EVALUATION OF THE ANIK B COMMUNICATIONS PROGRAM: PHASE ONE

VOLUME I
SUMMARY OF FINDINGS AND CONCLUSIONS

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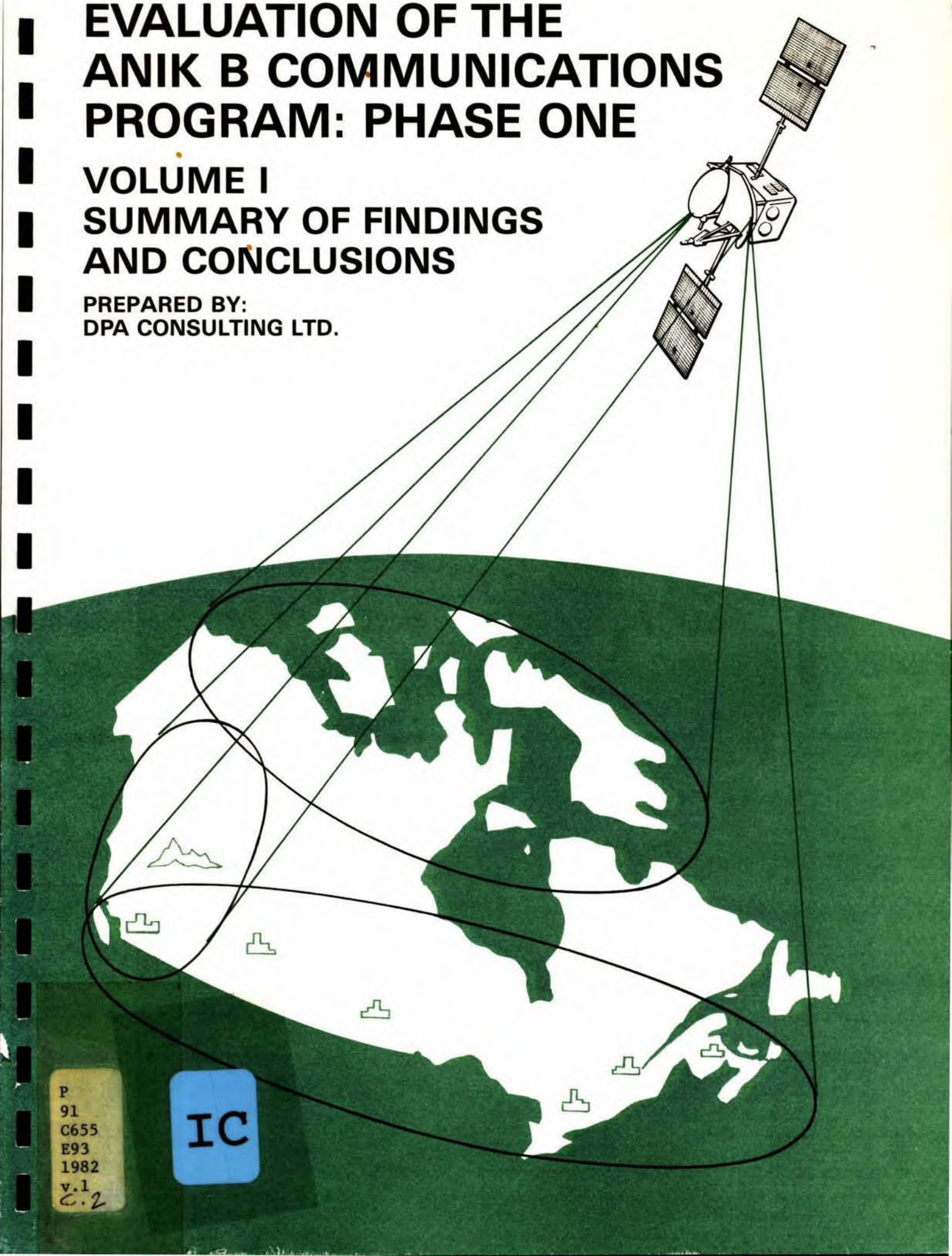

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Volume 1
Summary of Findings
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August 1982

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VOLUME 1: SUMMARY OF FINDINGS AND CONCLUSIONS

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PART A INTRODUCTION

A.1 BACKGROUND

This is the final report on the evaluation of Phase One of the Anik-B Communications Program which is delivered by the Space Sector of the Federal Department of Communications (DOC). The report is issued in two Volumes: Volume 1 is a summary of the findings and conclusions of the evaluation, while volume 2 presents the detailed findings.

