representatives of local organizations, community councils, cooperatives, and so forth, to use our equipment and make more television programmes. This process of our trainees teaching others how to use industrial quality television equipment to make programmes has started on an active basis only within the last three weeks but already we have now approximately 20 more Inuit in two communities who are in a television training programme run by our trainees.

We have been working closely with the Department of Communications of the Government of Quebec on the Naalakvik II Project and this summer they will install four TVRO's in our settlements and one TV transmit unit in Sugluk. In September of this year we become operational with the use of the ANIK-B satellite and on this basis we have twelve hours of programming each week available to us until February of next year. All satellite terminals have audio transceive capacity.

I could talk for a long time about what the project has meant to us but I guess the most important thing is that it will mean that the Inuit of Northern Quebec will have learned that television is not something that you sit and look at and that you turn on or off as you wish. By the time that the project is over we could have trained almost seventy-five of our people to operate television equipment, to make programmes, and that experience will

leave us with the impression that television is meant to be used by people, not to be looked at. We will use it to preserve our language, our culture, our way of doing things. We will use it to inform ourselves about ourselves. We will use it to inform ourselves about you and people all over the world. But I suspect in the long run that it will prove impossible for anyone to ever try to bring a television service to us which involves just sitting and watching.

We Inuit know well about satellites because in the North the air is clear and they are easy to see. We call them "taqinguaq" which means as false moon. For us the satellites will mean more now. They won't be as far away as the moon, they will be tools that are intended to be used by people, that <u>can</u> be used by people, and that <u>ought</u> to be used by people. I thank you very much.

E-1 SATELLITE TELE-EDUCATION PROGRAM

- B.C. Institute of Technology -

Presentation by D. Brousson
Dean, Continuing
Education and Industry Services
B.C. Institute of Technology

E-1 SATELLITE TELE-EDUCATION PROGRAM

INTERACTIVE INSTRUCTIONAL TELEVISION PROJECT

A Joint Project
of

Department of Communications
Province of British Columbia
British Columbia Institute of Technology
College of New Caledonia
East Kootenay Community College
North Island College
Northern Lights College
Northwest Community College
Yukon Vocational & Technical Training Centre

October 1, 1979 to May 31, 1980

Prepared by

Department of Distance Education
B.C. Institute of Technology
David Brousson, Dean, Continuing Education
& Industry Services
Bill Robertson, Head, Distance Education

ANIK-B USER MEETING
Department of Communications Canada
5 June, 1980
Ottawa, Ontario

OVERVIEW OF THE ANIK-B INTERACTIVE INSTRUCTIONAL TELEVISION PROJECT

The interactive instructional television project utilized the Canadian communications satellite, ANIK-B, to provide a two-way educational communications network to ten centres in British Columbia and to Whitehorse in the Yukon. The Department of Communications provided satellite time and equipment to permit Ministry of Education and members of the post-secondary educational community in the province to experiment with the delivery of education via interactive television. The project was designed to explore the possibilities of distance education for people living in widely scattered and sometimes inaccessible areas of Western Canada. This was to be a long-term test of whether interactive instructional television would be both feasible and acceptable to the people it was designed to serve. If it were acceptable, then it would be an excellent means of making post-secondary educational opportunities as available to rural communities as they are to communities in the urban areas.

The project was constructed in a consortium model with all of the receiving institutions as well as the sending institutions participating in the selection of courses and in the project decision-making. Courses were selected to complement those offered through local colleges or to provide training for specialized groups such as the Ministry of Highways, lawyers, doctors and building inspectors.

We found that this mode of education is effective and is well received by most persons participating in the remote centres. It requires a dedication on the part of the participating institutions to provide proper facilities and adequate staffing to promote the program in the community and to identify community requirements.

FACT SHEET
ANIK-B
INTERACTIVE INSTRUCTIONAL TELEVISION PROJECT

Where?

British Columbia, Canada.

Contracting Agencies?

Canada Department of Communications
British Columbia Ministry of Education

Operating Agency?

British Columbia Institute of Technology,
Department of Distance Education

Television Originating Center?

British Columbia Institute of Technology,
Vancouver, B.C.

Receiving Centers?

A. Satellite Audio Return

Port Alberni
Terrace
Prince George
Cranbrook
Dawson Creek
Whitehorse

B. Land-line Audio Return

Gold River
Prince Rupert
Mackenzie
Fort St. John
Fort Nelson

Participants?

A. Originating

Ministry of Education
British Columbia Institute of Technology
Ministry of Highways
Ministry of Labour
Ministry of the Provincial Secretary, Recreation Branch
University of Victoria
North Island College
University of British Columbia
Alberta Educational Communications Corporation

B. Receiving Institutions

North Island College
Northwest Community College
College of New Caledonia
Northern Lights College
East Kootenay Community College
Yukon Vocational and Technical Training Center

In addition the signal is being received in Alberta at Medicine Hat, Edmonton, Grande Prairie, Fort McMurray, High Level, Grouard, Peace River.

Operation of the System?

The signal originating in the BCIT television classroom is beamed from an up-link station at BCIT to the ANIK-B satellite and can be received at any point in British Columbia and the western two thirds of Alberta. Six stations identified as satellite audio return have the capability of providing an instant return of an audio signal from their classrooms into the BCIT classroom. All remaining centers must use conventional long distance land-lines to communicate with the instructor. The project utilizes regular and continuing education classes from each of the originating organizations, with the instructor being located at BCIT and the students being located at both BCIT and any of the centers in the receiving area where students are registered. Classes range from approximately 15 up to 200 students. The form of presentation ranges from straight lecture to small group seminars to lecture plus media presentation. The system is capable of film, video tape or slides as well as live presentations.

A typical class is held by an instructor making a live presentation and the students asking questions in much the same way they would in a regular lecture. The only delay involved is a requirement that the students pick up a special telephone in the satellite interactive centers or dial long distance to a special unlisted number to communicate to the instructor and to all the other students in the system. As soon as a student speaks into a telephone or is connected into the audio system, all students in all centers are able to hear the conversation.

Print materials are supplied to students via courier system. Assignments which are normally part of the course are collected at the local site by a coordinator and forwarded to the instructor at BCIT for assessment.

Courses Being Offered?

Introduction to Mining
Forest Utilization
Reading and Study Skills
Nursing Update Modules
Construction Administration
Introduction to Career Opportunities in Hospitality and Tourism
Avalanche Prediction
Management of Recreation Facilities
National Building Code
Community Law
Forestry Law
Anatomy and Physiology
Alcohol Abuse
Genetics in Medicine
Survey Calculations
Geology and Soils for Road Construction
Concrete Technology
Supervisory Skills for Educators
Developmental Psychology
Teaching Reading in Primary Grades
Library Technicians Program

Total Broadcast Time per Week?

32 hours live broadcasting
10 hours recorded broadcasting from Alberta

Personnel Responsible?

Ministry of Education
Dr. Walter Hardwick
David Roach

Department of Communications
Terry Kerr
Ken Gustafson

BCIT
David Brousson, Dean, Continuing Education and Industry Services
Bill Robertson, Head, Distance Education
Rob Nason, Technical and Facilities Coordinator

North Island College
John Tayless

Northwest College
Gary Karlsen

College of New Caledonia
Dave Snider

East Kootenay Community College
Joe Selby

Northern Lights College
Al Westcott
Margaret Cleaveley

Yukon Vocational and Technical Training Center
Steve Schaeffer

Project Duration?

October 1, 1979 to May 31, 1980
Continuance is expected past the end of May in some form through the summer and into the fall of 1980.

Total Registrants in Program?

October 1979 to January 1, 1980 - 560.
January 1, to May 31 - estimated 900 - 1100.

Equipment?

All satellite up-link and receive equipment was supplied by the Department of Communications of the Federal Government, which installed all equipment and operates the up-link and provides free satellite time. The Ministry of Education funded the capital costs ($215,000) for conversion of classrooms to IITV classrooms. Each participating institution provides staff time to support the project.

Signal Quality?

All video is in colour and at a quality better than normally seen in the receive sites. Camera source is JVC industrial camera rather than broadcast. Satellite audio signal is better than conventional phone lines.

Contact for Information?

Bill Robertson
Head, Distance Education
B.C. Institute of Technology
3700 Willingdon Avenue
Burnaby, B.C. V5G 3H2
Phone: (604) 434-5734

ANIK-B PROJECT ACTIVITIES

Terms 1 and 2

1. Course Information

Term 1 Start	Length Weeks	Off Campus Participants
Introduction to Mining	33	4
Forest Utilization	13	3
Reading and Study Skills	6	13
Nursing Update	12	156
Construction Administration	12	28
Careers in Hospitality & Tourism	10	40
Survey I	26	18
Concrete	13	36
Geology and Soils	13	15
Term 2 Start		
Avalanche Prediction	2	83
Management Recreation Facilities	6	
National Building Code	12	48
Community Law	3	
Forestry Law	4	
Anatomy and Physiology Review	10	58
Alcohol Abuse	4	
Genetics in Medicine	6	4
Supervisory Skills for Educators	10	
Developmental Psychology	16	
Reading for Primary Grades	12	
Library Technician Program	12	
Pharmacy Seminar	3	
Building Construction Seminar	7	
Recreation Leadership Series	6	
Adult Education Instructor Eval'n	8	
Newspapers in Education	3	
Real Estate Topics	3	
ACCESS		

2. Additional Events

Admin Conferences - Friday	30	All Centres
Health Seminar Planning	2	
Forestry Silviculture Planning	1	
Counsellor Conference	2	See attached
Open Learning Institute Explor.	1	
Evaluation Meeting	1	
Community School Discussion	1	
Program Organization Meeting	2	

2. Additional Events (Cont'd)

Facsimile Test	1	
UBC Open House	3	
Broadcast Students to Ottawa	3	
Broadcast to Building Inspectors AGM	1	
Broadcast to ACCC	1	
AV Communicators Assoc.	1	
Resource Tech. Discussion	1	
Outdoor Recreation Council Series	4	
Phi Delta Kappa Presentations	1	
Fire Management Planning	3	
Principals' Conference	2	All centres

PRESENTATION SCHEDULE FOR DEMONSTRATION TAPE

Highlights from
British Columbia Interactive Instructional Television
Project

Time	Event
30 Seconds	Introduction - BCIT project logo with series of short highlights selected from programs in the project - surveying, avalanche and geology.
1 Minute 10 Seconds	Descriptive animation of the satellite operating system describing uplink and downlink, area of coverage and interactive system. Animation supplied courtesy of BCTV, Vancouver.
1 Minute 2 Seconds	Dr. Patrick McGeer, Ministry of Universities, Science and Communications providing an introduction to the opening night October 1, 1979. The image is about a fifth generation and is not a good representation of the quality that can be produced in the system. Some cross-talk between the controlroom and the satellite uplink has been corrected. The comments by Dr. McGeer are a forerunner of the soon to be announced educational telecommunications authority in British Columbia.
34 Seconds	A general introduction to the way in which the interactive instructional television system works. (List of sites involved.)
33 Seconds	An example drawn from a series in a National Building Code seminar supported by the Ministry of Labor, Building Standards Branch, British Columbia. Representative of the B.C. Fire Commissioner's office speaking to students in Whitehorse both in a classroom and on the cable system. BCIT staff member Eleanor Riches commenting on the reaction in Whitehorse during her evaluation visit. Students in this class left for a fire and returned to the class before the evening ended.
33 Seconds	University of British Columbia Adult Education course for Continuing Education instructors with Adrian Blunt. Good examples of communications with Cranbrook and Dawson Creek.

Time	Event
52 Seconds	Concrete Technology course with Wally Quarry of the Ministry of Highways. Two good examples of the use of the overhead camera on illustrations of form construction and reinforcing steel placement.
1 Minute 59 Seconds	Michael Peterson, Channel 7 television commentator from Australia speaking with Bill Robertson on a Friday at 1:00 teleconference. Comparison of the Australian and Canadian distance education requirements. Stew Berry from the College of New Caledonia in Prince George talking with Mike about the Vancouver pipeline and two-way exchange of culture.
1 Minute 30 Seconds	Rob Nason, IITV Technical Coordinator setting up a two-way teleconference between Broadcast Technology students at BCIT and in the CRC studios in Ottawa. This is a first example of our two-way audio and video system.
1 Minute 11 Seconds	Special telecast of the University of British Columbia Medical Sciences Open House. Ann Worth at UBC talking with a series of cancer experts in Ottawa and using a television equipped microscope to illustrate cancer tissues.

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9 Minutes 30 Seconds

For copies of this video-tape on a tape exchange basis, please contact:

Distance Education Department
B.C. Institute of Technology
3700 Willingdon Avenue
Burnaby, B.C. V5G 3H2

Phone: (604) 434-5734, local 410

E-2 TELE-EDUCATION ACADEMY

- Ontario Educational Communications Authority -

Presentation by Peter G. Bowers
General Manager
Operations Division
Ontario Educational
Communications Authority

E-2 TELE-EDUCATION ACADEMY

Project Title: Tele-Academies 1979

Project Sponsors: Ontario Educational Communications Authority
(TVOntario - TVO)
Confederation College - Thunder Bay, Ontario
Ryerson Polytechnical Institute - Toronto, Ontario
Public Health Department - Thunder Bay, Ontario
Northwestern Regional Library System - Thunder Bay, Ontario

Project Managers: Peter G. Bowers - Principal Investigator
Wendy Wright - Tele-Academy Program Manager
Alex MacGregor - Technical Co-ordinator

Project Objectives:

To examine the effectiveness of providing opportunities for people living in remote communities to become involved in informal but directed learning experiences in the fields of the arts, social sciences, physical sciences and communications technology delivered via satellite (Tele-Academies).

To attempt to create an awareness and an understanding of the potential of educational television delivered at a distance as an interactive medium, and as a resource for learning.

To provide learning opportunities in remote communities in co-operation with appropriate regional agencies via satellite.

Outline of Activities:

The experiment ran from April 1st to June 30th, 1979. Four communities remote from the TVOntario broadcast service were chosen as reception sites; Marathon, Manitouwadge, and Geraldton, all physically quite remote, and Owen Sound, which while closer to TVOntario service receives only two off-air broadcast signals. Cable television systems were used for local redistribution of the signals, and the willingness of the local cable system operator to co-operate was a factor in the choice of sites.

A total of 5 Tele-Academies were offered, 4 in English; "Earth Sciences", "Omnibus" (Ares), "Family Living", "Communications and Technology," and 1 in French directed to homebound people.

The essence of a Tele-Academy is to provide an informal but structured learning experience utilizing television materials delivered via satellite to remote communities. The content, scope and complexity of the various academies varied, but all can be characterized as a total learning system comprising 5 elements;

- Television programs offered in some kind of context.
- Pre-broadcast utilization field work.
- An interactive element.
- A package of supporting print materials.
- Evaluation of the experience.

Choice of the topics arose from preliminary discussions with representatives of the Community College, the Regional Library System, and the Public Health Department about the nature and characteristics of the communities.

A brief description of the various academies will give some idea of their scope and variety, as well as illustrate the basic elements.

"Earth Sciences" based on the series "Planet of Man" consisting of 26 programs transmitted Tuesdays and Thursdays from 7:00 - 8:00 p.m. Print materials included a guidebook, Planet of Man Manual, and a course guide. These programs were originated on videotape played back at the Communications Research Centre (CRC) at Shirley Bay, Ontario.

"Omnibus" was based on the series Omnibus. 13 programs were transmitted on Sundays from 3:00 to 4:30 p.m Support materials consisted of an "Artskit". These programs were broadcast on the TV Ontario (TVO) network, received off-air at Shirley Bay and uplinked to the satellite.

"Family Living" was based on the series "Self Incorporated" and consisted of 27 programs transmitted on Tuesdays 10:00 - 10:30 a.m. and 8:00 - 3:30 p.m., on Wednesdays 10:30 - 11:00 a.m. The print component was a guidebook for group leaders. This series was picked up off-air from the TVO network.

"Communications and Technology" was based on the series "Fast Forward" consisting of 6 off-air telecasts plus a live interactive broadcast from the CRC studio. They were transmitted on Saturdays between 3:30 and 5:00 p.m.

The transmission times and repeat factors were selected in accordance with generally known viewing patterns and interactive possibilities.

Three field visits were made to each of the four communities before and during the course of the academies. In addition to the pre-broadcast utilization workshops much effort was devoted to the contact of a wide range of individuals and organizations with a natural interest in the courses offered in order to stimulate a high degree of awareness and participation.

The primary objective of the first visit was to interpret the nature and scope of the overall project, and to establish a system of co-ordination between the cable operators, local animators, TVO, and the local libraries which agreed to act as information centers and print distributors.

The second visit involved the Earth Sciences and Arts Workshops, and the third presented the Family Living Workshop.

In each community most of the following individuals or organizations were briefed and consulted about the academies; Regional Councillors, librarians, recreation departments, principals, teachers and guidance counsellors, public health and social workers, industry, YM-YWCA, police and fire departments, community colleges, Northern Affairs personnel, churches, and other organizations particularly interested in the courses.

For two of the academies the supporting print materials already existed. For "Family Living" a discussion leaders guide was prepared by Janet Willis of Centennial College, and for the "Communications and Technology" academy, Dr. David Coll of Carleton University prepared an extensive guide book.

The interactive element took a variety of forms. In the case of Earth Sciences the academy was conceived as a 'correspondence course' model with the individual learner working in a self directed fashion.

For the Arts academy an attempt was made to stimulate group viewing through local recreation departments, arts clubs, and arts councils.

The Family Living academy was designed to be used by social service personnel as a supplement to their work with families, parents, and children. These workshops drew the greatest response and appear to serve a well felt need.

The Communications and Technology academy involved a live interactive component (one way video - two way audio). Dr. Coll hosted high level experts in areas such as satellites, Telidon, personal communications, cable television, and computer aided learning.

Each community had a conference telephone at the cable television system and the format allowed for 20-25 minutes of dialogue between the community participants and the guest expert.

It is premature to rigorously evaluate a process which is evolving. The Tele-Academy concept was first offered in the Summer of 1978 on Hermes, and is being offered again in the Summer of 1980, as part of the "Northern Ontario Hybrid Direct Broadcast Operational Trial". In 1980 a total of 49 communities, 20 of them are satellite receiver communities, have indicated their desire to participate. So that, if success is measured in terms of community participation, the Tele-academy concept is working. The academies offered in 1980 include; for children: arts and crafts; for young people: personal computing; for adults: pre-retirement planning.

The opportunity to utilize the satellite to reach remote communities has enabled TV Ontario to develop a new form of distance televised education which is clearly filling a need.

Given the commitment of TVO to offer services to citizens in all parts of the province, and the likelihood that only via satellite can this service be provided, it is essential that we develop techniques for effective distance education, and it appears that Tele-Academy is such a technique.

In conclusion, the co-operation and support of DOC must be acknowledged not only in terms of making the satellite facility available for experimenters but also in providing operational support such as installation and maintenance, studio and uplink staff, and scheduling and administrative support.

E-3 TELE-EDUCATION PROJECT

- Ministry of Education of Quebec -

Presentation by S. Carle
Project Co-ordinator
Service général des moyens
d'enseignement
Ministère de l'Education
Gouvernement du Québec

Note: In addition, G. Legault representing the Kativik School Board made a few comments on their involvement with the TNI project in Northern Quebec to begin in September 1980.

"Tele-Talk" Continues

Report presented by

the Teaching Methods Branch

of the Quebec Department of Education

at the ANIK-B Users Meeting

held on June 5, 1980

at the Department of Communications

Ottawa

Prepared by Suzanne Carle

Co-ordinator, "Tele-Talk" Project

June 1980

"TELE-TALK" CONTINUES

Previous QDE Experiments

During the past four years, the Department of Communications in Ottawa, in conjunction with the QDE, has run a program involving experiments with the Hermes satellite in order to prove that satellite communications are feasible in the fields of medecine, teaching and social progress.

With this in mind, and to develop its own expertise, TMB conducted an educational and social experiment - SASKEBEC, communication between Quebec and Saskatchewan - on behalf of QDE.

The QDE Pilot Project

As a result of these experiments, another satellite is at the disposal of the users. In February 1978, at the request of the Quebec Deputy Minister of Education, Mr. Pierre Martin, TMB prepared a pilot project involving the use of the ANIK-B satellite.

In September 1978, TMB was informed that its project would continue for the next two years.

The pilot project actually consisted of two projects as it was aimed at two distinct communities: the White community in Northern Quebec and the Inuit who live further North in the province.

The objectives of this pilot project were:

1) to provide the Northern Quebec and Kativik Boards of Education with a communications system for the management of the school board, the support and development of personnel, and so on;

2) to encourage the production and distribution of educational materials in the three languages used in the Kativik school district: Inuktitut, French and English;

3) to make it easier for the Northern Quebec Board of Education and QDE services to communicate with the managers and teaching staff at LG-2;

4) to develop efficient work methods with the aid of telecommunications;

5) to evaluate, as far as possible, the economic viability of an educational telecommunications system in Northern Quebec and the possibility of using such a system on a permanent basis.

The first project was called "Tele-Talk". It hooked up, via satellite, the Jacques Rosseau School in Radisson (near the La Grande River, LG-2) and the QDE studios in Montreal. The project was conducted by the TMB in co-operation with the Northern Québec Board of Education.

The first part of the experiment - the "video" phase, conducted between April and August 1979 - was television-aided and thus the communication was two-way. This experiment was very successful as 70% of the allotted time was used. The broadcast time was 17½ hours per week broken down into two three-hour evening sessions, five two-hour morning sessions, and 1½ hours on Saturday morning.