The evaluation began in January 1980, under DSS contract serial No.: OSV79-00063, file No.: 12SV.36100-9-0951. The client for the study is the Assistant Deputy Minister (Space) of the DOC. The study began with an abbreviated evaluation assessment, and a milestone report was issued in May 1980 in which recommendations were made on the focus of the subsequent evaluation and the type of evaluation research to be conducted.

The approach adopted was then tested on the major pilot project of the Program, the Program Delivery Pilot Project (PDPP). An interim evaluation report on the PDPP was issued in February 1981.

A.2 AN OVERVIEW OF THE ANIK-B COMMUNICATIONS PROGRAM (PHASE ONE)

A detailed profile and model of Phase One of the Anik-B Communications Program were prepared as part of the original evaluation assessment submitted to the client in May 1980. We repeat here only the major features of the Program design.

The Anik-B communications satellite was a hybrid system, operating in both the 6/4 GHz and the 14/12 GHz ranges. The entire 14/12 GHz capacity was leased to DOC by TELESAT for the purpose of conducting experiments and field trials. The Phase One activities, which are the subject of this evaluation, began in April 1979 and continued until February 1981. A subsequent Phase Two set of projects and trials ran from March 1981 to September 1982.

The "Communications Program" refers to that part of the overall ANIK-B

Program as authorized by Cabinet in 1975, that is concerned with utilizing the leased 14/12 GHz capacity to conduct pilot projects in order to develop new communications services and industries using that frequency range.

The remaining parts of the overall ANIK-B Program delivered by DOC are concerned with broader issues, including the need to co-ordinate spacecraft procurement so as to establish a viable spacecraft manufacturing industry in Canada, and to establish a prime contractor for Canadian spacecraft.

This evaluation is concerned solely with the Communications Program part of the overall Program. Studies conducted on space prime contractors by officials of MOSST and IT&C present another perspective on the Program.

The four goals of the Communications Program (Phase One) are as follows:

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

- to develop the knowledge and expertise to better utilize 14/12 GHz satellite communication technology;

- to develop and create awareness in user institutions of the potential of telecommunications to deliver new services; and,

- to contribute to policy issues.

The above four goals are not end products in themselves, but rather are envisaged by DOC management as contributing to an overall Space Sector goal of:

> "orderly growth and establishment of a viable Canadian commercial satellite telecommunications systems, services and industry."

The Anik-B Communications Program was aimed particularly at developing 14/12 GHz satellite telecommunications systems, services and industry.

In the evaluation assessment, two main sets of activities were identified for the Commmunications Program: those activities aimed directly at creating and defining new markets for 14/12 GHz services, and those activities aimed at stimulating the development of an industrial and manufacturing base to service the above markets as they developed and were proven to be commercially viable by the carriers.

Within the first set of activities, aimed at creating new markets five sub-activities were identified: pilot projects, demonstrations, systems tests, promotional activities, and lease-back in which part of the 14/12 GHz capacity was leased back to TELESAT so that interim commercial services could be provided immediately to users. This evaluation addresses only the first four sub-activities. The lease-back activity was excluded.

The consultant team has evaluated the first set of activities, i.e. those aimed at defining and developing markets for the 14/12 GHz technology. DOC Space Sector management established a separate DOC team to evaluate a part of the second set of activities, i.e. those aimed at creating the necessary ground terminal manufacturing and industrial base. The report of the DOC study is to be issued at a later date.

A.3 FORMAT OF THIS REPORT

Volume I of this report consists of 3 parts. Part A, the Introduction, presents important background information on both the Phase One Anik-B Communications Program and the particular program evaluation.

In Part A.4, six key features of the evaluation approach are

described. They are critical to understanding the ways in which the results of this evaluation can, and cannot, be used.