Present Activities

In the "video" phase of the "Tele-Talk" project, an attempt was made to meet the needs of the Radisson population. In the area of adult education, several proposals were implemented:

1) the course "Effective Parenting", based on Dr. Gordon's theory, was hosted by a professor in the Montreal studio and was intended for twenty parents in Radisson (30 hours);

2) a general-interest course in economics was offered in five lectures (15 hours). Ten resource persons, recruited from various sectors of the business community participated in this program from Montreal;

3) an occupational safety course sponsored by OCQ was transmitted via satellite to 30 workers at the LG-2 site (twelve 2½ hour sessions).

At the Jacques Rosseau School, two senior classes took part in poetry discussions in the course of five two-hour broadcasts. The Montreal Regional admissions office presented an information program on the junior colleges in order to better prepare the Radisson youth for college life. Students were invited to the Montreal studio with a view to stimulating discussion among young people and to dealing with real problems. The student exchanges were particularly animated and spontaneous and there was a true feeling of communication.

In general, the video communications had quite an impact on Radisson and there were 240 hours of broadcasting.

The initial technological objectives established for the "audio" phase of the "Tele-Talk" project (September 1979 to June 1980) were very ambitious. An attempt was made to extend the link with Radisson to other schools situated in the James Bay school district - at LG-3, LG-4 and Caniapiscau - in order to have a larger group benefit from this new teaching method. As well, the Montreal studio attempted to use telephone extensions hooked up to satellite-assisted radio communications in order to eliminate the problems created by having participants travel to Montreal. Since certain technical problems could not be solved, most projects used public telephones with the tie-in with the anticipated audio system.

In general, the people of Radisson were not overly enthusiastic about the audio project after the success of the video phase. However, some experiments with very positive results took place in Montreal. A group of high school students gathered around a telephone with a microphone and talked with resource persons or professors from outside their classroom. One of the students was chosen to act as moderator and direct the group's participation. It was noticed that, in general, this method required greater concentration and listening skills. The students assimilated the information quite well and were proud that they conducted their own discussions. In the French program, one group had ten on-hour sessions with the students from Radisson, and the impact on the students was very positive.

Future Activities

The second QDE project will start in September 1980 and will be carried out by the Kativik Board of Education. It will link together five Inuit villages located in the Far North.

There will be two-way audio links, with a video production and broadcast centre at Sugluck. If necessary, video broadcasting will be from Dorval, where the Head Office of the Kativik Board of Education is located.

Scheduled broadcasting time is 12 hours per week: there will be two three-hour evening sessions and three two-hour morning sessions. The educational project will be produced in the three languages of the territory; English, French and Inuktitut.

This project is presently being planned and is twinned with the community television project presented by TNI.

Conclusions

An evaluation of the video phase of the "Tele-Talk" project will soon be published by the ADE Teaching Methods Branch. Given the initial objectives, it was found that tele-teaching was quite possible through this means of communication. This experiment, as has been shown, had met the teaching needs and had also helped to overcome the isolation of the inhabitants of Radisson, a village located about one thousand miles north of Montreal. However, several steps remain to be taken in developing an appropriate system of training and supervision before this project may be undertaken on a permanent basis. Nonetheless, the Tele-Talk project does seem to have paved the way for this possibility.

H-1 TELEMEDICINE PROJECT

- Memorial University of Newfoundland -

Presentation by J. Roberts
Project Co-ordinator
Memorial University of Newfoundland

H-1 TELEMEDICINE PROJECT

Project Sponsor: Memorial University of Newfoundland

Presentation by: J. Roberts, Project Co-Ordinator
Memorial University of Newfoundland

Memorial University is participating in the Department of Communications ANIK-B pilot project program through a telemedicine project developed by the University's Faculty of Medicine. Funding for this project has been received from the federal Department of Supply and Services, Health and Welfare Canada, and PetroCanada Exploration Incorporated.

The principal investigator of the project is Dr. A.M. House, who is the Assistant Dean of Continuing Education in the Faculty of Medicine. The technical system is being developed through a subcontract between the Faculty of Medicine and the University's Educational Television Centre. The system is thus under the supervision of ETV's technical manager, Mr. K. Hauschildt.

The ANIK-B Project is the latest in a series of related developments that started with the University's use of the Hermes satellite for 12 weeks in the Spring of 1977. Hermes permitted the University to transmit a video and audio signal from St. John's to hospitals in Stephenville, St. Anthony, Happy Valley, and Labrador City. Each of these sites was able to interact with one another and with St. John's by means of the interactive audio system provided on Hermes. In addition, there was a trial of Slow Scan equipment between Labrador City and St. John's. As a result of that project, the University went on to develop a terrestrial teleconference system through dedicated duplex lines installed by the Newfoundland Telephone Company Limited. That system connects a number of health and educational institutions throughout the Island portion of Newfoundland. The University is preparing to use the ANIK-B system to provide the links into Labrador that are not possible on the terrestrial system at the present time due to costs.

In addition, ANIK-B will be used to explore the health care needs in off-shore exploration by means of installing a terminal on the Neddrill ship that is to be operated by PetroCanada this Summer.

The ANIK-B project will last approximately 9 months, beginning in early July 1980 and running through to February 17, 1981. Memorial University has always expressed an interest in the extension of the Department of Communications lease because 9 months is too short a time for the University project. The University would prefer to have an additional 9 months so that data can be collected over an 18 month time span. The project consists of two phases:

(1) From approximately the first of July to the middle of October, the main activity will relate to the link between the Neddrill and the Emergency Department of the General Hospital located in the Health Sciences Centre. The system will be an interactive audio one that will be supplemented with transmissions using slow scan television and the transmission of other data.

(2) The second phase of the project will involve the installation of terminals in Labrador City, Goose Bay, and a coastal Labrador community sometime during August 1980. By the Fall of 1980 therefore, an interactive aduio system will be available that could be used for activities such as continuing education of health professionals, community health education, university credit and non-credit courses, administrative applications such as committee meetings, and patient consultations and the transmission of medical data. These activities are presently carried on the terrestrial teleconference system and it will thus be possible to explore the feasibility of operating these two interactive audio systems either separately or jointly.

The evaluation of the ANIK-B program will relate to the data that has already been collected in connection with the Teleconference System; i.e., patterns of system use, user satisfaction and some aspects of direct and indirect costs.

Further information about the project can be obtained through the project coordinator:

Miss Judy Roberts
Research Associate/Coordinator
Telemedicine & Health Office
Faculty of Medicine
Memorial University of Newfoundland
Health Science Centre
St. John's, Nfld.
A1B 3V6

H-2 TELEMEDICINE SYSTEM
Montreal-LG-2

- Université de Montréal -

Presentation by F. Roberge
Acting Director
Institut de Génie
Bio-médical
Université de Montréal

H-2 TELEMEDICINE SYSTEM MONTREAL-LG-2

Project Title: A Telemedicine System for Specialized Medical Services

Project Sponsors: Institut de genie biomédical,
Ecole Polytechnique et Université de Montréal

Hôpital du Sacré-Coeur et Hôpital Hôtel-Dieu de Montréal

Hôpital La Grande Rivière de la Baie James

SUMMARY

This pilot study is investigating the possibility of providing specialized medical care at a distance to people living in isolated locations. The objective is to examine the usefulness of audio and video communications with respect to various diagnostic and therapeutics actions. The underlying hypothesis is that health personnel from a specialized urban hospital can offer valuable support to general practitioners and nursing personnel working in an isolated location.

This Quebec Telehealth Project, steered by the Biomedical Engineering Institute of the Ecole Polytechnique and Université de Montréal, was initiated in early 1979. The James Bay hydroelectric development in Northern Quebec, E75°N53°, 1000 km north of Montreal, was chosen as the target site. From April to September 1979, a two-way black and white closed-circuit television network used the Canadian satellite ANIK-B to link the La Grande Rivière Hospital in LG-2 to the Université de Montréal Campus. In a subsequent phase of the project, slow scan television via narrowband audio channels replaced broadband television.

La Grande Rivière Hospital in LG-2 is a small 20-bed installation providing services to the workers and to the families living at Village Radisson. During the television phase of the project, experiments involving the transmission and interpretation of X-rays were conducted in collaboration with the Radiology Department at Hôtel-Dieu Hospital. Tele-consultation and tele-education activities involved numerous health professionals at Sacré-Coeur Hospital in the fields of nursing, cardiology, obstetrics-gynecology, pediatrics, community health, mental health, traumatology and pharmacy. Experiments in dentistry were conducted in collaboration with the Dental Faculty of the Université de Montréal.

During 193 hours of television time it was possible to execute the following program: each of 67 X-ray cases chosen from a teaching collection were interpreted by 4 different radiologists, 425 current X-ray cases from the LG-2 Hospital were interpreted by a radiologist, 104 hours of lectures related to various medical topics, 27 consultations and conferences, and discussions of a number of administrative problems related to the project.

The second phase of the project, based on slow scan television, began in the Fall of 1979 and is expected to last 12-15 months. Hospitals in LG-2 and LG-3 are linked to both Sacré-Coeur and Hôtel-Dieu Hospitals in Montreal. The tele-radiology program is carried out at Hôtel-Dieu while all other activities are pursued at Sacré-Coeur. A combination of ANIK-B satellite and ground telephone channels provide communications 12 hours a day, from Monday to Friday. The program of activities is similar to that of the previous television phase.

Preliminary results confirmed the usefulness of television for supporting health care services in isolated locations. In the present context, television is well suited for X-ray interpretation, tele-consultation and tele-education.

It is clear, however, that such a powerful medium is far too expensive for most telehealth applications. In view of the low population density in rural or distant locations, it is necessary to make the most efficient use of low cost facilities such as the telephone network. Fortunately, the advent of slow scan technology, by allowing to transmit a still television frame over a telephone line in 35 or 74 seconds, offers interesting possibilities for tele-consultation, tele-education and tele-radiology. Many other medical applications involving video transmission are also possible.

P-1 MULTI-POINT MULTI-PURPOSE SATELLITE NETWORK

- Ontario Ministry of Government Services -

Presentation by G. Chung-Yan
Manager
Engineering and Radio Services
Telecommunications Services Branch
Ontario Ministry of Government Services

P-1 MULTI-POINT MULTI-PURPOSE SATELLITE NETWORK

1. Project Sponsor: Ontario Ministry of Government Services

2. Project Staff: Project Manager - G. Chung-Yan
   Project Coordinator - N. Biswas

3. Timing: See Milestones - Fig. 1.

4. Project Objectives:

   - To design and implement a pilot multi-purpose multi-point satellite based telecommunications network for Ontario Government use.

   - To determine the benefits and costs as well as technical and operational factors associated with the network.

5. Project Approach:

   - The approach which was taken to meet these objectives was to establish a pilot multi-point general purpose satellite based audio/video teleconference service for use by Ontario Government Ministries.

6. Project Sub-Objectives:

   Sub-objectives of the Ontario Government project were, therefore, to:

   - Increase the awareness of Ontario Government Ministries of the capabilities of audio/video teleconferencing (TC) using satellite and other telecommunication facilities.

   - Provide an opportunity for Ministries to evaluate the effectiveness of TC in own program areas.

   - Determine potential demand for audio/video TC.

   - Develop Data-Base on system costs and technical and operational factors.

7. Design Objectives:

   (a) System Configuration

   The design objectives for the pilot TC Service called for a 3 mode network configuration, using both satellite and microwave transmission facilities. Full audio/video facilities augmented with high-speed facsimile were to be provided at each node or Teleconference Centre.

MILESTONES - ANIK B PILOT TC PROJECT

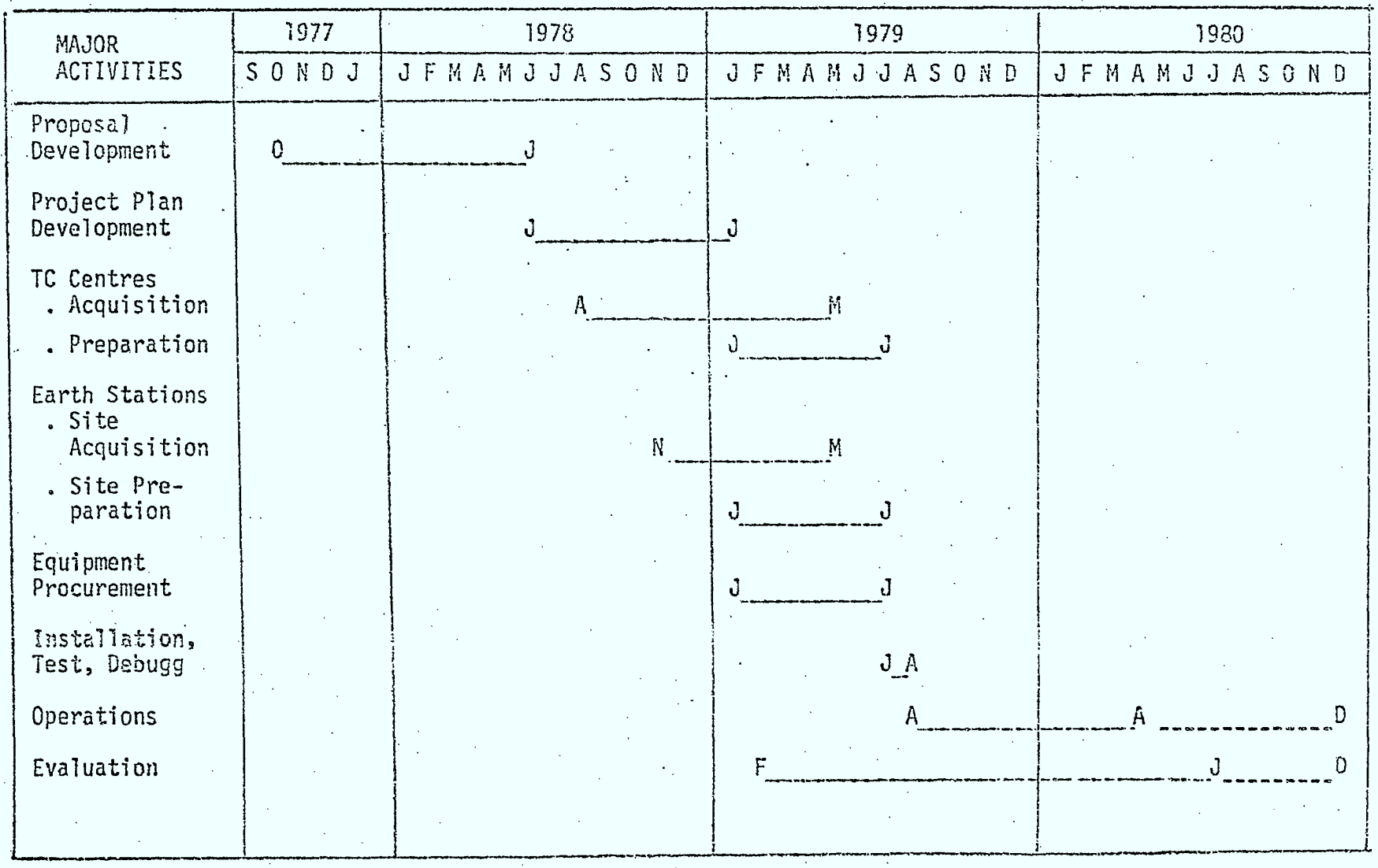


FIGURE 1

(b) Service Capability

TC Service was to be made available to Ontario Government personnel in Toronto, Thunder Bay and Sault Ste. Marie between the hours of 9:30 a.m. and 4 p.m. each working day during the period August 1979 and April 1980.

A seating capacity for 6 people for business type meetings, and 16 people for seminar type meetings was to be provided at each Teleconference Centre.

As mentioned previously full audio/video capabilities, together with facilities such as standard overhead, 35 mm and 16 mm projection systems, as well as flip charts and high-speed facsimile services were to be provided. The design objectives also called for the TC Centre to be centrally located so as to be easily accessible to as many ministries as possible, and for the TC Centre to make use of transportable type video conference terminals.

Fig. 2 is a picture of the basic transportable video conference terminal.

In actual practice the TC network service (see schematic in figure 3) fell somewhat short of our design objectives as follows:

- Sault Ste Marie TC Centre was provided only with 1-way receive video with 2-way audio because of terminal constraints. Also because of personnel and space constraints the Sault Ste. Marie Centre was only partially operational for the first 3 months.

- In addition, the Toronto TC Centre ended up not as centrally located as we would have liked. In fact the Toronto TC Centre was eventually located in the conference room in the Telecommunication Services Branch which is some two blocks away from the main Queen's Park Gov't complex. However, in spite of these setbacks we were able to provide, as stated by many users, an acceptable and usable TC service particularly between Toronto and Thunder Bay.

8. Evaluation Objectives:

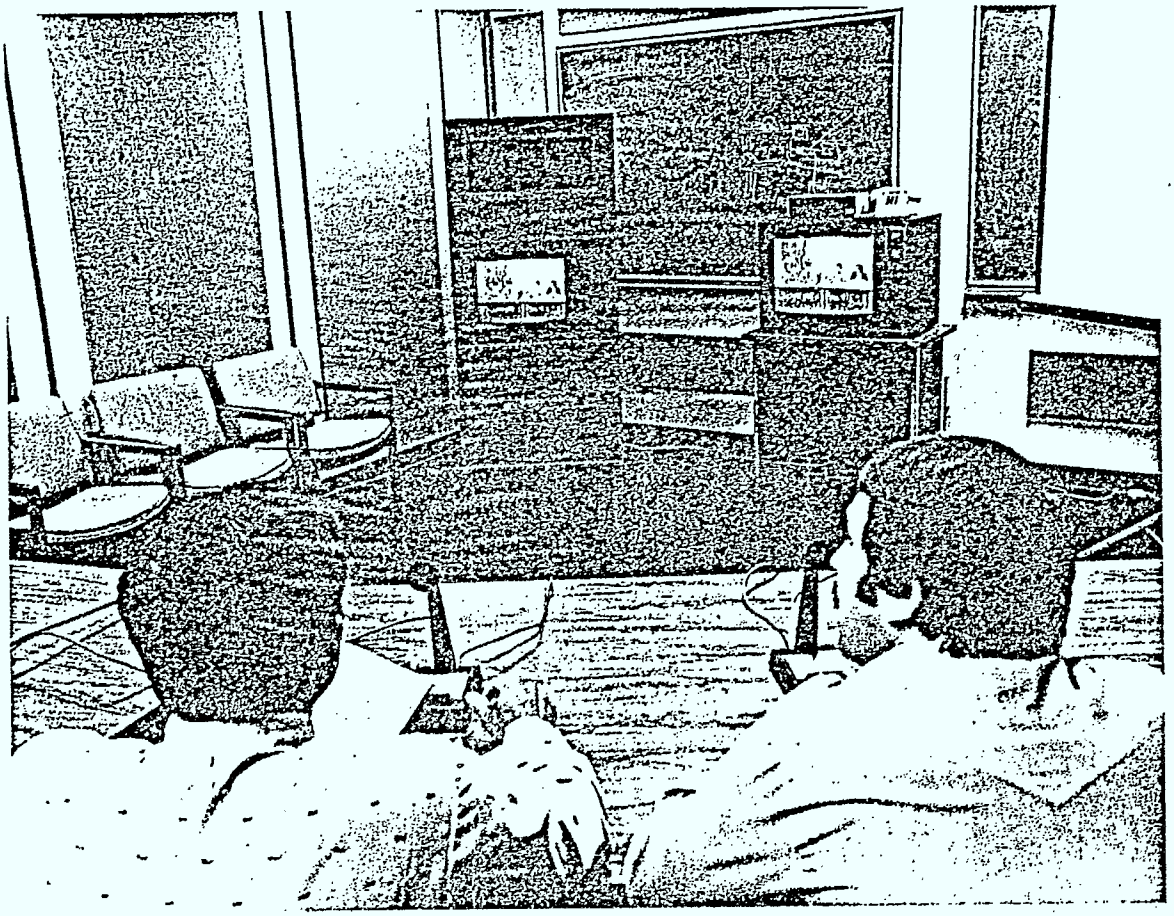
As part of the overall project plan the following evaluation objectives were established:

- To evaluate the operational reliability of the pilot satellite-based TC system.

- To evaluate the operational effectiveness of the TC system for various administrative and operational applications.

- To evaluate the potential demand for audio/video TC service within the Ontario Government.

- To evaluate the potential benefits and costs for using this type of service within the Ontario Government on an operational basis.