In Part B, we present a summary of the goal achievements and other effects of the various activities of the Program. The bulk of the evaluation work went into an examination of the pilot project activity, as it was the most resource-consuming activity of the Communications Program.

Part C then contains an assessment of the extent to which the achievements and effects listed in Part B have contributed to the overall end-state of the Program; i.e. the "orderly growth and establishment of a viable Canadian commercial telecommunications system and industry". (See A.4.2.5)

A.4 KEY FEATURES OF THE PROGRAM AND THIS EVALUATION

Several features of both the Anik-B Communications Program and the particular perspective of this evaluation must be appreciated when reading this report.

A.4.1 The Program

4.1.1 The Environment

The Program is operating in a very complex and changing environment. It is at one of the current forefronts of both technological and sociological change: communications. The host of inter-related issues such as the explosive growth of demand for a wide variety of traditional and new telecommunication services, the rapid pace of technological change and innovation, the growth of the "wired" home and city, the complex regulatory environment for communications in Canada, all combine to produce a very dynamic and unpredictable situation in which cause and effect are often difficult to disentangle. Furthermore, in the highly-regulated communications environment of Canada, the time between cause and effect can be quite long. Closeness to the

U.S. is an additional complicating factor. Being less regulated, the time to introduce changes into the U.S. market is often shorter than it is in Canada. This can exert considerable pressures on the Canadian scene.

4.1.2 Phase One as Part of a Process

This study was aimed at evaluating Phase One of the Anik-B Communications Program. However, it is important to appreciate that Phase One is but one step in a DOC process of defining and creating a market for satellite communications services in the 14/12 GHz band and the appropriate supporting systems.

The process began with the DOC HERMES communications satellite, and its associated field trials and projects. Many of the experimenters and sponsors who used that facility are also taking part in the Phase One activities. Separating out the effects of the Phase One activity can be difficult. This will be seen particularly in the case of one pilot project for which it was important to isolate the incremental effects of the Phase One activity from the overall effects of the DOC sequence of Programs.

Looking forward in time, a similar situation arises. Many of the sponsors and experimenters have continued into Phase Two of the Program. The focus of this report is on the status of their work as of the termination of the Phase One project. Whenever possible, however, we support our analysis by referring to events that may have occurred since the end of Phase One.

4.1.3 The Program's Goals

The goals of the Program specify the intended ways in which the Program is to affect its environment. Departmental officials responded to the complex environment by preparing Phase One goals that provided for the Program to make "inputs" to the communications environment. (See Phase One goals listed in A.2

above). That is, the Program was intended to stir up the general communications pot, but the specific direction of the stirring was not stated in a detailed, normative sense. For example: there is nothing in the goal statements to indicate whether a "yes" viability decision is preferable to a "no" decision, and yet the real intent of the Communications Program is to develop the 14/12 GHz market and delivery systems.

Furthermore, the Program's goals have changed over time. The current Phase Two of the Program has goals which are more specific than those for Phase One, based, in part, on experience gained in Phase One.

A.4.2 The Program Evaluation

The above features of the Program have influenced directly the nature of the evaluation that has been carried out. There are six key features of this program evaluation.

4.2.1 Focus of the Evaluation

The focus of the evaluation is on "goal achievements", i.e. on the identification of viability assessments, increases in technical knowledge and awareness, and contributions to policy issues that can be attributed to the intervention of the DOC-sponsored activities. Other third party and unintended, but possibly important, effects are also described, but the focus is on formal goal achievements. Thus, the evaluation is designed to answer the questions:

- "Did Phase One of the Anik-B Program achieve its formal goals?" and,

- "Were there other important, but unintended or unanticipated Program results?"

The Phase One evaluation is not designed to answer questions such as: "As a model of government intervention to achieve industrial and communications goals, how does ANIK-B compare with the alternatives?", or "What was the opportunity cost of particular pilot projects or forms of program activities?", or "What would the results have been under different levels of Program funding?" These very important questions may be addressed in the Phase Two evaluation.

4.2.2 Goal Achievements

In this evaluation, an event or achievement must pass two tests to be called a "goal achievement."