BASIC TRANSPORTABLE VIDEO CONFERENCE TERMINAL

FIGURE 2

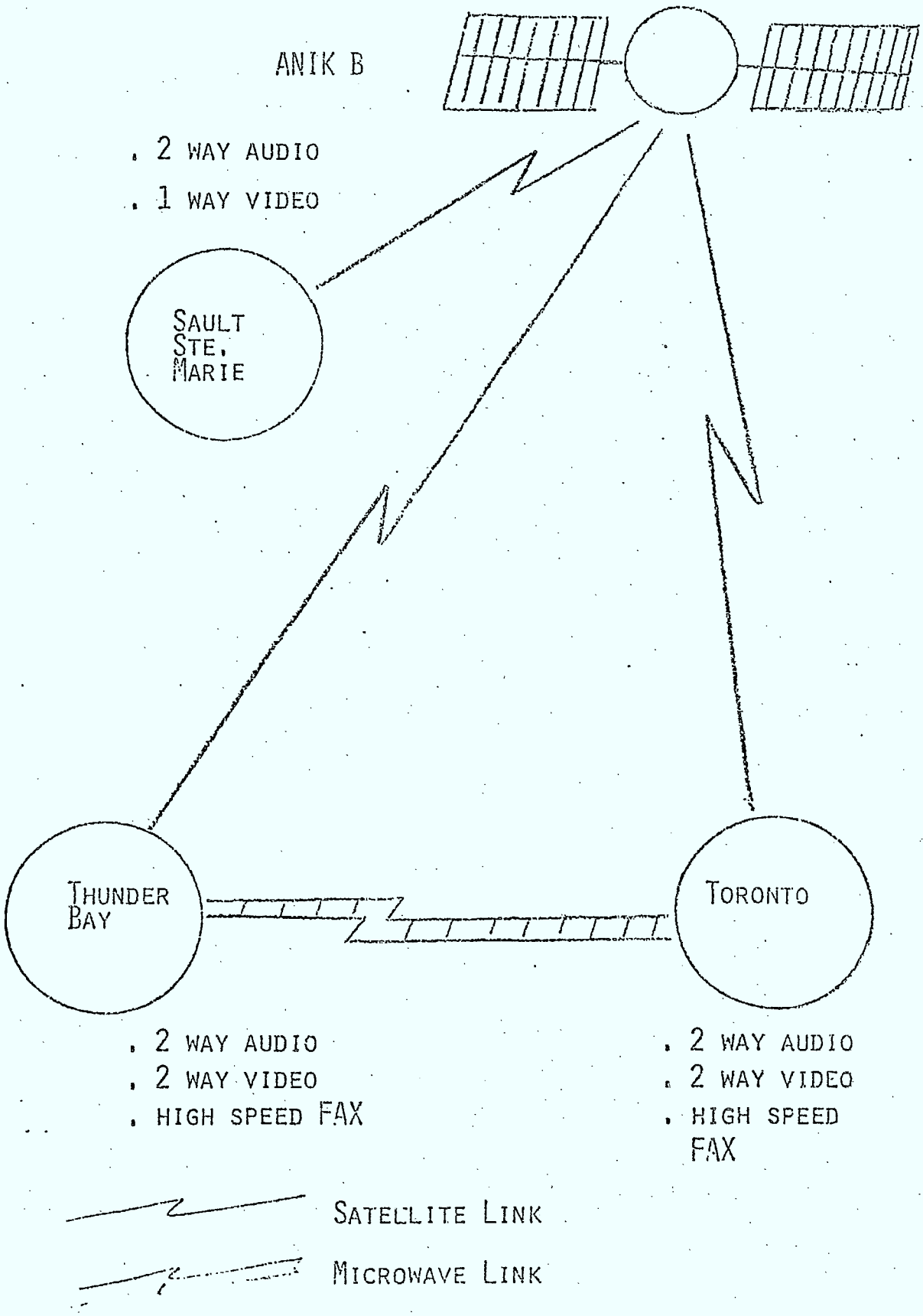

ANIK B
. 2 WAY AUDIO
. 1 WAY VIDEO
SAULT STE. MARIE
THUNDER BAY
TORONTO
. 2 WAY AUDIO
. 2 WAY VIDEO
. HIGH SPEED FAX
. 2 WAY AUDIO
. 2 WAY VIDEO
. HIGH SPEED FAX
SATELLITE LINK
MICROWAVE LINK

FIGURE 3

9. Evaluation Method:

Three evaluation instruments are currently being used in the program. These are:

- A written questionnaire - each first time TC user is required to fill out a questionnaire.

- Interviews - selected participants are interviewed on various aspects concerning the TC service.

- Keeping a daily log on various operational aspects of the TC system.

10. Preliminary Evaluation Results:

(a) General

Currently we have just completed the operational phase of our program and are now in the evaluation phase. So at this stage we can only present our preliminary findings and observations.

(b) User Awareness

To date the following Ontario Government Ministries have participated in the program. These are:

- Agriculture
- Civil Service Commission
- Community and Social Services
- Consumer and Commercial Relations
- Culture and Recreation
- Government Services
- Housing
- Health
- Natural Resources
- Northern Affairs

Over 200 Ontario Government personnel participated in demos, seminars and business type meetings.

(c) Technical Observation

Technically the following comments can be made at this stage:

-Transmission quality and reliability of satellite was generally good for audio/video TC applications.

-Flexibility of the satellite system was very suitable for TC applications and this is of particular importance if we have to provide such services in remote areas of Northern Ontario where microwave facilities are not readily available.

- Some problem experienced with echos.

- Audio sub-carrier suitable for high speed fax; telephony channel found unsuitable for nefax 6000 machine.

(d) Typical Application

Typical applications for which the pilot TC system has been used to date are:

- Senior, middle and lower management type meetings involving a number of projects in the planning, design or implementation stages in Northwestern Ontario, e.g. Ontario Housing projects in Thunder Bay, architectural plans for Ministry of Natural Resources, etc.

- Information dissemination type seminars, e.g. seminars on Ontario Government policy issues of common interest.

- Medical consultation and patient interviews in the area of psychiatry.

11. Preliminary Observations:

- ANIK-B type satellites are technically and operationally viable for a range of administrative and specialized interactive audio/video applications.

- Specifically, ANIK-B type services have the potential of making an important contribution to Ontario Government program areas such as:

    - Energy Conservation

    - The provision of improved medical and other public services to underserved areas of Ontario.

- For some applications, particularly in the medical area, some form of privacy will be needed for certain medical applications.

- The degree to which ANIK-B type communication services are utilized for the provision of any future TC or other network services will depend on final cost to end user, which is dependant on regulatory and institutional developments.

T-1 EVALUATION OF 91 Mbps DIGITAL LINKS

- Telesat/Trans-Canada Telephone System -

Presentations by D. Gray
Engineer, Heavy Route
Message and T.V. Systems
Systems Engineering Group
Telesat Canada

and

J. Butterworth
Senior Engineer
Satellite Systems (Earth)
Trans-Canada Telephone System

T-1 EVALUATION OF A 91 MBIT DIGITAL LINK

Sponsoring Organizations: Transcanada Telephone System
Telesat Canada
Bell Canada

Managers: R.M. Lester
Assistant Vice-President & Director
Communications Systems
Telesat Canada

G.R. Smart
Director of Network Development and Operations
Transcanada Telephone System

PHASE I

Objectives:

Evaluation and Characterization of the performance of the satellite portion of the digital service using "ANIK C" stations at Montreal and Toronto.

Outline of Activities:

Preparation for Phase I

Factory tests of earth station equipment.

Installation and acceptance of the Montreal and Toronto earth stations.

Modification of these stations for operation on ANIK-B.

Phase I

Evaluation and characterization of the performance using the Montreal and Toronto stations over ANIK-B using:

in-station loops, one-way links and two-way links

Preparation for Phase II

Current Activities:

Factory tests are taking place.

Installation of the Montreal station has started.

Current Schedule:

Summer 1980 - Completion of the Montreal station

- Modification to ANIK-B frequencies

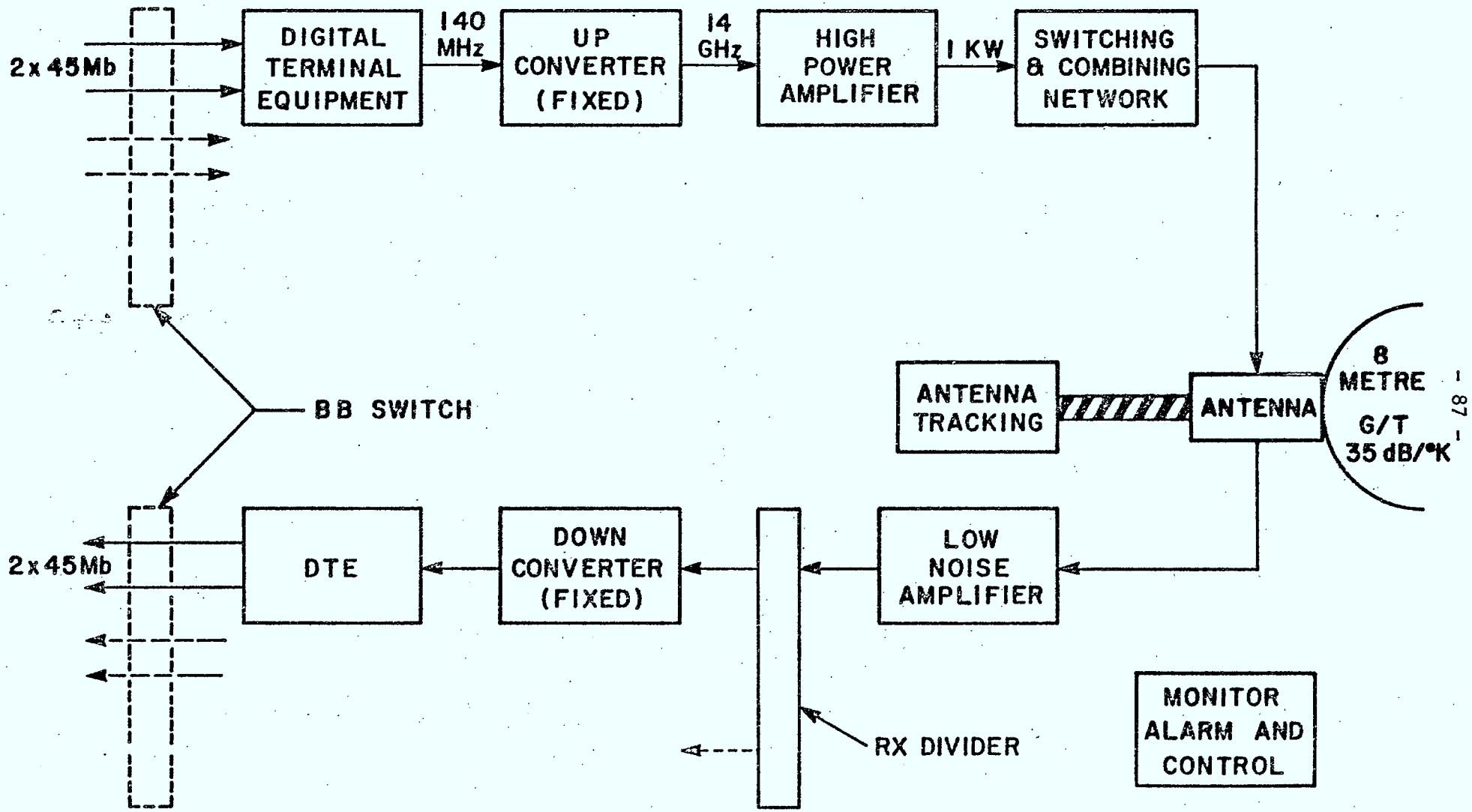
- Start of the installation of the Toronto station

Fall 1980 - Completion of the Toronto station

- Modification of Toronto to ANIK-B frequencies

- Evaluation and characterization of performance of the satellite portion of the digital service, studying the effects of noise, operating points and interference on BER performance

- Preparation for Phase II



EARTH STATION BASIC BLOCK DIAGRAM

Phase II

Sponsor: Transcanada Telephone System

Coordinator: John S. Butterworth

Objectives: Integrated Network performance verification for the ANIK-C digital message service.

Network Integration Tests:

1. Simulated traffic will be run between the Montreal and Toronto DMS 200 digital toll switches via the ANIK-C ground terminals in these cities.

2. A comparison circuit will be run over the LD-4 co-axial cable system.

3. Simultaneous measurements of transmission characteristics will be made.

Outline of Activities:

During 1979 Bell-Northern Research were under contract to define and develop transmission and switching tests for the field trial.

During 1980 BNR are under contract to develop the detailed test procedures for the switching (traffic simulation) tests.

Bell Canada will supply facilities and staff support to meet TCTS requirements.

The computer communications group will run concurrent tests to characterize the channel for data transmission.

Schedule:

The network integration tests will be run during the first quarter of 1981.

The timing is mainly determined by the following pre-requisites:

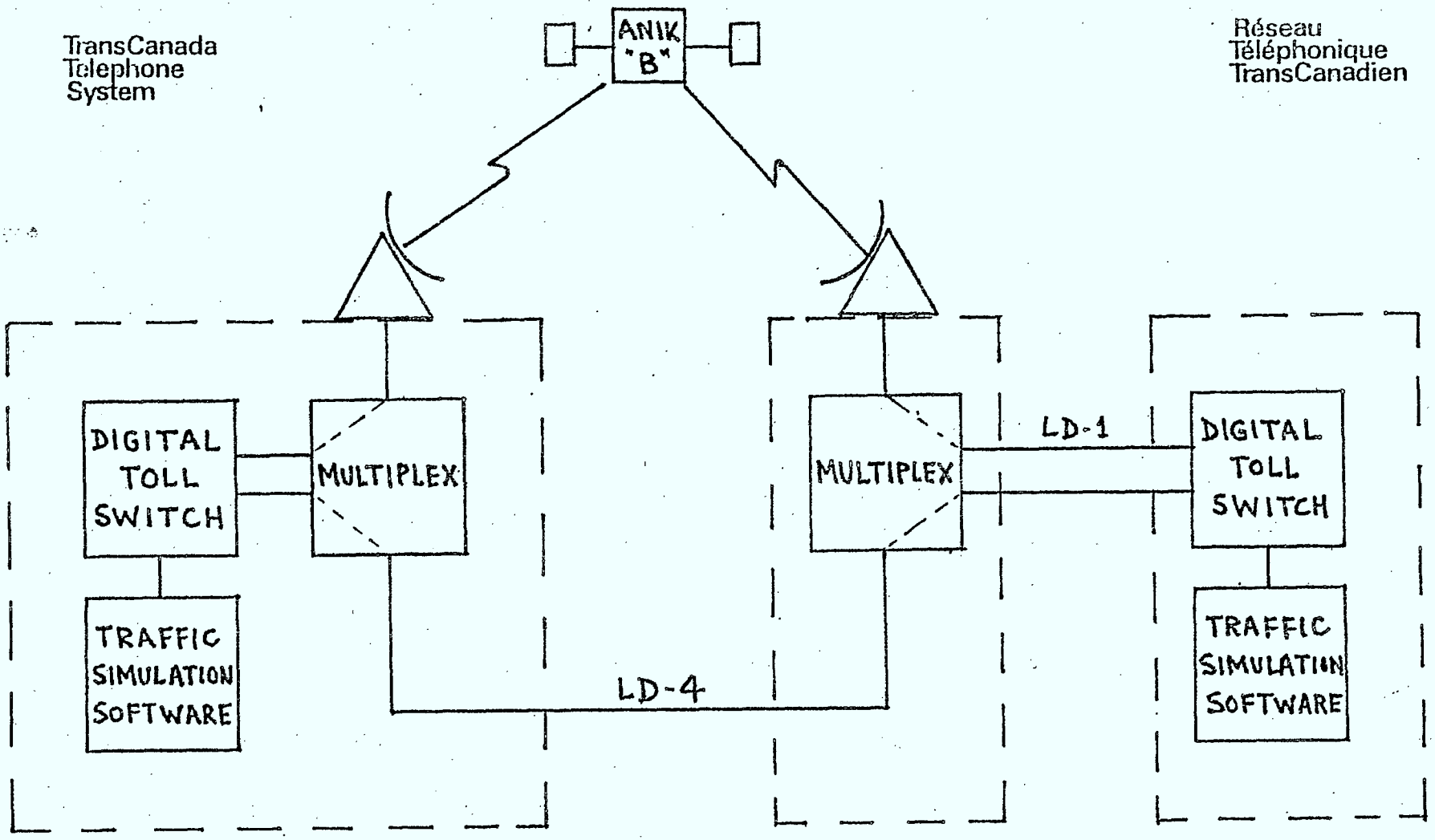
1. Completion of Phase I testing.

2. Implementation of clock synchronization for the DMS 200 digital switches (Oct-Nov 1980).

3. Availability of interface hardware for the DMS 200 (Jan 1981).

TransCanada Telephone System

Réseau Téléphonique TransCanadien



TORONTO : ADELAIDE ST. TOLL OFFICE

MONTREAL BELMONT ST.

MONTREAL AYLMER ST.

PROJECT T-1 ; PHASE II

T-2 SLIM ROUTE TDMA

- DOC/CNCP Telecommunications -

Presentation by P.P. Nuspl
Project Leader
Advanced Digital Systems
Department of Communications

and

G. Gothe
Planning Engineer
Customer Systems
Canadian National Telecommunications

T-2 SLIM ROUTE TDMA

Sponsors: Department of Communications
Canadian National/Canadian Pacific

Objectives:

(A) Develop a medium-capacity TDMA system (SLIM TDMA) and associated technologies.

(B) Establish parameters for TDMA equipment, earth stations and compatibility with other services in repeater channel.

(C) Develop and test interfaces between SLIM TDMA and CNCP facilities.

(D) Evaluate the SLIM TDMA Network for commercial data, voice, video services.

(E) Investigate applications as alternative to existing facilities and for new, innovative services.

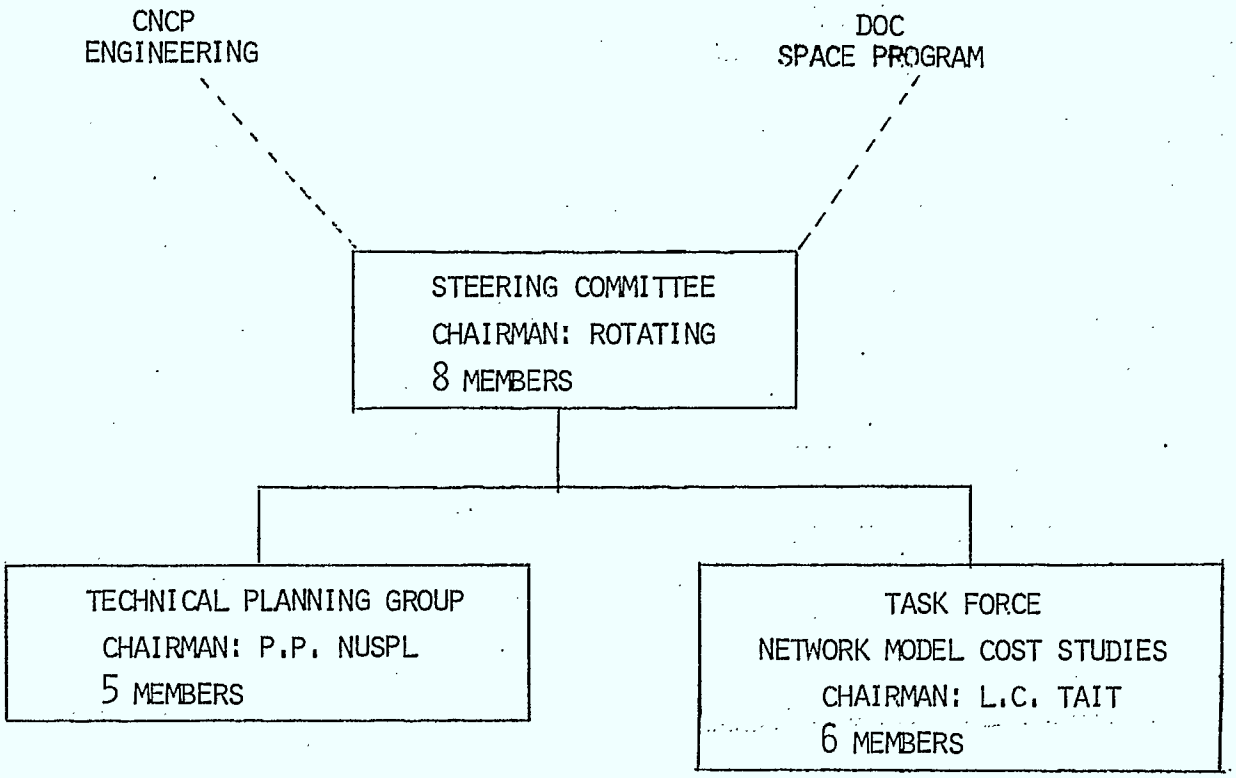
(F) Evaluate needs for operations and maintenance features.