Firstly, the event or achievement must be reasonably demonstrable. For example, the claim that a viability decision was made should be backed up by evidence of serious discussion with suppliers or agencies and, in some cases, actual budget proposals to funders for the use of the 14/12 GHz communications technology.

Secondly, the event must be attributable to the intervention of the DOC program. The central question here is: "Did the DOC-sponsored activity cause the goal achievement, or was it due to other factors?" The nature of the goals, coupled with the complex environment within which the Program is operating, dictate that considerable judgement be exercised in deciding whether or not an effect was "caused" by the Program intervention. When such judgements are made, we identify them clearly.

4.2.3 Hierarchy of Goals

An examination of the background to the Program and its evolution make it evident that there is a hierarchy among the goals. In particular, the recording of "viability decisions" (i.e. achievements for goal #1) is especially important to the goal of

creating markets for 14/12 GHz satellite-based telecommunications. Thus, we have attached priority to determining those viability assessment and decisions that could legitimately be attributed (See 4.2.2 above) to the intervention of the Program.

4.2.4 Achievements for all Goals

The Program goals are very general. It would be the rare activity that could not demonstrate achievements for at least the "technical knowledge" and "awareness" goals. Indeed, all of the activities examined in this study will show achievements under these two goals. Care must be exercised in interpreting these results, as this evaluation does not examine the opportunity cost of projects or activities, i.e. goal achievements that might have resulted if the DOC resources had been used in other market sectors or other forms of activities.

4.2.5 An "End State" for the Program

DOC officials and the evaluation consultants agreed that the very general Phase One goals did not reflect accurately the true intent of the Program. It was decided that the identified goal achievements should be assessed in terms of their contribution to an "end state" that represented the link between the individual goal achievements and the overall DOC mandate for space and telecommunications. After considerable discussion, DOC Space management presented the following description of this end state:

> "the orderly growth and establishment of a viable Canadian commercial telecommunicatons system, services and industry."

Thus, in the final part of this evaluation report we present a brief assessment of extent to which the identified Program achievements have contribued to this end state, with particular emphasis on a 14/12 GHz satellite-based system and industry.

Three specific indicators of success of the Program in achieving this end-state are examined:

- the commercial viability of the ANIK-C (14/12 GHz) satellites;

- the existence of a Canadian commercial manufacturing capability for the 14/12 GHz LCET's and related systems and equipment, capable of producing for large markets and with a proven record of sales; and

- a group of Canadian organizations using both of the above services on a commercial basis.

4.2.6 The Evaluation As a Snapshot

The results of this evaluation present a "snapshot" of the status quo at a certain point in time. However, the environment within which this Program is operating is changing very rapidly. New CRTC decisions on marketing practices, technical innovations, spreading interest in telecommunications, all combine and exert powerful change forces.

Some changes can come about very quickly, and it must be appreciated that the results reported here may well have altered since the date of publication.

PART B: FINDINGS ON GOAL ACHIEVEMENTS AND OTHER EFFECTS

We summarize below the Phase One goal achievements and other effects of the Program that are likely to constitute the most important contributions to the desired end-state, i.e. a viable Canadian commercial satellite telecommunications system, services and industry. Section and page references are to the Volume 2 report.

B.1 PILOT PROJECT ACTIVITY

B.1.1 VIABILITY DECISIONS MADE AND PURSUED

B.1.1.1 In Favour of 14/12 GHz Satellite Communications Systems

.KNOWLEDGE NETWORK of the West was created and its current budget contains provision for a 14/12 GHz satellite-based system, subject to satisfactory rate negotiations with TELESAT and approval by the B.C. Ministry of Universities, Science and Education. In support of the KNOWLEDGE NETWORK, the B.C. government is subsidizing the purchase by communities of 14/12 GHz earth stations and re-broadcast units. Funding for this year is approximately $1.5 million. (Ref. G.4.1)

.OECA/TVONTARIO has received Cabinet approval to roll-over its terrestrial distribution system to a satellite-based one, subject to satisfactory rate negotiations. In support of this thrust, the Ontario government is also subsidizing the purchase by communities of 14/12 GHz earth stations and re-broadcast units. (Ref. G.2)

B.1.1.2 In Favour of Other Satellite Distribution Systems

. The pilot projects contributed significantly to the success of the Inuit Broadcast Corporation in being licensed by the CRTC and funded by the federal government. Inuit programming is now being delivered via 6/4 GHz satellite systems on an interim basis. (Ref. G.3.1)

B.1.2 VIABILITY ASSESSMENTS MADE OR CONTINUING

Two of the high technology pilot projects have resulted in positive but limited viability assessments regarding the introduction of new technologies that could broaden the potential applications of 14/12 GHz communications systems.

- Technical viability of an integrated 90 mbps satellite digital link was demonstrated, and is being further explored in Phase Two (Ref. G.7.1);

- Technical viability of a slim TDMA network was demonstrated, and possible applications are being explored in Phase Two. (Ref. G.7.2)

B.1.3 TECHNICAL KNOWLEDGE

All projects reported increases in technical knowledge. In terms of the potential impact on the end-state, we judge the following achievements to be particularly important:

i. the technical results of the PDPP's which contributed to the positive viability decision (see G.8.1) and influenced the sale of ANIK-C capacity for DBS usage (See G.2.5);

ii. the technical knowledge gained by DOC officials and others in installing and operating 14/12 GHz systems; and

iii. the technical knowledge gained by the manufacturers, systems integrators and consultants.

B.1.4 AWARENESS OF POTENTIAL OF TELECOMMUNICATIONS TO DELIVER NEW SERVICES

Again, all project participants reported such achievements. We judge the following ones to be particularly important in terms of potential impact on the end-state:

i. the interest in off-shore communications stimulated by the pilot project of Memorial University of Newfoundland (Ref. G.5.1)

ii. increased and continuing interest on the part of Provincial educational organizations in using satellite telecommunications systems to deliver their programming, increasing their penetration for existing services and opening up new educational markets (e.g. outside of institutions). This interest seems to be backed up by funding (Ref. G.2, G.4.1, G.4.3);

iii. increased recognition by various Provincial Ministries that 14/12 GHz satellite communications systems offer the potential to equalize service delivery throughout a Province (Ref. G.8 and G.9); and

iv. awareness on the part of recipients of services (broadcasting, education and health in particular) that telecommunications can provide access to new and important services, leading to increased pressure for these services.

B.1.5 CONTRIBUTIONS TO POLICY ISSUES

All pilot project participants encountered major Canadian policy, regulatory and institutional barriers to the introduction of a 14/12 GHz satellite-based telecommunications system in Canada. As well, most participating organizations took opportunities to

argue against these barriers in front of the CRTC and elsewhere. However, only one actual Canadian policy change can be said to have been aided by the Phase One experience: the CRTC decision to permit the leasing by TELESAT of partial transponder capacity to broadcasters.

Internationally, the experience of the television broadcasting projects may contribute to decisions at RARC and WARC, but is is premature to tell.

An effect of the Program related to the "policy" goal is the creation of a continuing committee of senior federal and provincial officials to examine policy issues in the field of satellite-delivered educational programming. There is evidence to suggest that the high profile Phase One projects in British Columbia and Ontario re-inforced the awareness of the need to begin to examine such issues.

There are two causes of this lack of more substantial policy change achievements. The first is the difficulty of effecting such changes. The second is that the DOC Program and review activities were not designed to identify particular policy barriers and to ensure that specific and co-ordinated steps were undertaken to deal with them (Ref. G.8, G.9). No DOC resources were assigned to this task.

B.1.6 OTHER EFFECTS

Major other effects are as follows:

. Increased interest, internationally, in the use of lower-powered satellites for DBS applications (Ref. G.2.5). In particular, the Canadian experience played an important role in shaping the satellite communications plans of Australia;

. The involvement of CNCP in developing satellite expertise which could result in the addition of satellite

telecommunications services to their existing range of services (Ref. G.7.2)

. The British Columbia government has identified satellite telecommunications as a sector for industrial development for both the Canadian and foreign markets (Ref.G.4.1); and

. Networks, Task Forces and organizations have been established between potential users of satellites, examining major issues such as the possibility of establishing consortia to share satellite capacity and thus reduce costs (Ref.G.9).