(G) Foster new technology and its commercial application

--- alert policy-makers, regulators

--- support Canadian industries

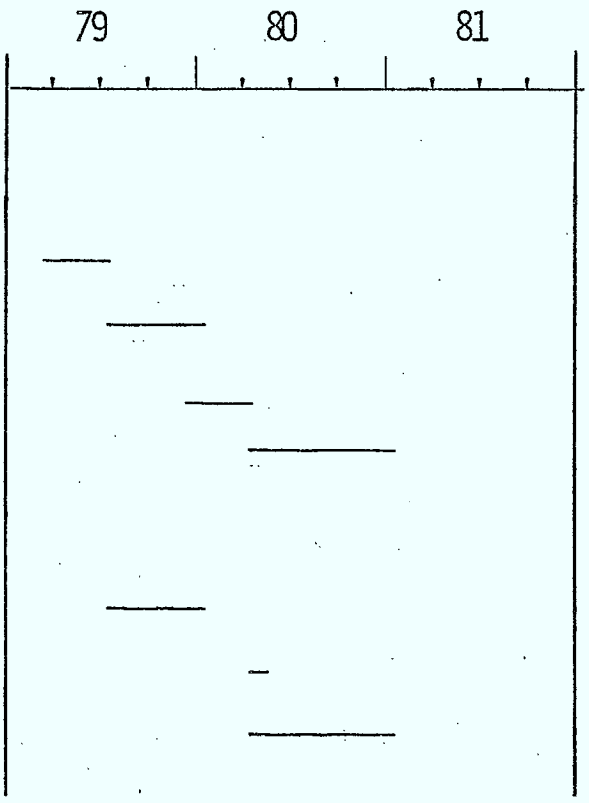
--- encourage carriers to consider liaise with potential users



CO-ORDINATORS: MR. G. GOTHE (CNCP)

DR. P.P. NUSPL (DOC)

ACTIVITIES AND PROGRESS:



SLIM TDMA

DOC: DEFINITION

DESIGN

BREADBOARD (1)

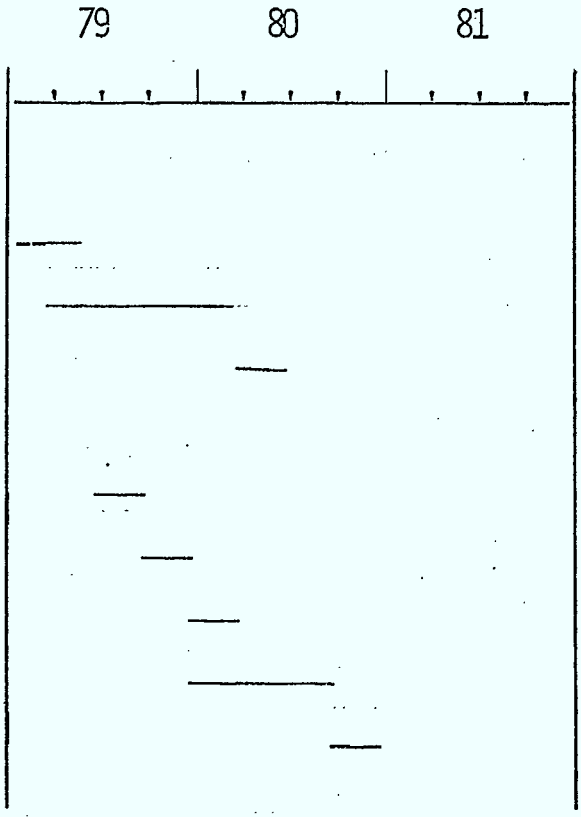
PROTOTYPE (2)

CNCP: SPECIFICATIONS

RE-DESIGN

BUILD

ACTIVITIES AND PROGRESS:



EARTH STATIONS

DOC: SPEC. AND DESIGN

ASSEMBLE, TEST

FIELD TEST

CNCP: SPECIFICATIONS

CONTRACT

DESIGN

ASSEMBLE

FIELD TEST

FUTURE PLANS:

PHASE II FOR PILOT PROJECT

--- CHANNEL HOPPING (FREQUENCY AGILITY)

--- RE-CONFIGURATION

--- DEMAND ASSIGNMENT

--- POSSIBLE EXTENSION TO PACKET SWITCHING

--- OTHER ERROR CONTROL TECHNIQUES

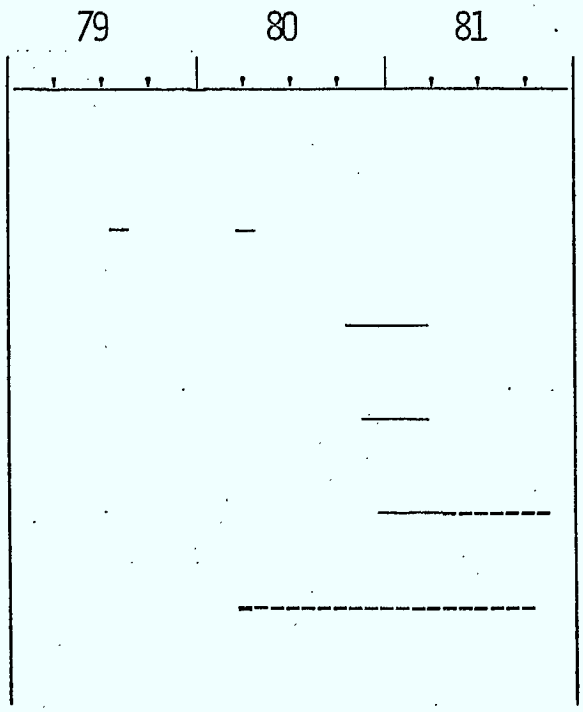
--- OTHER BUSINESS SERVICES

--- OTHER TECHNOLOGICAL DEVELOPMENTS

NETWORK PLANNING

--- COST STUDIES IN PROGRESS

ACTIVITIES AND PROGRESS:



THE DOC/CNCP SLIM TDMA PILOT PROJECT

Purpose

The Slim TDMA system tests are to provide us with the design parameters required for the earth stations, the TDMA, the error control, and the overall system to fit into the existing CNCP networks and their performance requirements. The Pilot Project will also serve to demonstrate various services to the industry.

Locations

Earth stations for the Pilot Project will be located in Kitchener, Toronto, Ottawa, and Montreal. This puts them into the Eastern Beam of Anik B as shown in Fig. 1.

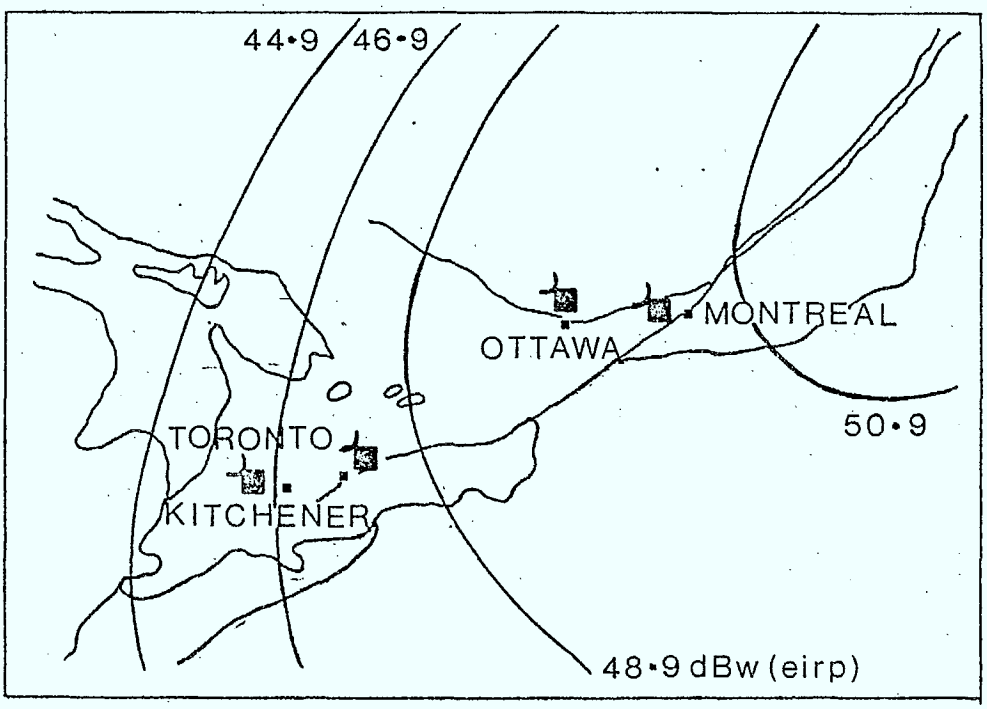


Fig. 1.

Demonstrations

The Equipment is arranged so we can demonstrate the following services:

SYNCHRONOUS DATA	2.4 - 19.2 Kb/s 56 Kb/s 1.544 Mb/s

In point to point or multipoint configurations.

ANALOG SERVICES	Simplex Voice using 32 Kb/s or 16 Kb/s delta modulation
	Slow-Scan Video at 56 Kb/s in two-way configuration at 1.5444 Kb/s, one-way switch-reversible.

Tests Conducted

The tests that are planned will include BER vs. Receive Signal Level, a comparison of FEC rates and methods, Long term (5-day) tests of Bit Error Rate, Block Error Rate, and Error Free Seconds. We will also record the voice quality and assess the video quality and under what circumstances it can be useful for conferences.

Tests will establish the successful integration into the existing private line and switched network facilities. By simulating data network operations we will test the suitability of satellite circuits for various configurations and protocols.

Test Schedule

Earth Stations and TDMA equipment is on order and the various tests are scheduled as shown in Fig. 2.

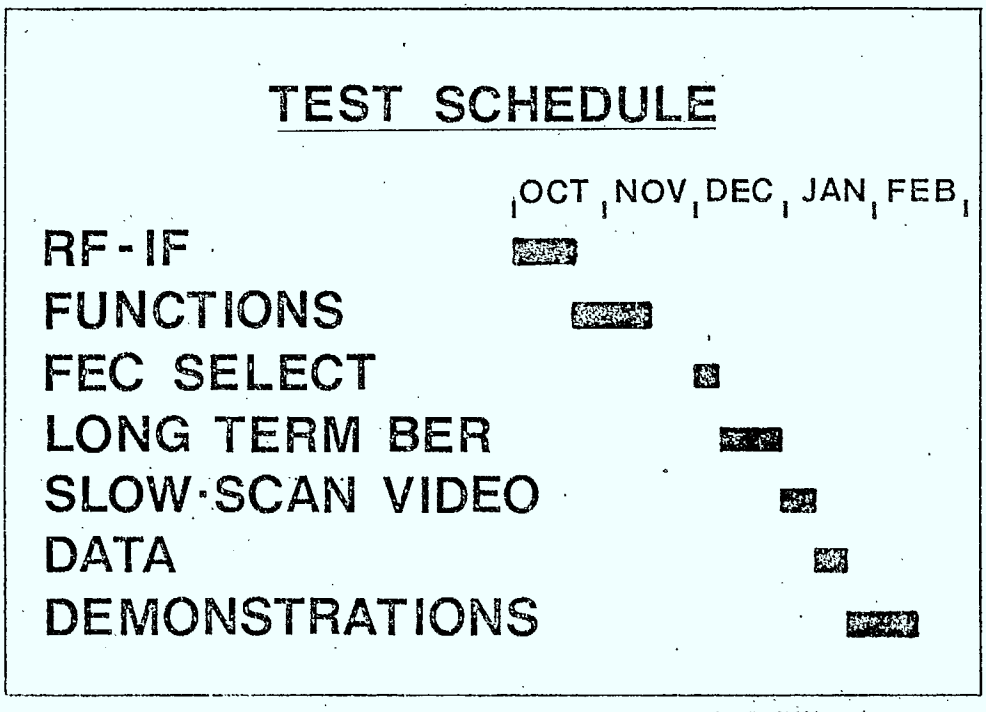


Fig. 2.

Results

The Pilot Project will give us a knowledge of the design parameters required to achieve a successful integration into the existing CNCP network, allow us to choose the optimum error control method, and demonstrate possible new services.

T-3 PHASE COHERENT LONG BASELINE INTERFEROMETER

- University of Toronto -

Presentation by W. Cannon
Associate Professor
of Engineering
Environment Science Program
York University

PROGRESS REPORT ANIK-B PILOT PROJECT T-3

PHASE COHERENT LONG BASELINE INTERFEROMETER FOR GEOPHYSICAL APPLICATIONS

J.L. Yen, W.H. Cannon, W. Petrachenko, S.K. Knowles,
W.B. Waltman, J.A. Galt, J.A. Popelar

INTRODUCTION

A steadily increasing interest in the motion of the earth's crust on the one hand and the structure of the earth's interior on the other have prompted the development of new experimental techniques for global position determination. Attempts to directly measure such global phenomena as the relative motion of tectonic plates, which may manifest itself locally as volcanic eruptions and earthquakes, and instantaneous axis and rate of rotation of the earth, which is related to seasonal movements of the atmosphere and ground water level, will require global positioning to accuracies exceeding the capability of classical instruments.

There are two methods known today capable of measuring position in the terrestrial frame with the requisite accuracy, namely, lunar laser ranging and very long baseline interferometry(VLBI). Of the two,VLBI is basically simpler because the sources used are essentially stationary while the lunar orbit requires the simultaneous determination of many orbital parameters. One principal deficinecy of VLBI is the lack of phase coherency because of the use of independent oscillators at each station. Regardless of how stable the oscillators may be, with enough time there will be relative phase drifts. The experiment of Pilot Project T-3 removes this difficulty by introducing a phase-link between the remote oscillators using the ANIK-B satellite. As a result the phase of the VLBI fringes can be used for global positioning measurements instead of using delay as employed previously.

The ANIK-B phase link also represents an advance in the technique of time transfer by satellites. Many experiments have been performed using various satellites for time transfer. Most of this work employs pulses or ranging codes; among the most precise results were the CENSAR experiment of Nuspl et al. and the experiment of Costain et al., both using the Hermes satellite achieving accuracies of a few nanoseconds. Using the ANIK-B phase link, preliminary results show an accuracy of 100 pico seconds or less can be readily achieved which represents more than an order of magnitude improvement.

VLBI GLOBAL POSITION DETERMINATION

The basis of VLBI global position measurements is the difference of arrival time at the two ends of an interferometer baseline of a wave front emitted by an unresolved extraterrestrial radio source a great distance away. If the earth-fixed baseline is $\underset{\sim}{u}$ and the radio source is in the direction of a space-fixed unit vector $\underset{\sim}{\ell}$ than the time delay is

$$\tau = \underset{\sim}{u}.\underset{\sim}{\ell}/c$$

where c is the velocity of light. As the earth rotates the earth-fixed baseline $\underset{\sim}{u}$ changes its direction resulting in a diurnal variation of delay τ. The accuracy with which the delay τ can be measured is inversely proportional to the bandwidth of observation. In VLBI where the bandwidth of observation is limited by the recording system which records the signal at each end of the baseline for subsequent correlation, it is necessary to use more than one frequency band to synthesize a wide band system for high delay resolution. This is the process adopted by US investigators for their geophysical VLBI systems.

The variation of delay τ on the other hand can be measured to much greater accuracy without using large bandwidth if the variation of the fringe phase given by $2\pi f\tau$, where f is the local oscillator frequency of the receiver, can be measured. To use delay measurements to achieve the same precision would require a bandwidth equal to f which is impractical. By measuring the total phase excursion between consecutive times when the delay is an extremum, the length of day can be found from a knowledge of the baseline and the source direction. Unfortunately, the fringe phase cannot be measured by conventional VLBI because the use of independent local oscillators introduces an additive term equal to the unknown phase difference between the oscillators. Even with the most stable oscillators the phase difference increases with time and remains a major cause of uncertainty in the system. In the ANIK-B Project this deficiency is removed by a satellite phase link which measures the difference of remote local oscillator phases.

THE ANIK-B PHASE COHERENT GEOPHYSICAL VLBI

The principal aim of the ANIK-B Pilot Project is to establish phase coherent VLBI as a geophysical instrument. This is to be achieved by measurements of the length of day and the wander of the pole of earth's axis of rotation. For the length of day measurements a large East-West baseline is provided by the Algonquin Radio Observatory in Lake Traverse, Ontario and the Dominion Radio Astronomical Observatory in Penticton B.C. For measurement of polar wander a North-South baseline is further required. This is provided by the third station, the Maryland Point Observatory of the Naval Research Laboratory in Maryland. The three station observations are carried out using the Canadian analog VLBI system with a recording bandwidth of 4 MHz. Two stations have hydrogen maser oscillators while the other is equipped with a rubidium frequency standard. Observations are carried out simultaneously at 11 cm and 21 cm wavelengths for correction of ionospheric path lengths. The use of three stations also provides a closure phase relation, useful in analyzing fringe phase data. The processing of the radio astronomy data is performed at the VLBI Processing Centre at the Herzberg Institute of Astrophysics in Ottawa. The main observation programs involve observation of a small number of strong nearly unresolved radio sources from horizon to horizon. By connecting phase between different sources the time of day can be measured.

To implement phase coherent VLBI each station is equipped with a transmit-receive ground station for transmitting and receiving pilot tones via the ANIK-B satellite. The details of the phase link are described in the next Section.

THE ANIK-B PHASE LINK

An earlier experiment using the Hermes satellite has indicated that remote oscillator phases can be compared using a satellite link. The ANIK-B satellite is however different from Hermes in that no beacon related to the transponder frequency translation is transmitted. As a result, a more complicated scheme is required to remote the unknown phase caused by the transponder transfer oscillator. The basic phase recovery scheme adopted is to transmit from each end of a baseline to the other end two tones located near the band edges of a transponder channel, in this case 60 MHz apart. Upon reception of the two tones at the remote station the phase difference is taken resulting in a 60 MHz signal. Since both tones have been shifted by the satellite transfer oscillator, the difference cancels out completely the transfer oscillator phase. This 60 MHz signal is a replica of a signal of that frequency generated by the transmitting station delayed by the total path delay. As the satellite moves there is a small Doppler shift accompanying the signal. The delayed version of the transmitting oscillator phase is then compared with the phase of a 60 MHz signal derived from the oscillator at the receiving station resulting in a signal whose phase is the sum of the Doppler shift of the path length variation and the phase difference of the two oscillators at the transmitting and receiving stations. To remove the contribution from path length variation a pair of tones is transmitted along the reverse path. For economy in transponder channel occupancy, the tones transmitted by each station are separated by a conveniently small amount such as 1 kHz. In the reverse path the contribution of path length to total phase remains the same but the roles of the transmitting oscillator are reversed. Subtraction of the two path phase differences thereby results in the phase difference between the two remote oscillators.

In the actual experiment, since three stations are involved, three pairs of tones are transmitted through the satellite, separated by 1 kHz with respect to the channel used. One station is located in the West beam while the other two are within the East beam of ANIK-B. To provide flexibility for possible more accurate phase recovery schemes, all the tones received at each station are down converted to the audio band by means of the receiving station oscillator and recorded on magnetic tape. The tapes are later processed for phase recovery using a combination of hardware and software in a processor located at the Naval Research Laboratory in Washington, D.C. A simplifed block diagram of the system is shown in Fig. 1.

OBSERVING PROGRAMS, PRELIMINARY RESULTS AND IMPLICATIONS

The three transmit and receive ANIK-B terminals and the associated equipment were put into operation in 1979. Two geophysical observing programs, each lasting for five days, were subsequently carried out, one in November 1979 the other in April 1980. In April 1980 all three stations operated dual-frequency radio astronomy receivers as well as the phase link. The phase link data processor was put into operation and the processing of the phase link data is almost complete. The radio astronomy data have not been completely reduced because the VLBI Processor can only handle two stations. Since the observing program involves three stations each operating at two frequencies, the total processing time required is six times the observing period. It is expected that processing will be completed in the Summer of 1980 and detail analysis of data will be available in the Fall of 1980. In the following some preliminary results are given.

The two-tone reverse path phase recovery scheme of the ANIK-B phase link appears to work very well. 1/10 second averages show peak to peak phase noise of about 2^{o} at the 60 MHz difference frequency. This corresponds to a peak to peak time error of about 100 ps and a propagation distance error of 3 cm. The 1/10 second averages of individuals received 60 MHz difference phases show differences in character below 2^{o}-3^{o} level some of which could be explained but not others. For instance, the variations are in general worse in the East beam in comparison to the West beam, probably due to more traffic in the East transponder. Furthermore, evidence of quasi periodic variations common to all the 60 MHz difference times received in the East beam amounting to 3^{o} amplitude with period approximately 5 seconds indicates probable nonlinear dispersive phase shifts caused by transponder loading. Detailed analysis of the data below the few degree level should help to understand thermal noise and interchannel interference limits of system performance and perhaps lead to improvements.

Although for geophysical VLBI only the relative phase of the remote oscillators are required, for time transfer the cycle ambiguity of phase measurements must be resolved. Projecting from the accuracy achieved, a third tone 1 MHz away from one of the two will be able to have a measurement accuracy of 5-10 ns, sufficient to resolve the cycle ambiguity at 60 MHz. Since most time standards are synchronized by other means to better than 1 μs, there will be no cycle ambiguity problem at 1 MHz. Thus a three tone system will be sufficient for time transfer with accuracy of the order of 100 ps if systematic errors due to ionosphere in the path, transponder differential phase shift can be properly accounted for. This implies a very economic method of time transfer because of the very small satellite channel bandwidth that is required.

A second result of the phase link data shows long term drifts of remote oscillators can be readily measured. In one observation period rubidium frequency standards were used at two of the three stations. The phase link tracks the phase difference of the two rubidium oscillators showing a frequency difference of 6.3×10^{-11} with a linear rate of 5.6×10^{-12} in 24 hours. This implies that less stable oscillators such as rubidium or even crystal oscillators in remote locations could be made phase coherent using phase links. Aside from removing the requirement of hydrogen masers in VLBI networks, this may have applications in other areas such as TDMA in satellite communication systems and bistatic radars.

A complete evaluation of the phase coherent geophysical VLBI is yet to be performed pending the completion of radio astronomy data processing. Partial results available indicate that there is no problem to connect phase across observation breaks due to tape changes, source changes and other causes. Observation at two frequencies should properly remove ionospheric effects on the data by using known dispersion relation.

FUTURE WORK

In the evaluation of the performance of the entire system, special emphasis will be given to instrumental effects such as the ionospheric and atmospheric path lengths in both the VLBI and the phase link, the variations of cable lengths due to flexure and temperature, the effect of the satellite transponder phase shift and the nonlinear phase shift caused by transponder traffic. Potentially more accurate phase recovery schemes using loop back single tone phase link will be explored. Phase synchronization of remote not very stable oscillators using phase link will be investigated. Connection of phase using more observing frequencies but discontinuous observations will be examined. Finally, comparison with delay measuring VLBI and lunar laser ranging and other methods will be carried out in relation with project MERIT, a special period of international cooperation in studying and intercomparing new techniques for precision measurement and to obtain new precise data on rotation of the earth.

ANIK-B BASIC PHASE LINK

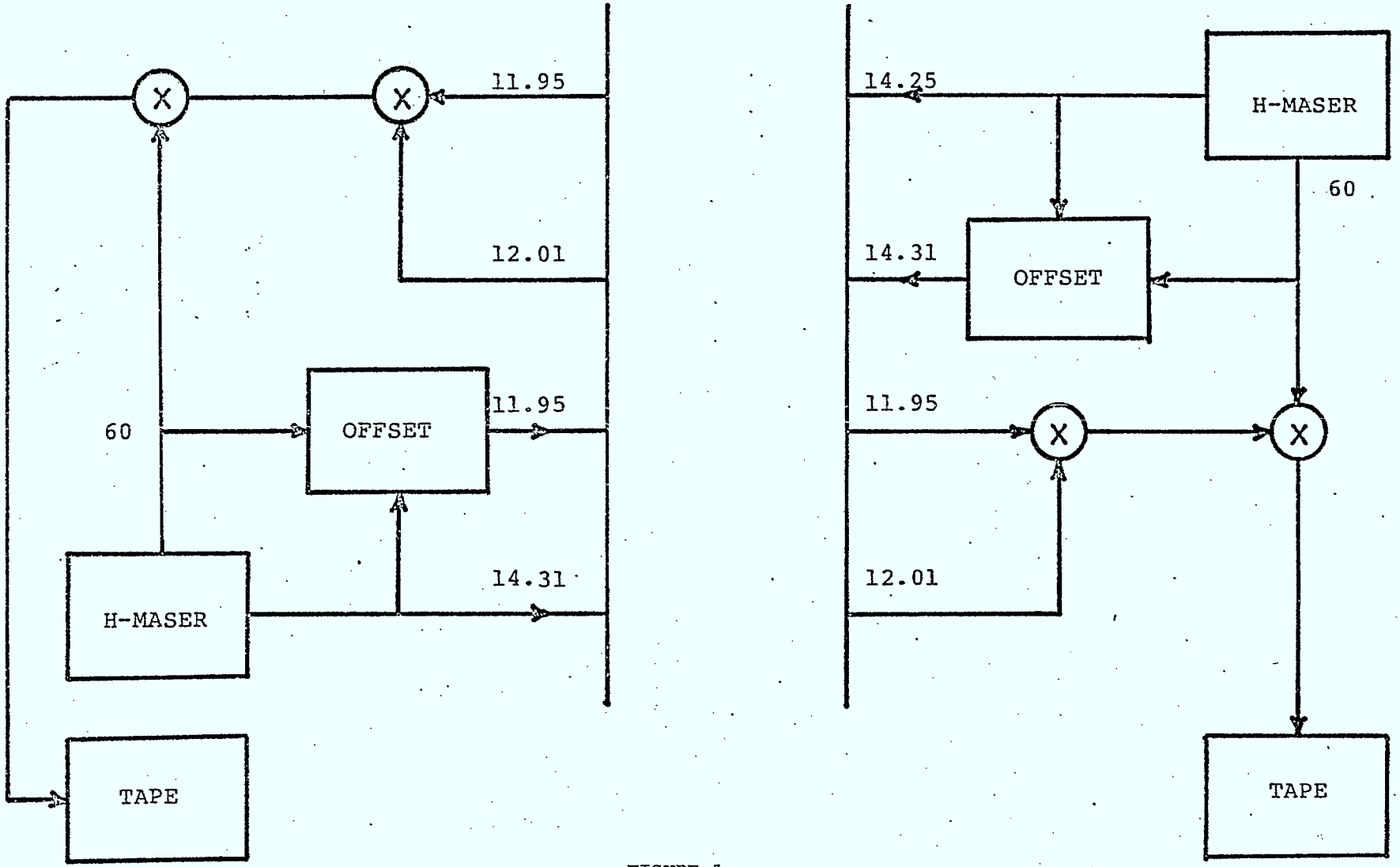


FIGURE 1

T-8 12 GHz PROPAGATION STUDY

- Telesat Canada/
Department of Communications -

Presentation by B. Azarbar
Systems Engineer
Telesat Canada

T-8 12 GHZ PROPAGATION STUDY

Project Sponsors: Telesat Canada
Communications Research Centre,
Department of Communications

Project Managers: Dr. K.S. McCormick
Communications Research Centre

Mr. R.M. Lester
Telesat Canada

Principal Contacts: Mr. J. Schlesak
Dr. J. Strickland (Communications Research Centre)

Dr. B. Azarbar
Dr. M. Zuliani (Telesat Canada)

Objectives:

1. Attenuation statistics

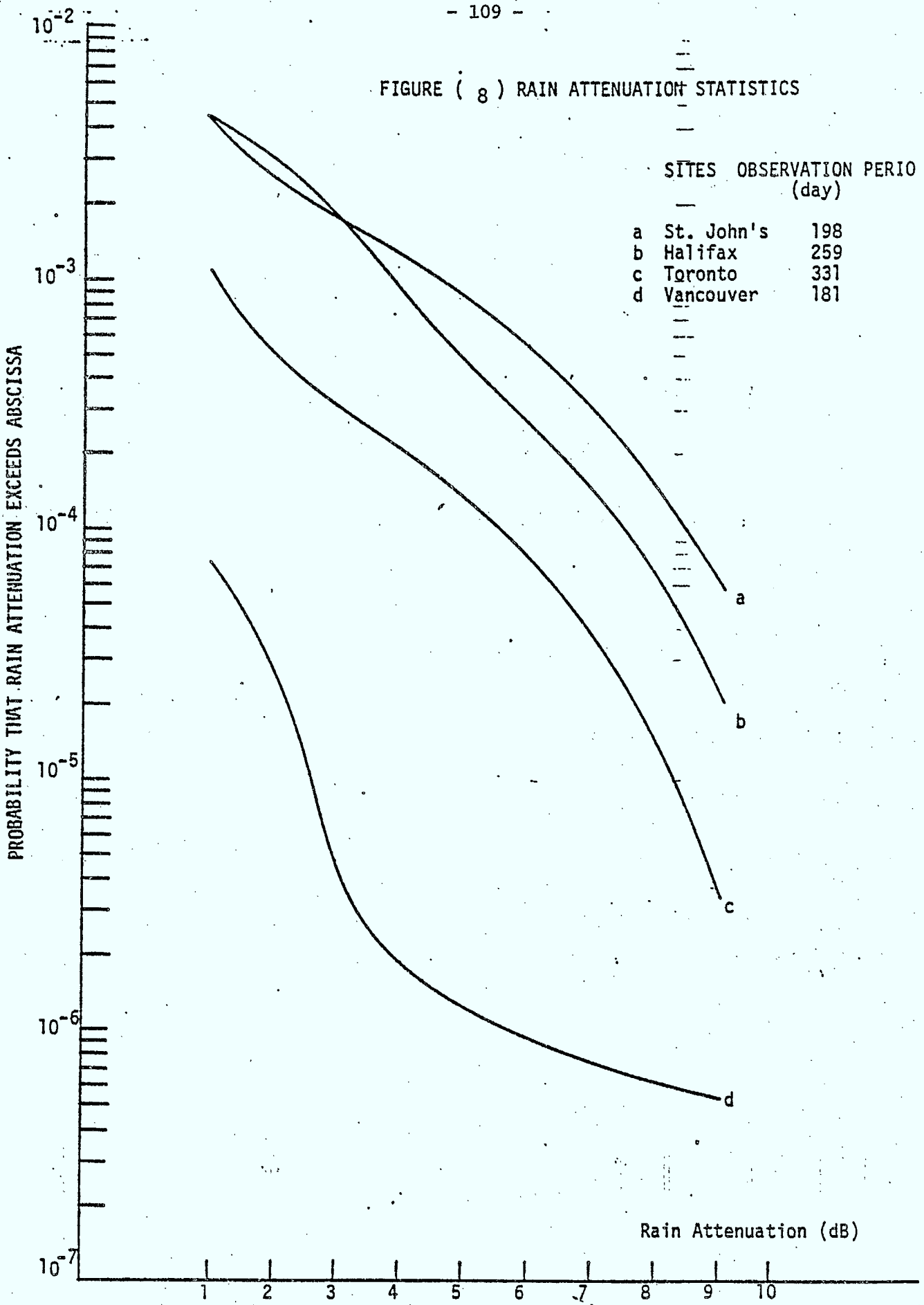
2. Cross-polarization statistics

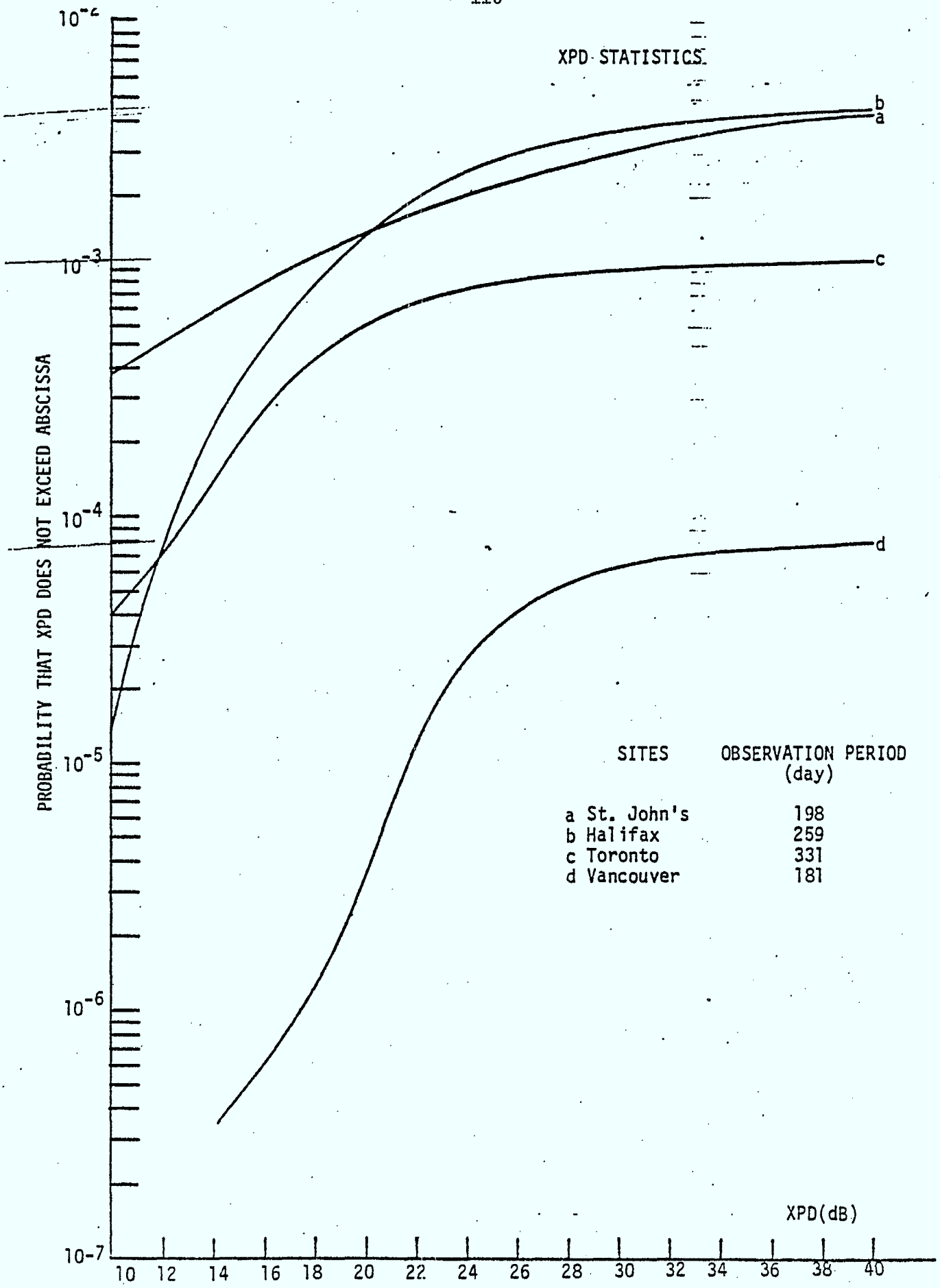
3. Cross-polarization vs. co-polar attenuation

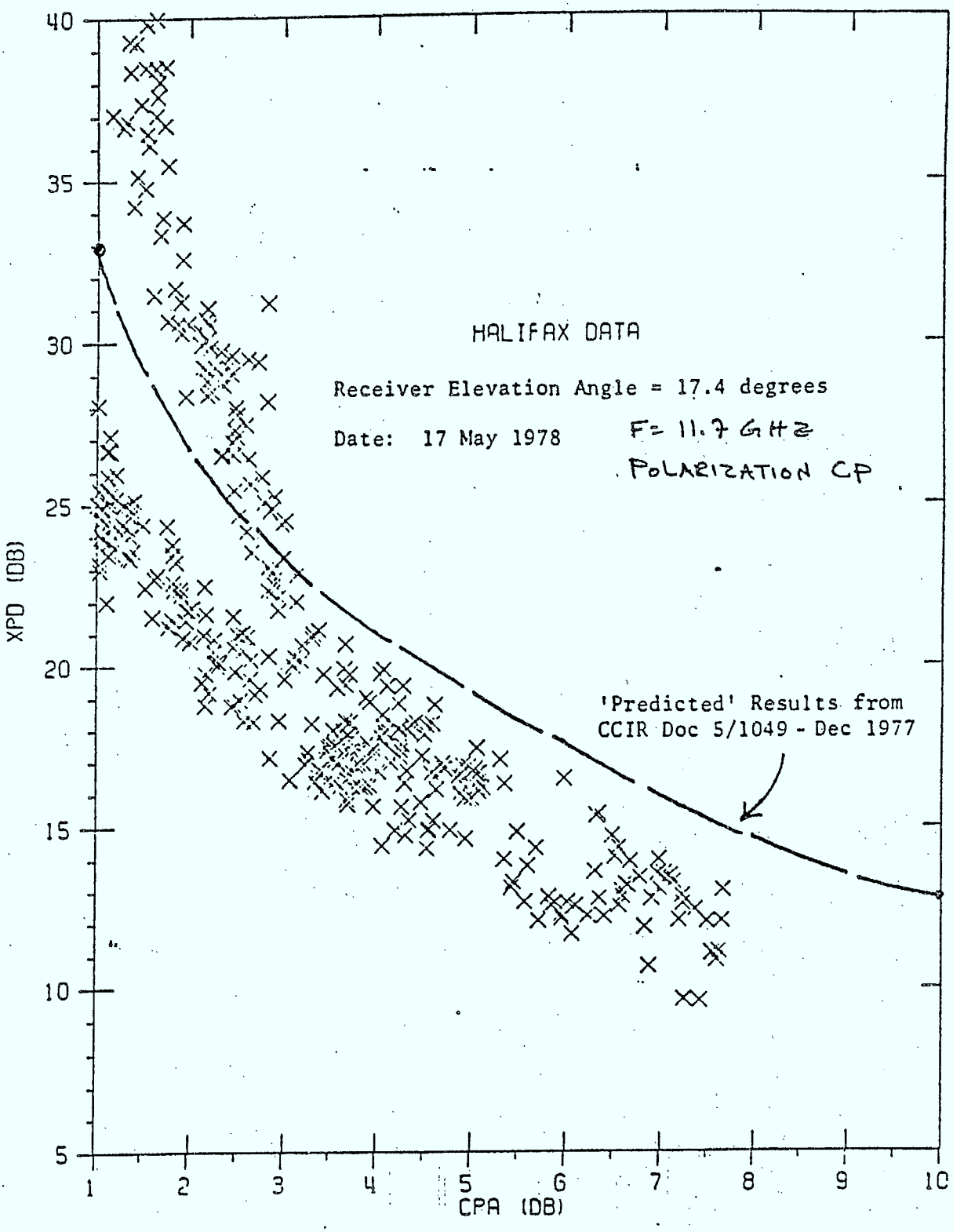
$$XPD = U - V \log (FADE)$$

4. Possible extension to study cumulative uplink and downlink cross-polarization interference

FIGURE (8) RAIN ATTENUATION STATISTICS




XPD STATISTICS
PROBABILITY THAT XPD DOES NOT EXCEED ABSCISSA
10^{-2}
10^{-3}
10^{-4}
10^{-5}
10^{-6}
10-7
b
a
c
d
SITES
OBSERVATION PERIOD (day)
a St. John's 198
b Halifax 259
c Toronto 331
d Vancouver 181
XPD(dB)
10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40