B.2 OTHER PROGRAM ACTIVITIES

The other program activities (demonstrations, systems tests and other promotional activities) contributed mainly to the goals of "technical knowledge" and "awareness". The identified acievements are listed below.

The evaluation of the "other promotional" activity, to be conducted by DOC staff, was not completed because of the unavailability of resources.

B.2.1 AWARENESS GOAL

Demonstrations have yielded definite program goal achievements. However, it is difficult in most cases to attribute a goal achievement solely to one demonstration. Often the effect is complemented by other modes of activity such as continuing personal contact, conferences, seminars, etc. Following are the major achievements (Ref.H.14):

- Demonstrations have preceded participation of several users in pilot projects, e.g. OECA, Dome, CBC, BCIT and several cable companies;

- Demonstrations have shown technical and operational

feasibility of 14/12 GHz systems to foreign communications personnel and Canadian expertise in the 14/12 GHz systems e.g. Australian Visitors, and have enhanced Canada's export opportunities;

- Demonstrations encouraged ALL VIEW NETWORK I to purchase their own LCET for demonstration purposes. This was used to convince their Board of Directors and others of the potential of satellite broadcasting services which in turn resulted in the establishment of North Star Theatre and submissions to CRTC hearings that laid out clearly the choice between the 14/12 GHz mode and the 6/4 GHz services.

B.2.2 TECHNICAL KNOWLEDGE GOAL

Two goal achievements can be attributed to the systems tests activity (Ref. H.2.4):

- Systems Tests activity is a necessary planning phase to establish new Pilot Projects and to ensure continuing operation of existing ones: and

- Extensive test of LCET equipment in the field after one year of operation provided a large amount of useful data for future planning and TV broadcasting, and represented the first such large-scale test anywhere of 12 GHz TVRO's.

B.2.3 OTHER EFFECTS

Although the thorough evaluation of the "other promotional" activity was not carried out because of a shortage of DOC staff time, we believe that such an evaluation would demonstrate that the promotional work of DOC staff had significant effects on raising the level of awareness in many organizations in Canada and other countries of the potential of satellites (both 6/4 GHz and 14/12 GHz) to solve communications problems.

PART C: CONTRIBUTIONS OF PILOT PROJECTS AND OTHER ACTIVITIES TO A VIABLE CANADIAN COMMERCIAL SATELLITE TELECOMMUNICATIONS SYSTEM, SERVICES AND INDUSTRY

In Part B above, we recorded the major goal achievements and other effects of the Phase One program activities. We now present a preliminary assessment of the contributions of these achievements to the establishment of a viable Canadian commerical satellite telecommunications system and industry. This assessment is "preliminary" in two senses: the results may well change as a consequence of Phase Two activities, and a final assessment will require the conclusions of the DOC evaluation of the direct industrial expenditures activity.

The Phase One Communications Program has three indicators of success for its contribution to the above end-state. They are:

- the commercial viability of the ANIK-C 14/12 GHz satellites;
- a Canadian manufacturing capability for the LCET and associated systems and equipment, capable of producing for large markets and with a record of substantial sales; and,
- a body of users committed to, and using, this particular technology on a commercial basis.

The Phase One Program has produced real progress in all three areas.

The first ANIK-C satellite, to be launched in late 1982, is in a favorable financial situation, as reported by TELESAT; there is a real potential for substantial sales of the modified LCET being developed by SED and GI; and there is a body of influential and committed Canadian users (See Part B above).

However the progress in these three areas has not been co-ordinated. The heavy committment of ANIK-C (1) is to American broadcasters; the LCET sales may be in the U.S. market to recipients of the American DBS signals; but the committed Canadian users are unsure as to whether their needs will be accomodated by the first ANIK-C satellite. The Program activities have contributed substantially to defining and creating a DBS market opportunity which is being seized, at least initially, by the U.S.

We believe that this situation is due in large part to the lack of a co-ordinated thrust in the DOC Phase One Program activities to effect and influence the policy changes necessary for a viable 14/12 GHz system and services. Phase Two may change this situation.