XPD Scattergram

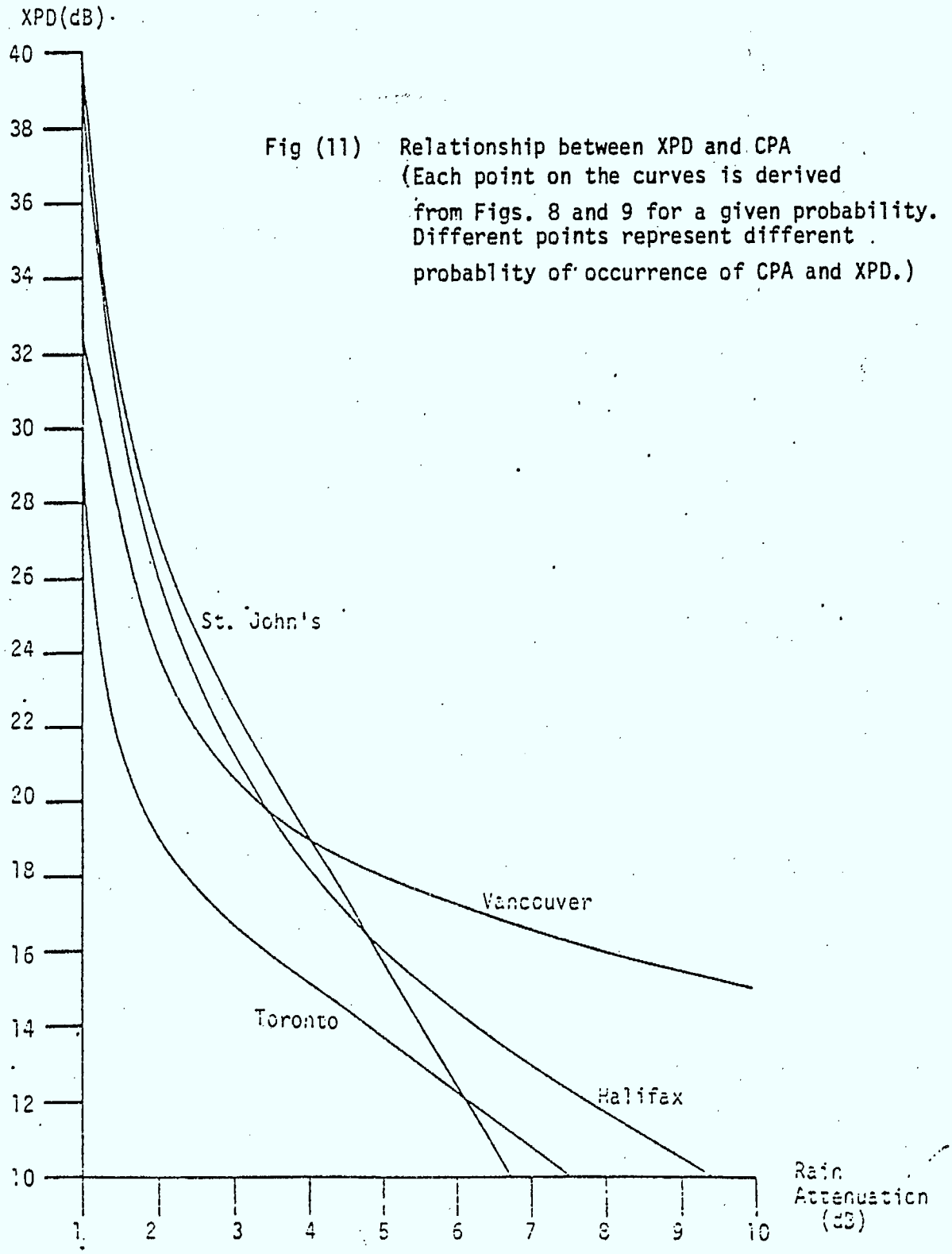
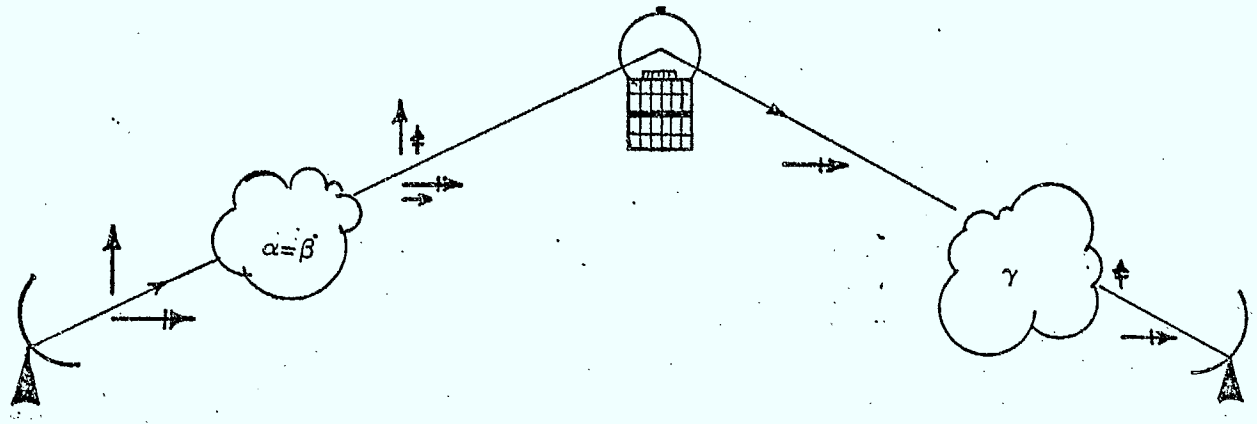
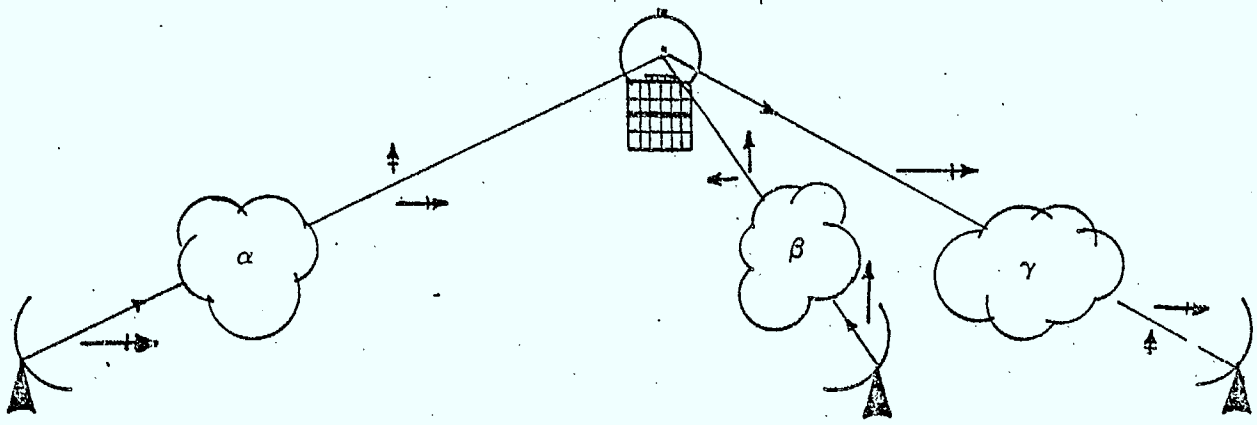
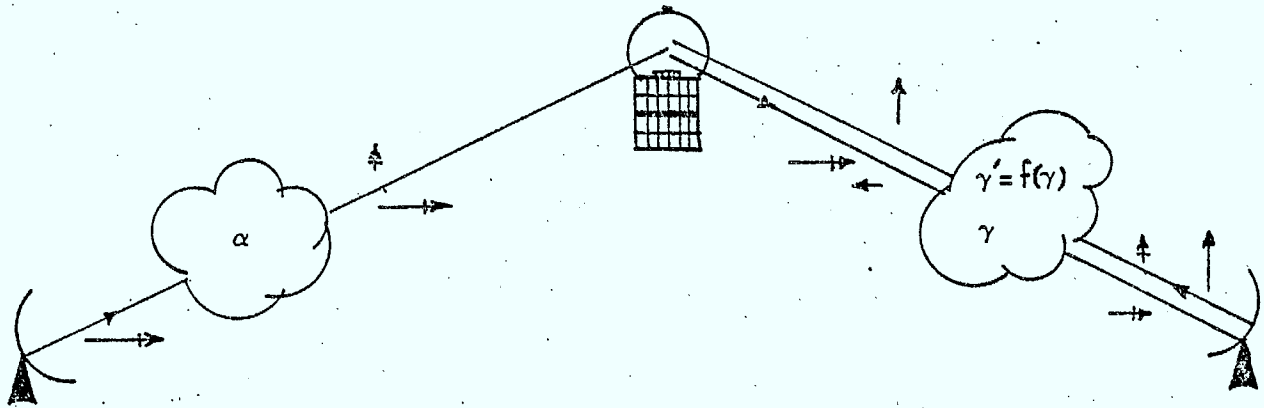
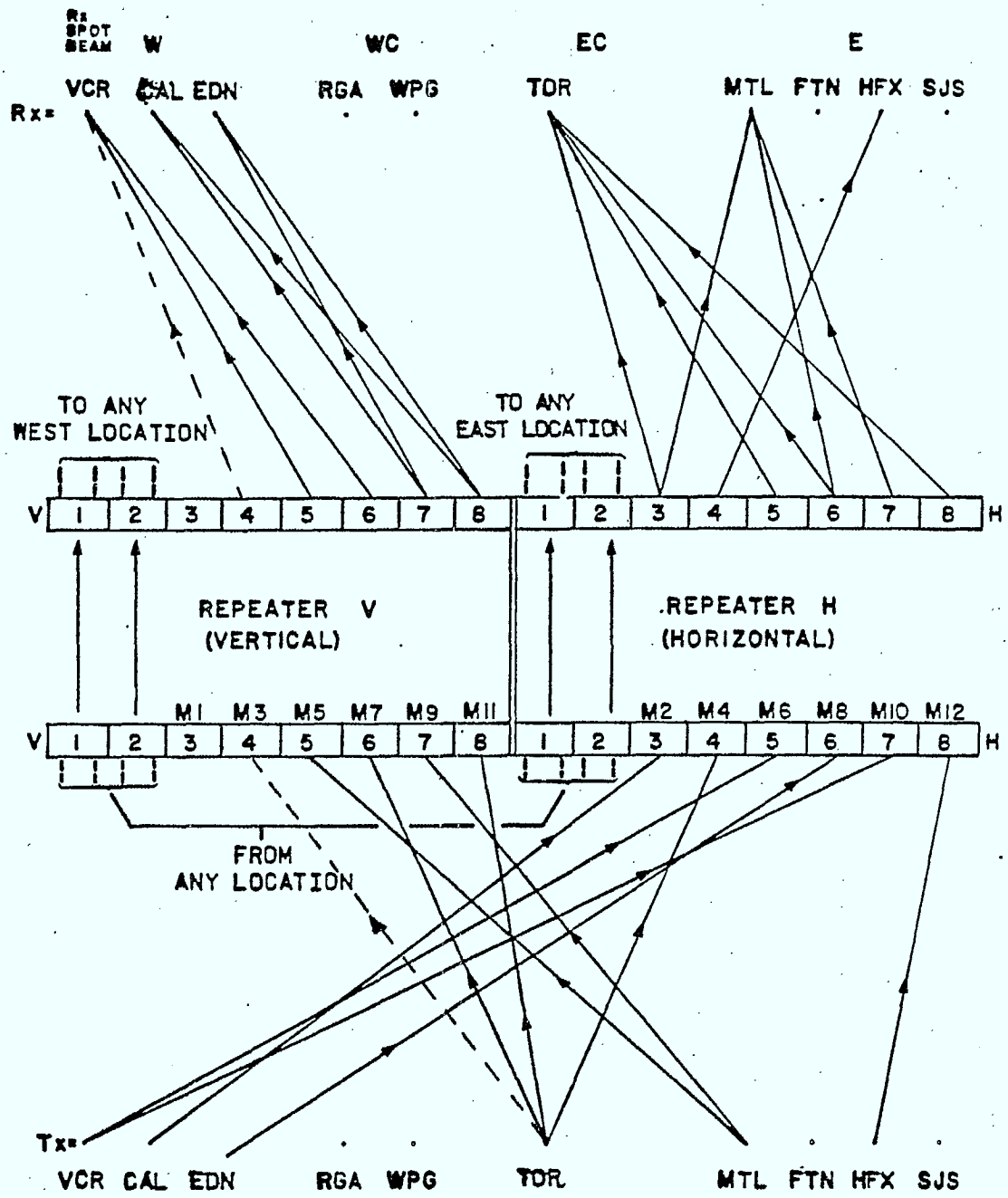


Fig (11) Relationship between XPD and CPA
(Each point on the curves is derived from Figs. 8 and 9 for a given probability. Different points represent different probablity of occurrence of CPA and XPD.)

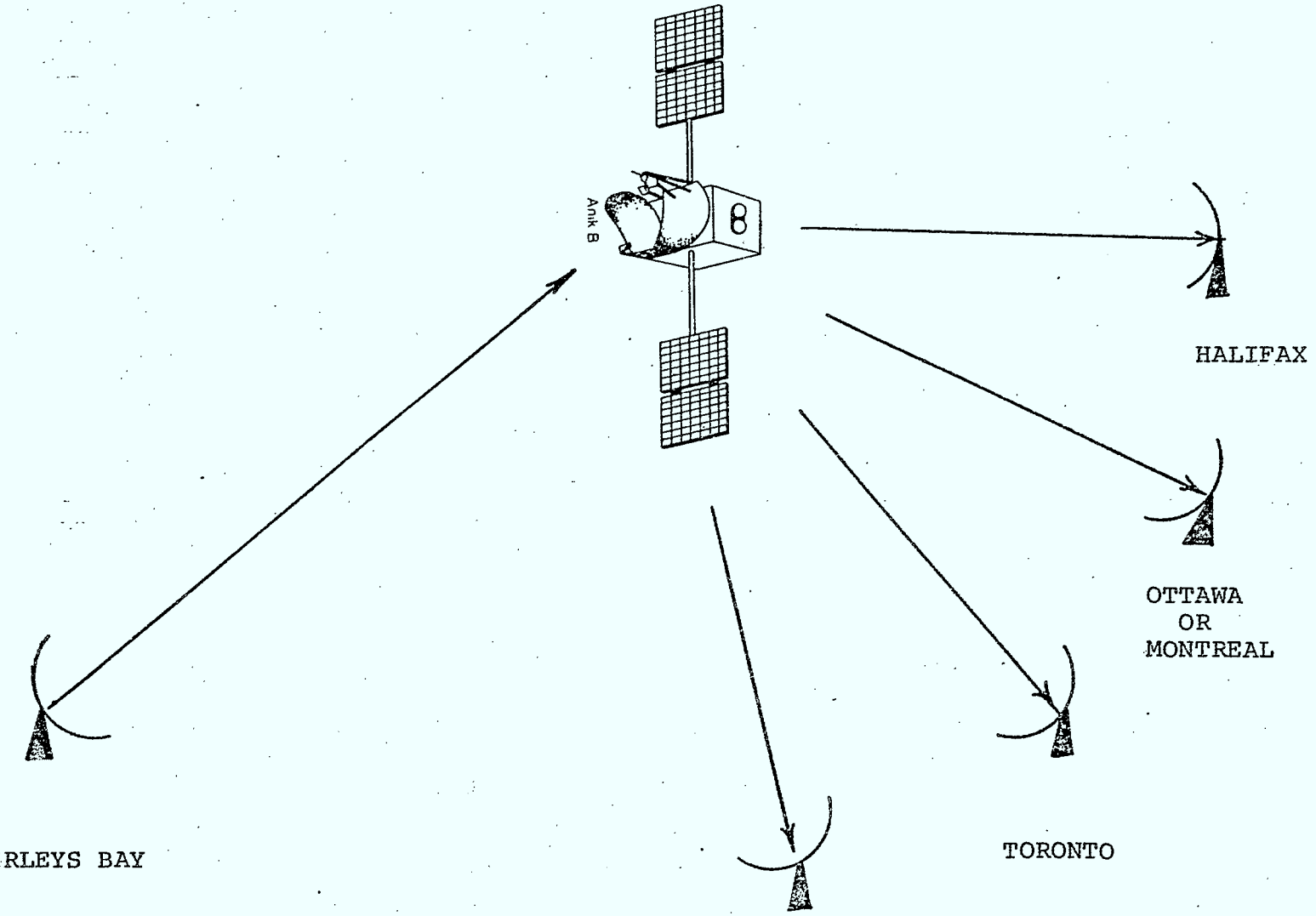

α=β
γ

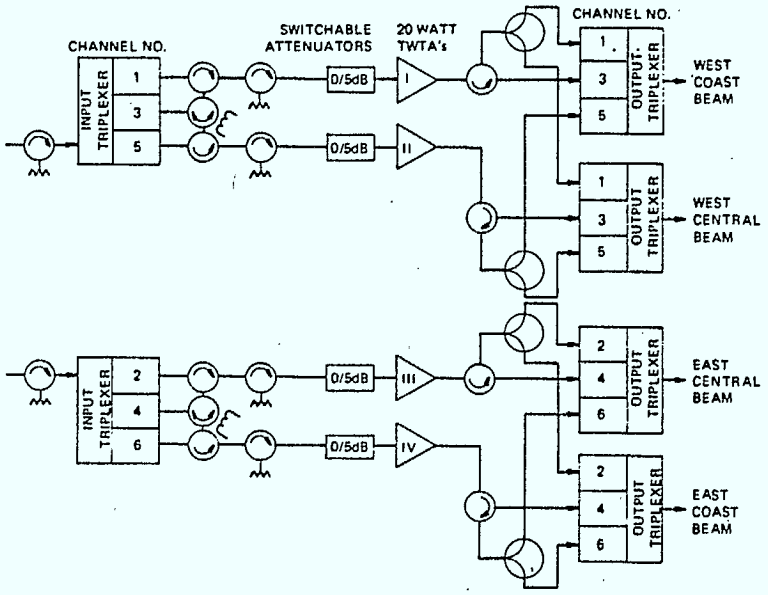

α
β
γ


α
γ'=f(γ)
γ



ANIK C TRAFFIC CONFIGURATION


Anik B
HALIFAX
OTTAWA
OR
MONTREAL
TORONTO
WINNIPEG
CRC SHIRLEYS BAY



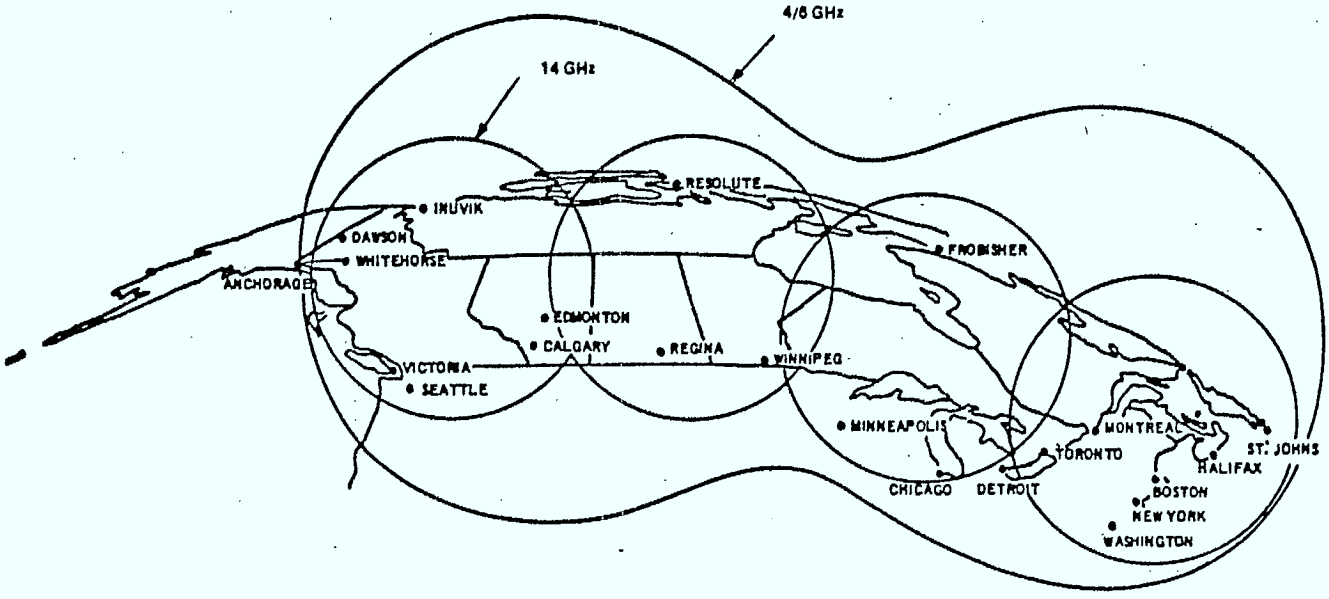


Fig. 2
All-Canada coverage is possible with uplink antenna patterns; downlink provides four regional bands.

TRANSMITTER	RECEIVER
15-FOOT DISH	6-FOOT DISH
DUAL-POLARIZED J-HOOK FEED (14 GHz)	DUAL-POLARIZED J-HOOK FEED
5-WATT TWT	12 GHz NARROWBAND RECEIVER
PHASE LOCK CW FREQUENCY SOURCES AT 14.3101 GHz AND 14.4701 GHz	

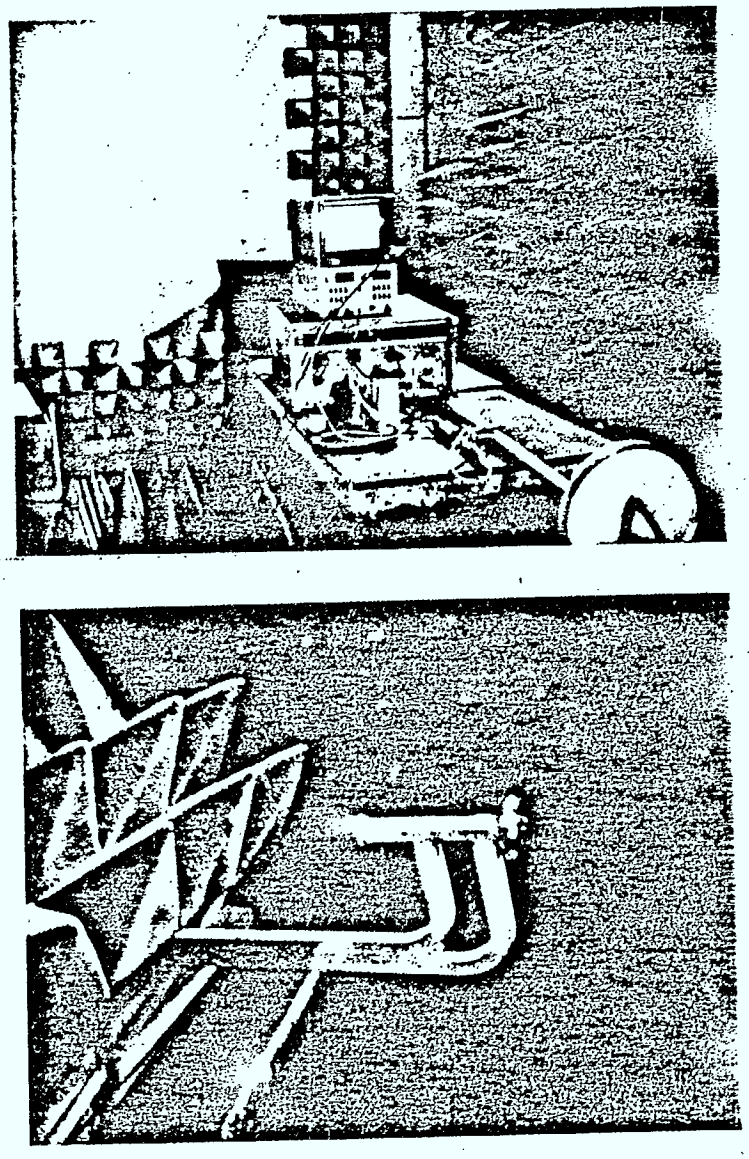
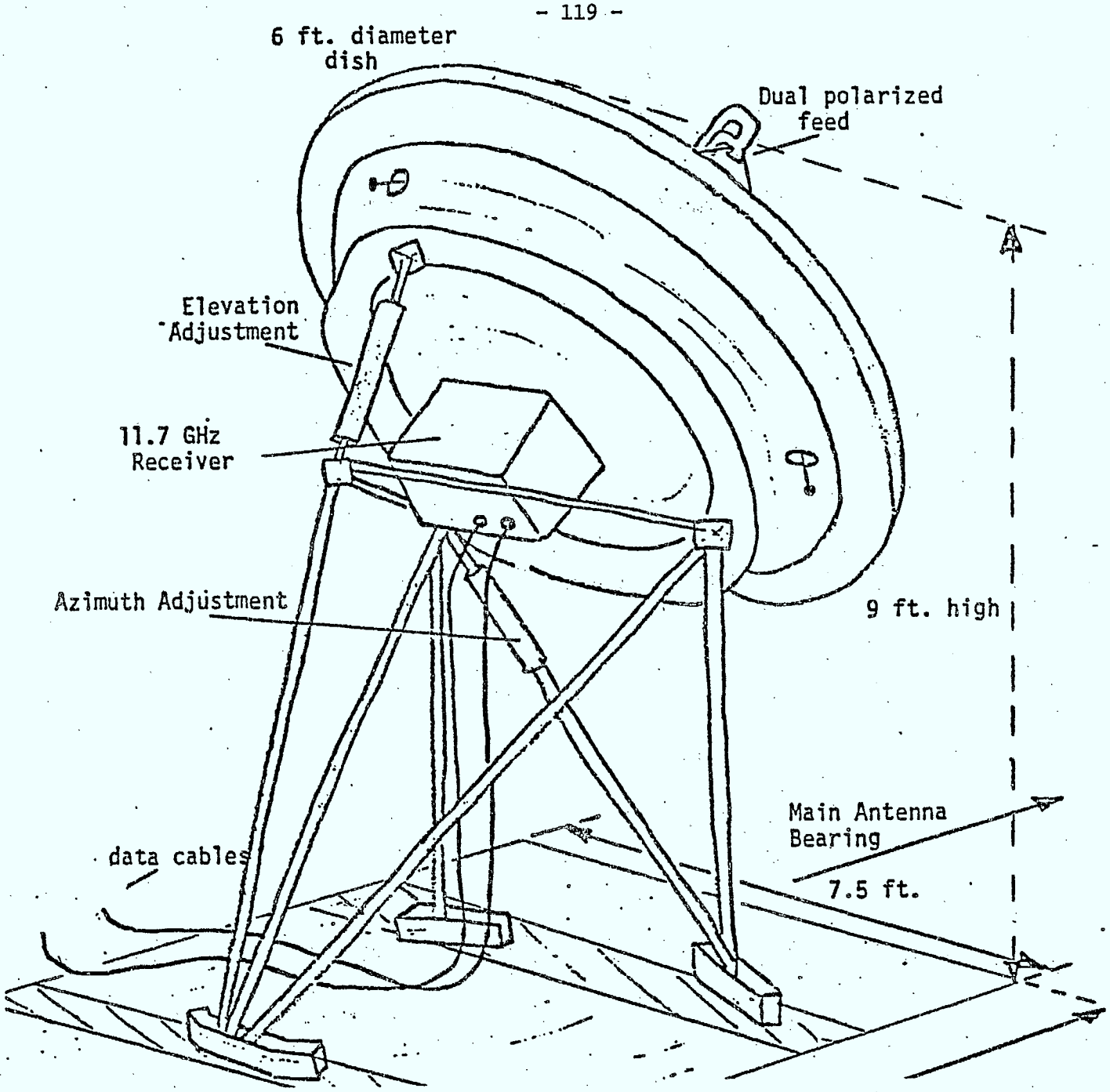
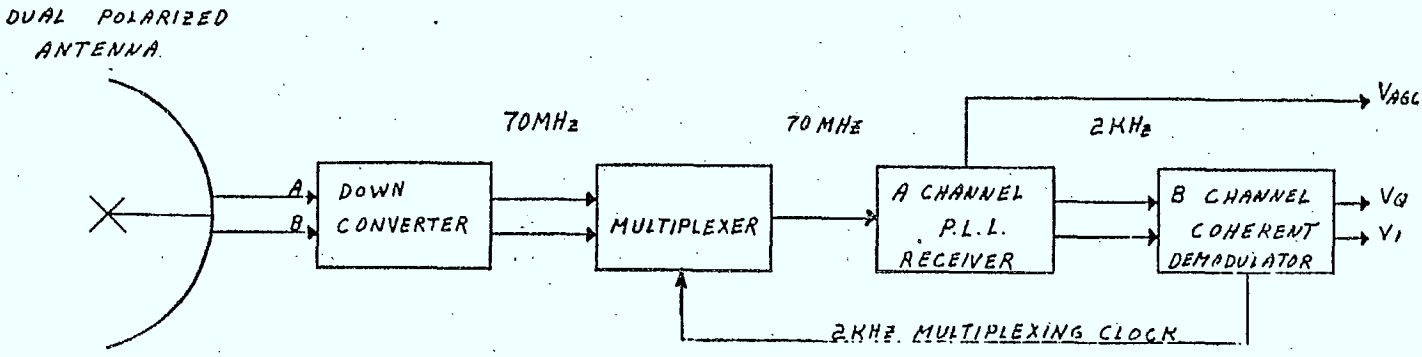
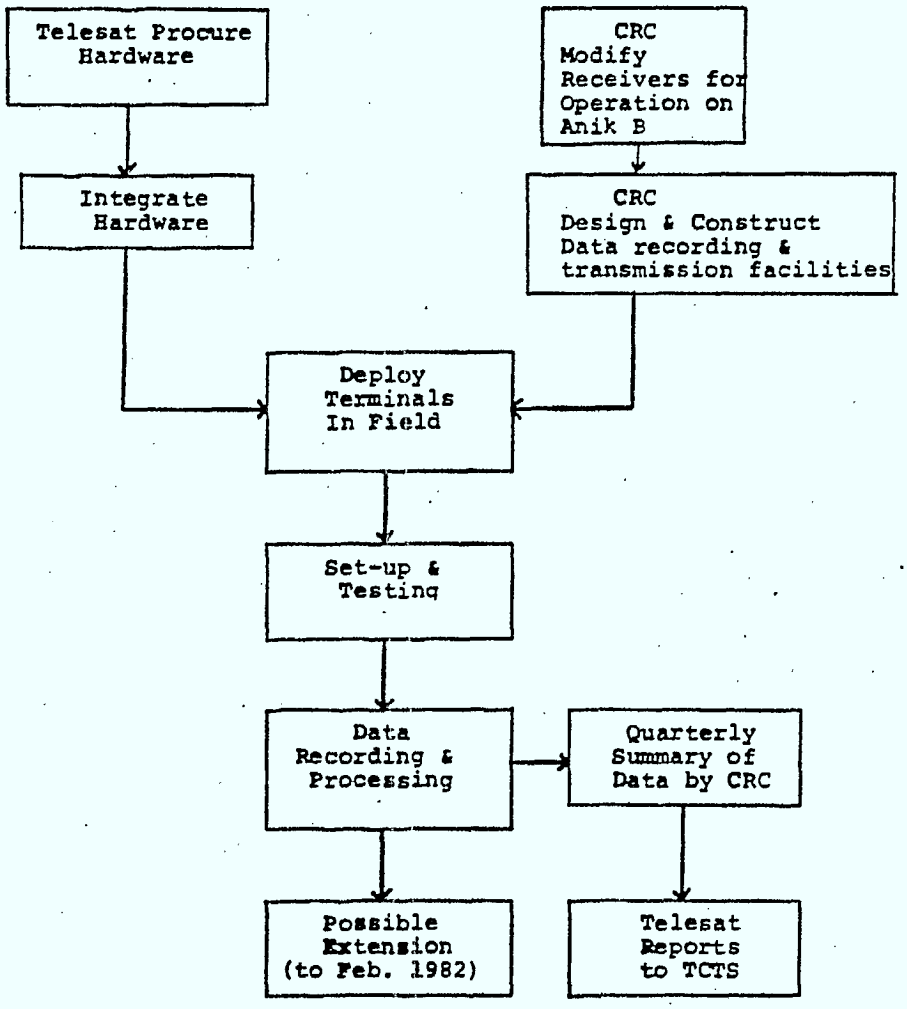


Figure 1 - RF test facilities used for tuning and the dual polarization J-hook feed in the anechoic chamber of David Florida Laboratory, CRC at Shirleys Bay.


6 ft. diameter dish
Dual polarized feed
Elevation Adjustment
11.7 GHz Receiver
Azimuth Adjustment
9 ft. high
Main Antenna Bearing
7.5 ft.
data cables


DUAL POLARIZED ANTENNA
A
B
DOWN CONVERTER
70MHz
MULTIPLEXER
70 MHz
A CHANNEL P.L.L. RECEIVER
2KHz
VAGC
B CHANNEL COHERENT DEMODULATOR
VQ
VI
2KHz MULTIPLEXING CLOCK



Project Organization

SUMMARY AND COMMENT

ON PROGRESS

Panel: Chairman - N.G. Davies, Director
Space Communications Program Office
Department of Communications

Members - D.L. Martin
Consultant in Health Administration
Health and Welfare

H.B. Taylor
Secretary, Northern Communications
Committee
Department of Indian and Northern
Affairs

J. Underhill
Director, Industry
Marketing Division
Telesat Canada

Note: The following is the Department of Communications overview of the panel discussion. A transcript of D.L. Martin's comments is included.

PANEL - SUMMARY AND COMMENTS ON PROGRESS

Chairman - N.G. Davies
Director
Space Communications Program Office

Panel Members - D.L. Martin
Consultant in Health
Administration Health
and Welfare Canada

- H.B. Taylor
Secretary, Northern
Communications Committee
Department of Indian and
Northern Affairs

- J. Underhill
Director, Industry Marketing
Division, Telesat Canada

The Chairman commented on several notable achievements during Phase I of the ANIK-B Communications Program noting particularly the potential demonstrated by the TV broadcasting, instructional TV and phase coherent long baseline interferometer projects. He noted that the goals of the ANIK-B program, in contrast to the experimental Hermes projects, were to explore the viability of new services and that these goals were largely being achieved. Many project groups have accumulated impressive experience in the use of satellite communications and are in a strong position to address a future operational service. Others will require a continued opportunity to explore the need and the best way to provide a service before a decision can be made. A capability to provide an operational service will soon exist with ANIK-C and the challenge will make the transition to a service which can bear the full costs of transponder lease and earth station acquisition.

H. Taylor indicated his Department's interest and satisfaction with progress of the Taqramiut Nipingat Incorporated (TNI) and Inuit Tapirisat of Canada (ITC) pilot projects and particularly the establishment of Inuit production centres in Sugluk, Frobisher Bay and Baker Lake. Mr. Taylor indicated that many factors will have to be examined to determine the operational viability of the satellite pilot projects and it would be premature to do so at this time when the TNI and ITC projects have not yet reached the operational phase.

D.L. Martin reviewed the technical achievements made to date by the ANIK-B satellite projects and outlined the further steps required in the software and organizational structure aspects. He concluded by indicating that new technological services require all these aspects to be operational in order to survive.

J. Underhill briefly described the ANIK-C satellite system noting that each satellite has 16 channels and is designed for a 10 year life. He indicated that, whether the launch is by Shuttle or Delta, ANIK-C1 will most probably be available in late 1982 or early 1983. The rates for use of ANIK-C will depend upon the capacity that is leased and have not yet been firmed up. However a charge of $825K per annum for lease of one-half of one transponder on ANIK-B has been set. Since considerable lead time is required to implement a satellite service, Telesat/TCTS welcomes early inquiries from potential users.

The general discussion which followed included questions primarily related to the ANIK-C system - the launch schedule, capacity, system flexibility, uplink rates and so on. Message traffic will go on ANIK-C1. The date for ANIK-C2 has not been finalized and will depend on the utilization being made of ANIK-C1. ANIK-D1, a 24 channel 6/4 GHz satellite, is scheduled to be launched at approximately the same time as ANIK-C1.

REMARKS MADE TO ANIK B USERS MEETING,
JUNE 5, 1980 BY DAVID L. MARTIN

These remarks will attempt to briefly address the questions of: achievements made to date by the Anik B satellite experiments, work to be done, and further steps to become operational or to make the service marketable, for each of the hardware, software, and organization structure or "orgware" aspects. Thus I will attempt to cover a matrix of nine cells and conclude with one further comment regarding technological services in general.

With regard to hardware, it is obvious that the current achievements include proven satellite hardware in terms of the satellite station and ground stations, and these have been proven to be satisfactory for the pilot phase. However, work still remains to be done on peripheral equipment. We had some problems with facsimile equipment in an experiment we performed in the Baffin Island Zone, which parallels the problems experienced by the Ontario Government Anik B Experiment. Other peripheral equipment similarly needs to be investigated.

In addition, work needs to be done on confidentiality equipment, to come up with a better product than appears to be commercially available. In this regard, I am disappointed that the Department of Communications has not continued with the work that was started by John Day to develop an effective confidentiality system. The third area in terms of work that needs to be done appears to be methods to derive variable bandwidth services. With regard to marketability, from a hardware standpoint, and in terms of what I know of the current costs, I think the only possible consumers would be government consortia, industrial or professional consortia including cable systems, as well as the current common carriers.

With respect to the software, I believe we have reached some understanding of the types of application and program amendments that would be necessary for satellite telecommunications. Conversely, however, I feel that work still needs to be done to develop definitions of indicators for satellite telecommunications as a check list for screening potential users more easily. In addition, with respect to marketability, I believe that a source of advisory or consultative services needs to be developed to support, at reasonable costs, any efforts which are to be sustained by independent potential users to join the satellite system. Otherwise, I am afraid that this may fall by default to the common carriers.

Finally, in the area I believe probably to be the most crucial, "orgware", we have seen the development of effective ad hoc organizations to carry out the experiments. I believe it remains to be seen, however, how well these ad hoc groups could be sustained in a permanent "marriage" relationship. We have also shown the amount of coordination and logistic

support required for telecommunications activities, particularly by satellite. Further work is needed to define organizational arrangements for long-term aggregation. Otherwise, aggregation may again fall by default to the common carriers, who aggregate users in any event.

More work needs to be done to develop a definitive cost-benefit analysis technique to assist potential users to accurately measure their cost-benefit expectations. Most important, I feel that further work needs to be done to define who is the potential future customer and how can he be brought "on line" and serviced. Thus further research is needed into the organizational arrangements which are needed to bridge the gap between the satellite owners and potential users. Otherwise, these may revert by default to the common carriers.

Finally, I am concerned about the future of this technology as it relates to potential other technologies in development stages. How many of you remember quadraphonic sound, television games, and even the more recent microchip games. Many of these have gone the way of the hula hoop. In fact, the final tombstone was laid over quadraphonic sound last week. I am particularly concerned about the definitions of potential consumers. I can envisaged a salesmen for a Telidon type satellite based communications technology in one of the three following situations:

1) Approaching the housewife who has otherwise nothing to look at but four walls and listen to three screaming kids, indicating to her that with the magic box she no longer needs to go out to the store, to the library, to the school, but can do all of her shopping, deal with all of her kids' school problems, and even do all of her voluntary work within the four walls of her home!

2) Approach the junior manager who makes two to three trips a year, which form the highlight of his year's activities, and indicating to him that he no longer needs to make that trip to Vancouver, but can take part in the same meeting simply by staying in his own office!

3) Approaching the isolated nurse in the north (such as in Baffin Island) who lives in an extremely vigorous environment and in a community with a different cultural milieu and the enmity and suspicions that engenders, and indicating to her that she no longer needs to come south for consultation, education or logistic support, but can stay right there in Baffin Island indefinitely!

If he concludes his spiel by asking where he could stick this little black box, no doubt they will tell him! Technologies tend to develop rapidly and overtake one another so that what appears to be today's new, sexy, "better mousetrap", becomes tomorrow's "hula hoop". Without a definitive analysis of the consumer, and of the "orgware" necessary to bring him into the system and maintain him there, we may very well be designing more technological "hula hoops".

David L. Martin/gc
June 9/80

FUTURE DOC ACTIVITIES

Panel: Chairman - R.W. Breithaupt
Director
Communications Satellite Program

Members - N.G. Davies, Director
Space Communications Program Office

J.D. Palmer
ANIK-B Program Manager

E.D. Rainboth
Director
Extension of Services Policy Division

Note: The following is the Department of Communications overview of the panel's discussion. A hardcopy of J.D. Palmer's viewgraphs is included.

PANEL - FUTURE DOC ACTIVITIES

Chairman - R.W. Breithaupt
Director,
Communications Satellite Program

Panel Members - N.G. Davies
Director
Space Communications Program Office

- J.D. Palmer
ANIK-B Program Manager

- E.D. Rainboth
Director
Extension of Services Policy Division

The chairman opened by indicating that the purpose of this Panel Session and subsequent discussion was for DOC to identify and discuss its objectives and plans for a subsequent phase of the DOC ANIK-B communications program activity, beyond the present termination date in February 1981. He noted several important constraints relating to extended activity, including: the necessity of government approval for a lease extension for satellite service; the availability of current and modified terminal types; the availability of DOC engineering support; limitations imposed by the DOC mandate and objectives; and the limited spacecraft capacity in terms of power and/or bandwidth.

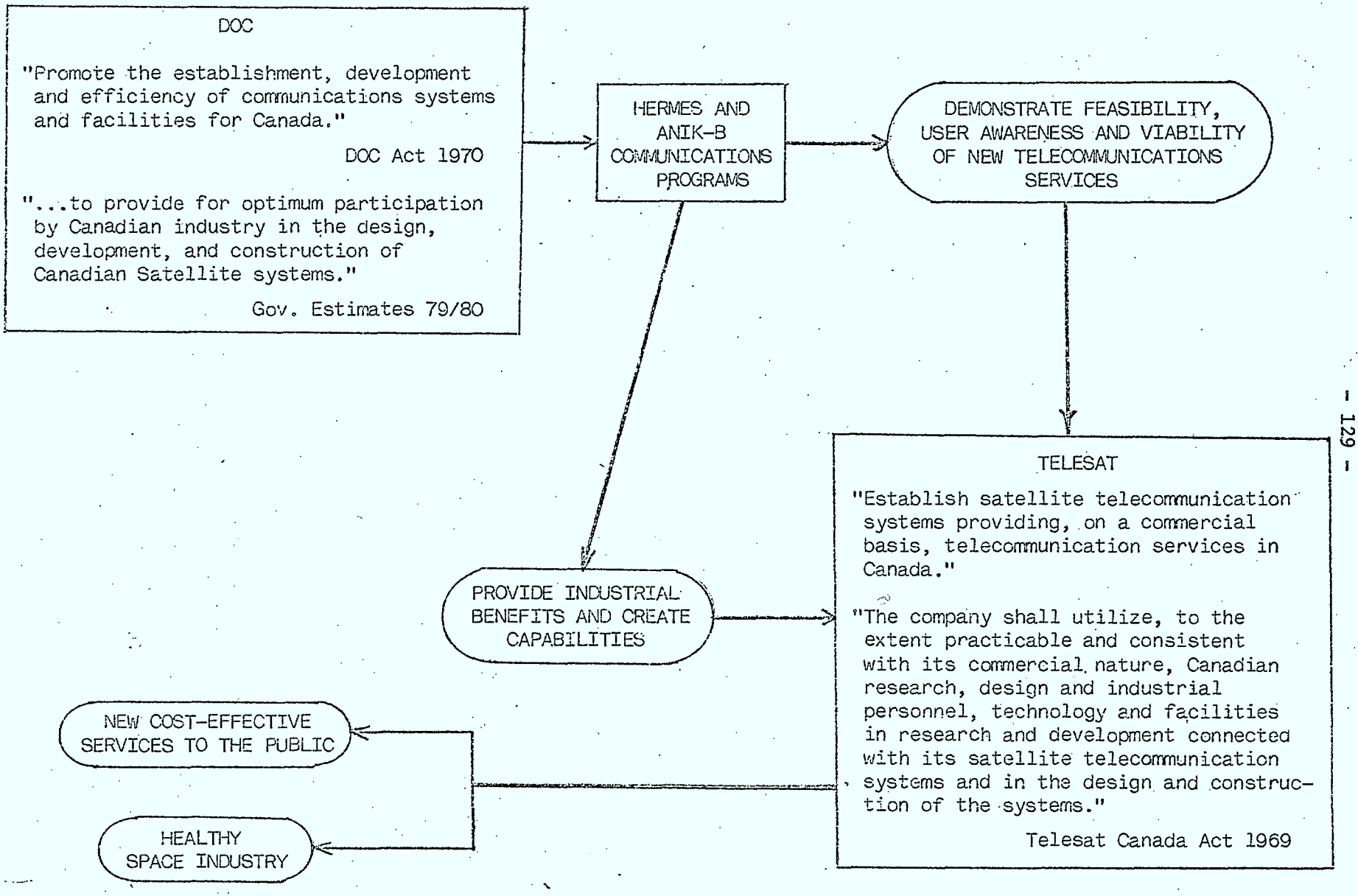
Mr. Palmer then provided specific information on DOC plans for an extended program; this presentation is attached. (9 viewgraphs).

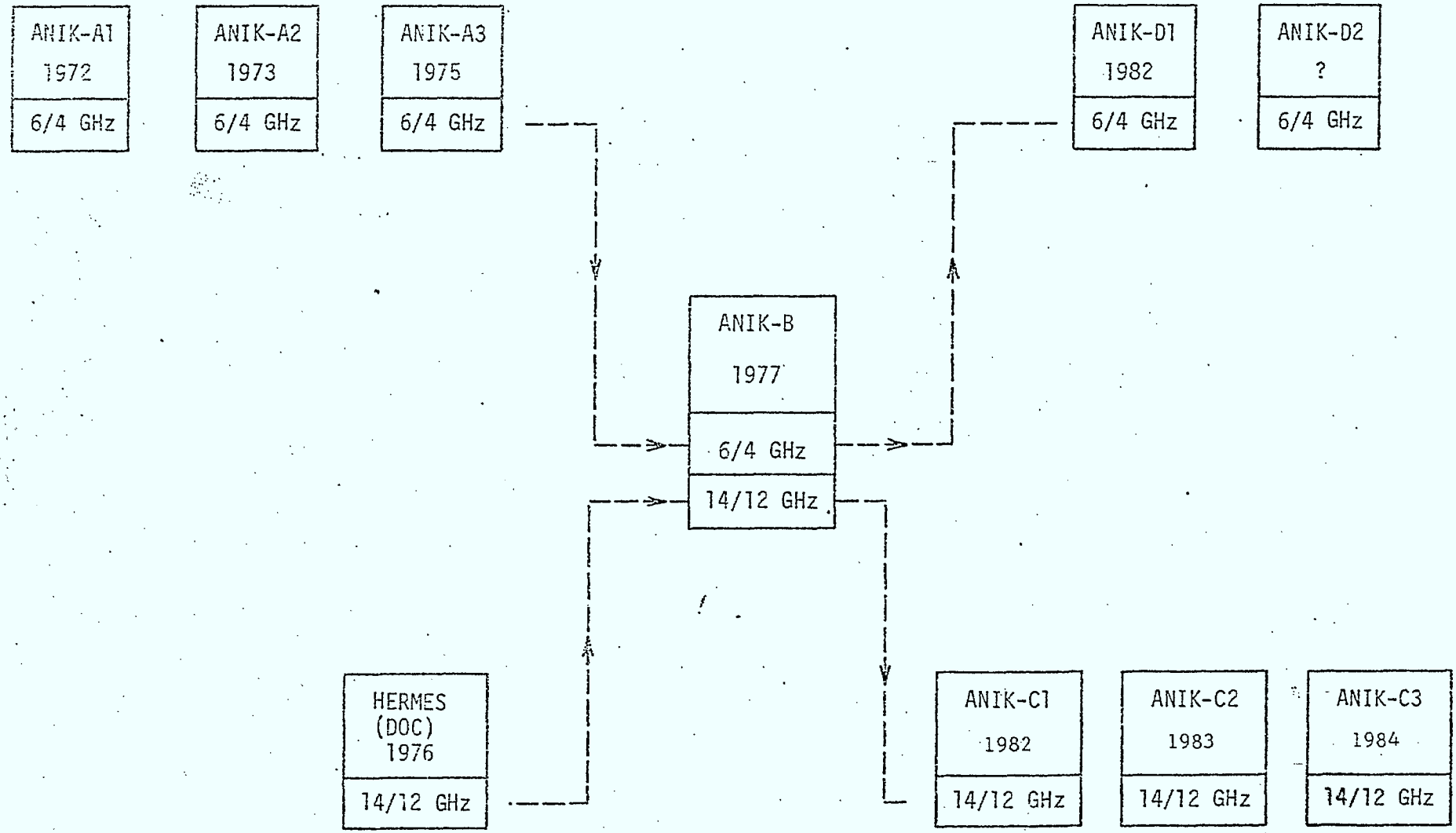
In the short time remaining for open discussion Mr. Brousson of BCIT emphasized the undesirably short lead time existing for experimenters to prepare for post-February 81 activity, however he also stressed the importance of such a follow-on to maintain existing momentum and to consolidate the achievements to date. Further discussion involved a prediction of what improvements to small ground terminals could be expected over the next three years. Mr. G. Davies mentioned the introduction of small two-way solid state telephony or data terminals very soon, as well as improvements in antenna efficiency and receiver noise figure in existing receive-only terminals. The possibility of multiplexing several TV signals into a single TV video channel was mentioned, as well as plans to carry several radio channels with TV for receive-only terminals.

PHILOSOPHY OF DOC 14/12 GHZ COMMUNICATIONS SATELLITE PROGRAMS

* OPPORTUNITY FOR HIGH POWER BROADCAST
* EXPLORATION OF NEW TECHNOLOGY AND RESULTING NEW SERVICE OPPORTUNITIES IN 14/12 GHZ FREQUENCY BAND
* INITIAL TECHNICAL FEASIBILITY EXPERIMENTS LEADING THROUGH EXTENDED PILOT PROJECTS AND TRIALS TO COMMERCIAL SERVICES
* STIMULATION OF USER AWARENESS;VIABILITY DETERMINATION;INPUT TO POLICY DEVELOPMENT;AND INSTITUTIONAL ARRANGEMENTS
* DEVELOPMENT OF CANADIAN SPACE INDUSTRY (SATELLITES AND GROUND STATIONS)

COMPLEMENTARY ROLES OF DOC AND TELESAT IN COMMUNICATIONS PROGRAMS





CANADIAN COMMUNICATIONS SATELLITES

ANIK-B COMMUNICATIONS PROGRAM

PHASE I OBJECTIVES

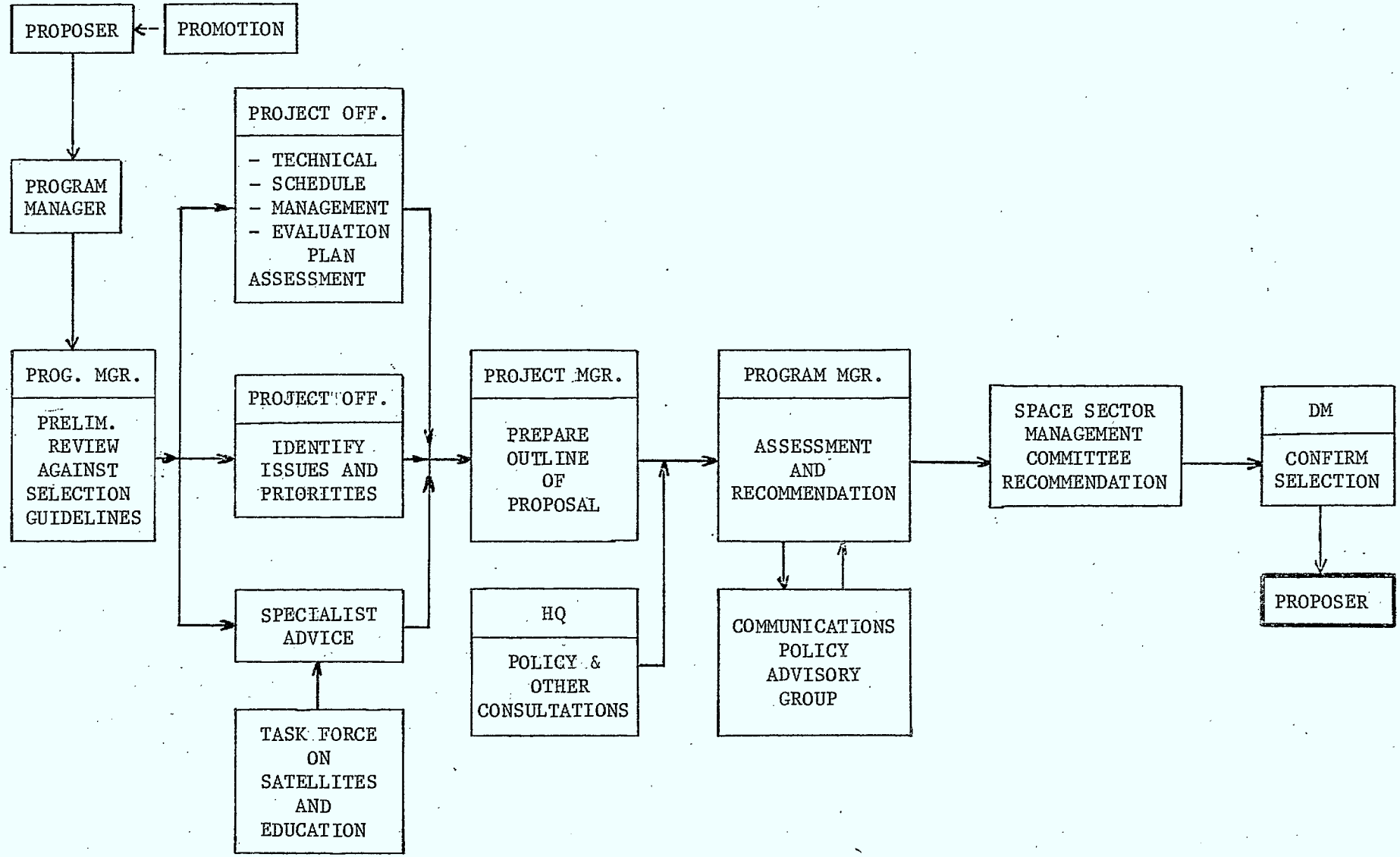
1. To determine the viability, on a pre-operational but continuing basis, of telecommunications services designed to meet identified requirements;

2. To develop the knowledge and expertise to better utilize 14/12 GHz satellite communications technology; and

3. To develop expertise and create awareness in user institutions of the potential of telecommunications to deliver new services.

ANIK-B STATUS

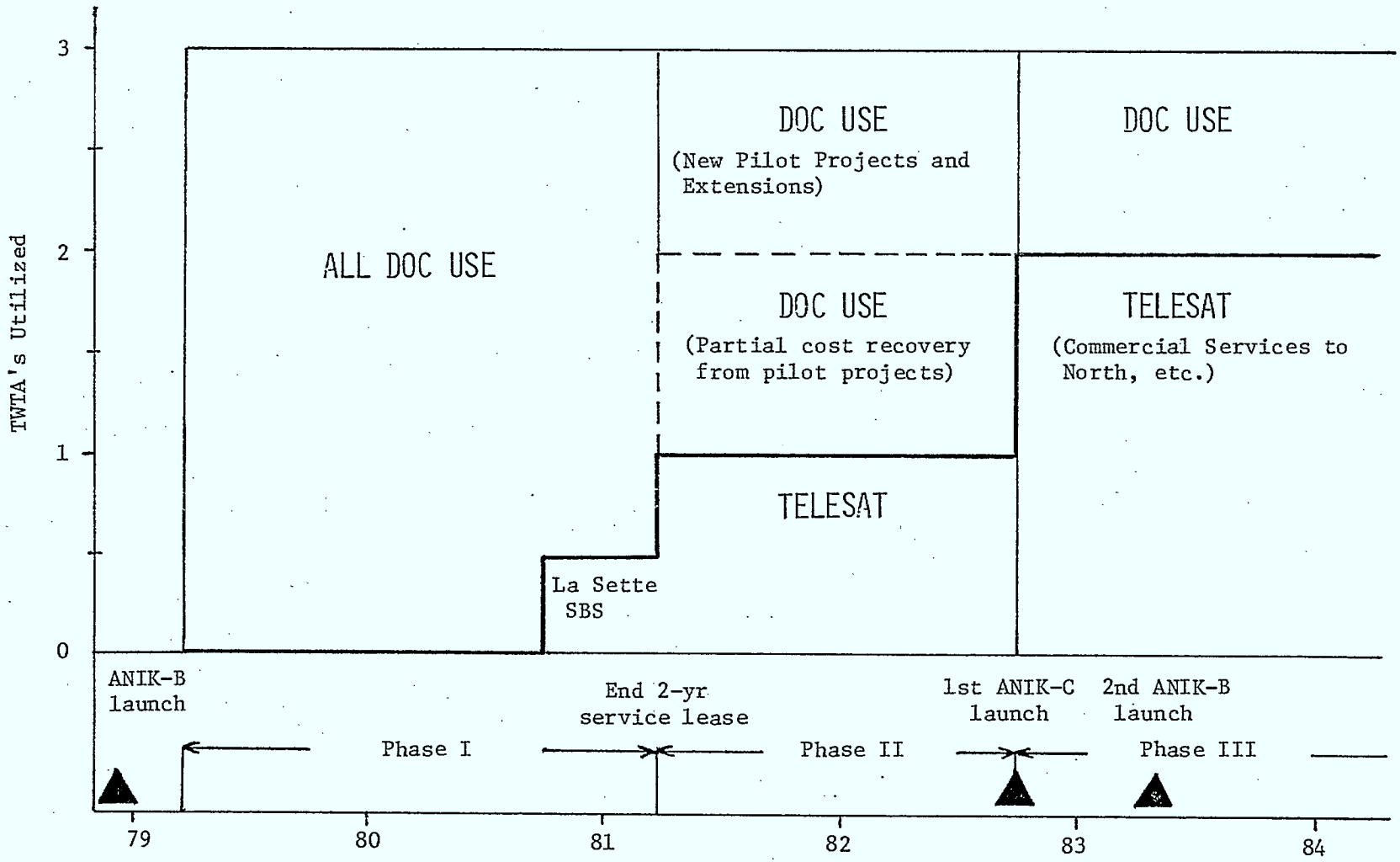
17 DECEMBER 1978	SATELLITE LAUNCH
12 FEBRUARY 1979	START OF 14/12 GHZ SERVICE
17 FEBRUARY 1981	END OF INITIAL 2-YEAR CONTRACT FOR 14/12 GHZ SERVICE TO DOC (PHASE I)
17 SEPTEMBER 1982	END OF 19-MONTH EXTENSION (PHASE II) ANIK-C AVAILABILITY
17 FEBRUARY 1984	END OF OPTIONAL 3-YEAR EXTENSION OF LEASE TO DOC



ANIK-B PHASE II

SELECTION PROCEDURE

(proposed)



PROPOSED PHASING OF ANIK-B USE

PROPOSED PHASE II OBJECTIVES

1. TO SUPPORT EXPERIMENTS, PILOT PROJECTS AND TRIALS TO FURTHER DEVELOP AWARENESS, KNOWLEDGE AND EXPERTISE, PROMOTE INTRODUCTION OF NEW SERVICES ON COMMERCIAL SATELLITE SYSTEMS AND EXPLORE MEANS TO CONSOLIDATE AND AGGREGATE USER NEEDS;

2. TO ENCOURAGE CANADIAN USER INSTITUTIONS, INDUSTRY AND THE CARRIERS TO ADVANCE CANADIAN CAPABILITIES IN SATELLITE COMMUNICATIONS TECHNOLOGY AND SERVICE DELIVERY, TO RESPOND TO NATIONAL NEEDS AND INTERNATIONAL MARKET OPPORTUNITIES;

3. TO ENSURE CONTINUITY FOR SERVICE DEVELOPMENT TRIALS, TO PROVIDE A VEHICLE TO BRIDGE THE SERVICE GAP BEFORE ANIK-C BECOMES AVAILABLE (WHERE APPROPRIATE THROUGH INTERIM COMMERCIAL SERVICE ON A LEASE-BACK BASIS) TO THOSE USERS ALREADY COMMITTED TO ANIK-C OPERATIONS;

4. TO PROVIDE DATA FOR TELECOMMUNICATIONS POLICY AND SERVICE DEVELOPMENT THROUGH EVALUATION OF THE RESULTS OF THE EXPERIMENTS, PILOT PROJECTS AND TRIALS.

PROPOSED SELECTION GUIDELINES FOR PHASE II

A) THE DEGREE TO WHICH THE PROJECT SATISFIES ONE OR MORE OF THE PROGRAM GOALS;

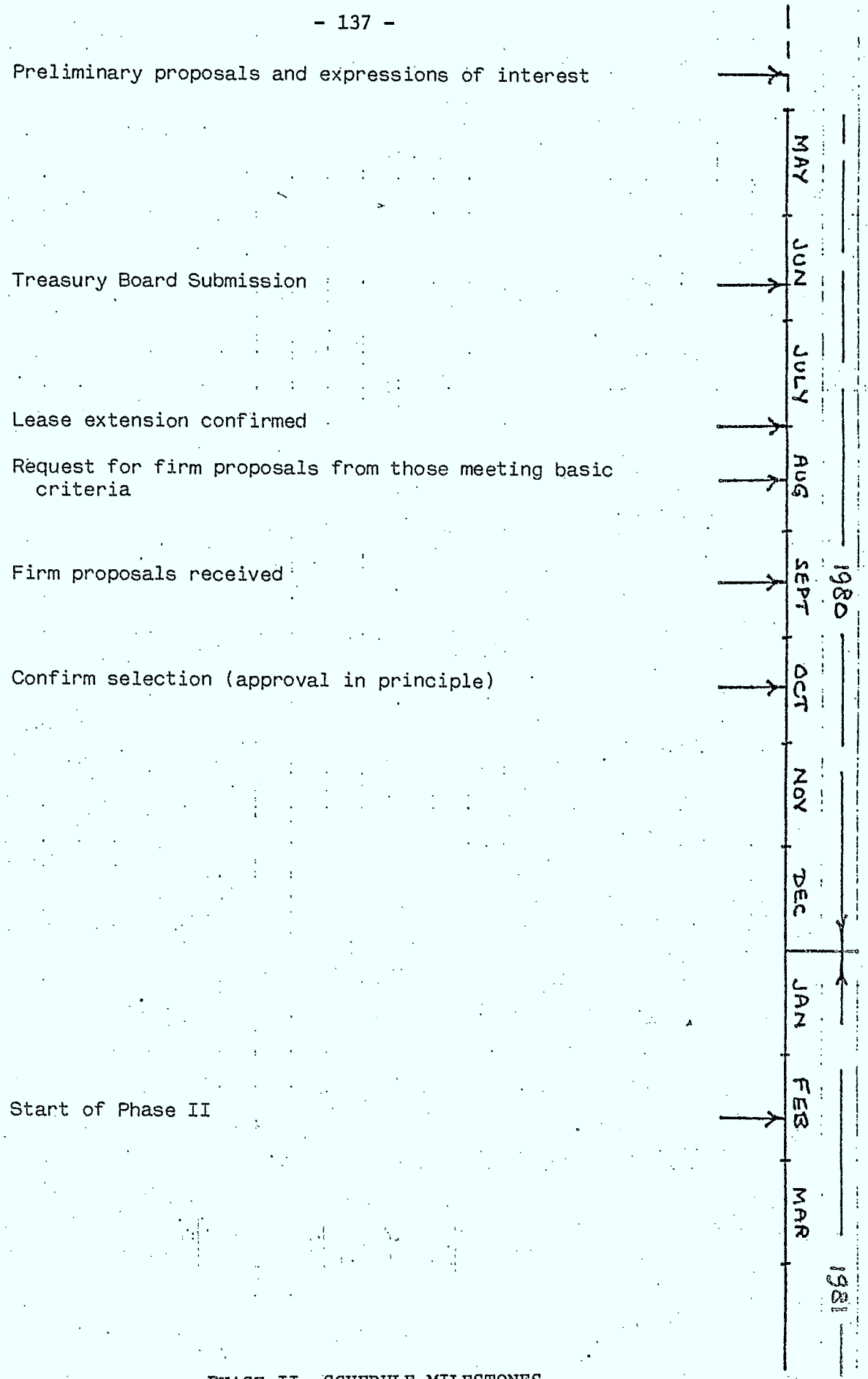
B) THE DEGREE TO WHICH THE PILOT PROJECT IS LIKELY TO MAKE THE TRANSITION TO A NEW OR IMPROVED OPERATIONAL SERVICE;

C) THE OPERATIONAL MANDATE OF THE PROPOSING ORGANIZATION(S) AND THE DEGREE OF COMMITMENT APPARENT IN THE PROPOSAL;

D) THE EXTENT TO WHICH OPERATIONAL AND TECHNICAL FEASIBILITY HAVE BEEN PREVIOUSLY DEMONSTRATED;

E) THE INTEGRITY OF THE PROPOSAL WITH RESPECT TO ITS TECHNICAL PLAN, MANAGEMENT PLAN, EVALUATION PLAN, AND RESOURCES PLAN (HUMAN, FINANCIAL AND FACILITIES); AND

F) FEASIBILITY OF INCORPORATING THE PILOT PROJECT INTO THE OPERATING SCHEDULE OF THE SATELLITE.



PHASE II SCHEDULE MILESTONES

ANIK-B USERS MEETING ATTENDEES AND DISTRIBUTION LIST

* Attendees at the ANIK-B Users Meeting

ORGANIZATION AND REPRESENTATIVES	ADDRESSES
Provincial/Territorial Government Departments and Agencies	
Atlantic Consultative Committee on Communications	
Council of Maritime Premiers F.M. Waller	Council of Maritime Premiers Box 2044 Halifax, Nova Scotia B3J 2Z1
Alberta	
Alberta Educational Communications Authority (AECA) * H.G. Kratz	Alberta Educational Communications Authority 11160 Jasper Avenue Edmonton, Alberta T5K 0L2
Alberta Educational Communications Corporation (ACCESS) * L.J. Shorter * I.R. James L. Mann	ACCESS Alberta 16930-144 Avenue Edmonton, Alberta T5M 3S2
Ministry of Utilities and Telephones Government of Alberta G. Haas	Ministry of Utilities & Telephones Government of Alberta Petroleum Plaza, Room 415 9945 - 108 Street Edmonton, Alberta T5K 2G6
British Columbia	
Ministry of Universities, Science and Communications W.G. Hardwick T. Prentice * E. Byrnes	Ministry of Universities Science and Communications Parliament Buildings Victoria, British Columbia V8V 1X4
British Columbia Institute of Technology (BCIT) * D.M. Brousson * W. Robertson * R. Nason	British Columbia Institute of Technology 3700 Willington Avenue Burnaby, British Columbia V5G 3H2

Manitoba

Department of Consumer and Corporate Affairs Government of Manitoba D. Smith	Department of Consumer and Corporate Affairs Government of Manitoba 440 Broadway Avenue Winnipeg, Manitoba R3C 0V8

Newfoundland

Department of Transportation and Communications Government of Newfoundland T.D. Grandy	Department of Transportation and Communications Government of Newfoundland Confederational Building Prince Philip Drive St. John's, Newfoundland A1C 5T7
Department of Education C. McCormick	Department of Education Confederational Building St. John's, Newfoundland A1C 5R9

Nova Scotia

Office of the Minister Responsible for Communications Policy Government of Nova Scotia D. Colville * J. Vance	Office of the Minister Responsible for Communications Policy Government of Nova Scotia P.O. Box 701 Halifax, Nova Scotia B3J 2T3

New Brunswick

Department of Transportation Government of New Brunswick D. MacIntosh W. Steeves	Department of Transportation Government of New Brunswick P.O. Box 6000 Fredericton, New Brunswick E3B 5H1

Ontario

Ministry of Transportation and Communications Government of Ontario H.F. Gilbert * R.P. Bulger * B. Gordon	Ministry of Transportation and Communications Government of Ontario 1201 Wilson Avenue(East Bldg.) Downsview, Ontario M3M 1J8

Ontario

Ministry of Culture and Recreation W.J. Lane	Ontario Ministry of Culture and Recreation 77 Bloor Street, West 7th Floor Toronto, Ontario M7A 2R9
Ministry of Government Services * W. Robertson * G. Chung-Yan * N. Biswas	Telecommunications Services Branch Ontario Ministry of Government Services 5th Floor, 22 College Street Toronto, Ontario M7A 1K3
Ministry of Health W. Copeman	Ministry of Health 15 Overlea Blvd., Room 633, Toronto, Ontario M4H 1A9
Ministry of Northern Affairs * E. Robertson	Ontario Ministry of Northern Affairs 10 Wellesley Street, East 9th Floor Toronto, Ontario M4Y 1G2
Ontario Educational Communications Authority (OECA) * P. Bowers * M. Cioni * A. MacGregor	Ontario Educational Communications Authority P.O. Box 200, Station "Q" Toronto, Ontario M4T 2C1

Prince Edward Island

Department of Industry and Commerce Government of Prince Edward Island J. Kane	Department of Industry and Commerce Government of Prince Edward Island P.O. Box 2000 Charlottetown Prince Edward Island C1A 7N8

Quebec

Ministry of Communications * L. Leclerc * H. Dupond * T. Cung Trong * D. Doucet	Ministère des Communications 580 Grande Alleé, est Québec,(Québec) G1H 1G5

Quebec

Ministry of Education M. Tremblay * S. Carle L. Belzile	Service général des Moyens d'enseignement Ministere de l'education du Québec 600, rue Fullum, 4e étage Montréal, Québec H2K 4L1

Saskatchewan

Office of the Minister Responsible for Communications Policy Government of Saskatchewan R. Simpson	Communications Secretariat Office of the Minister Responsible for Communications Policy Government of Saskatchewan Room 330, Administration Bldg. 3085 Albert Street Regina, Saskatchewan S4S 0B1

Yukon Territory

Department of Municipal Affairs L. Imrie	Department of Minicipal Affairs Yukon Territorial Government Whitehorse,Yukon X0E 1H0

Northwest Territories

Information Services A. Sorenson	Information Services Northwest Territorial Government Yellowknife, Northwest Territories X0E 1H0

Advisory Group on ANIK-B Provincial Projects (established by the Federal-Provincial Task Force on Satellites and Education)

Provincial Representatives

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--Summary record of the ANIK-B Users Meeting, Ottawa, Ontario, ...