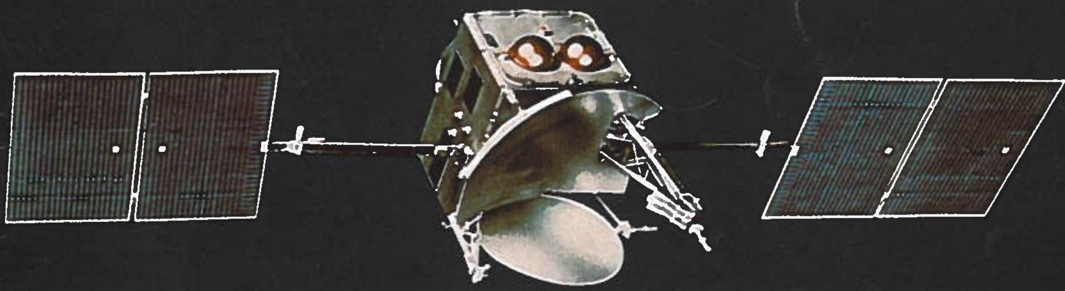
Anik B



Anik B

Canada's Inuit, whose ancient culture has contributed to international language such words as igloo, mukluks, kayak and parka, have given a sound to the era of space: Anik. It means brother and it is a big name in satellite technology.

This name, brought from the roof of the world, is a reminder both of the dimensions of Canada and the reasons that we have moved so boldly from earth to space. We have enormous distances to cover. In reaching across them, we suffer the complications from the geomagnetic north pole's location in the Canadian Arctic, which results in interference with radio communications. Travel to our remote places is difficult, not only because of distance but because the climate is harsh and Arctic seas are hard to navigate. To physical remoteness is added isolation of a small and dispersed population living far from each other and from the rest of Canada.

These northern residents too are Canadians, entitled to participate in Canadian life, to share in its benefits and responsibilities. Other Canadians, following the trail of rich resources to the Arctic Circle and beyond, are hampered by the harshness of the climate, but perhaps equally by the uncertainty of communications with the rest of the world. The weakness of business or industrial communications is not the only hazard: a stable work force with high morale is more likely to be achieved with reliable access to radio and television, easy personal communications, high standards in medical care and continuing educational opportunities.

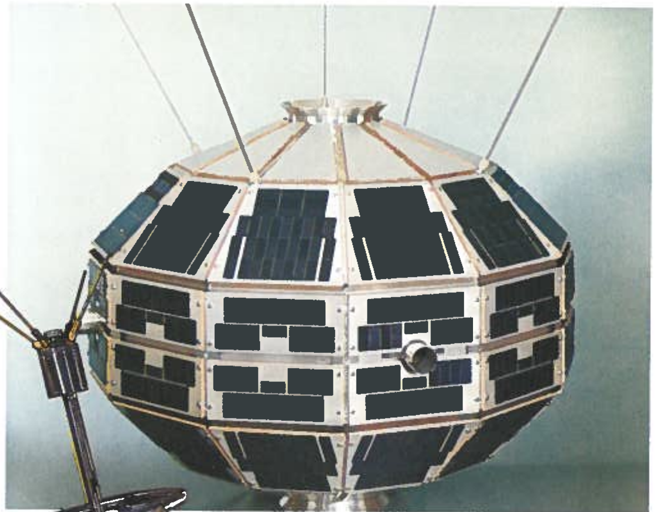
These are some of the reasons which led Canada quickly and decisively into space. No country on the planet needs more the communications which space technology provides. That is why Canada was the third country to enter space. That is why Anik was born.

Launch of the Anik B spacecraft on December 15, 1978.

Photo: NASA

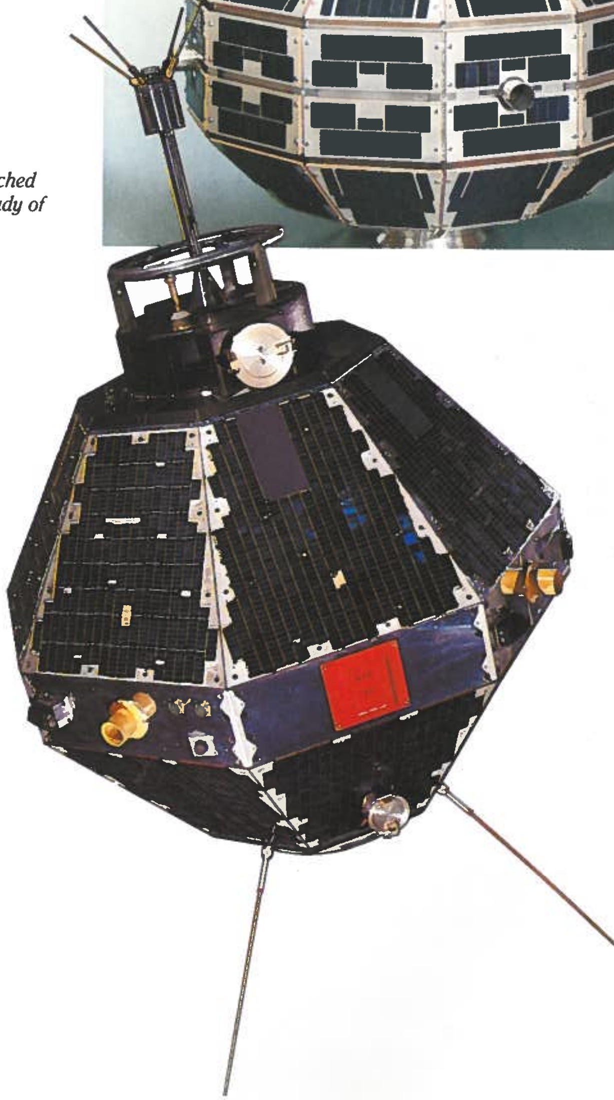
Canada is third nation in space with September 29, 1962 launch of Alouette I research satellite.

Photo: Scientific Imagery,
Department of Communications



ISIS II, research satellite launched in 1971 to provide data for study of ionosphere.

Photo: Scientific Imagery,
Department of Communications



Early satellites

The story begins in 1959 with the start of work on our first satellite. The next milestone was September 29, 1962, when Alouette I was launched to provide data for the study of the ionosphere. It was a project vital to the improvement of high frequency radio communications. Alouette's expected lifespan was 12 months, but for 10 years it operated in its circular orbit 1000 km above the earth.

Between 1965 and 1971, three more satellites for scientific research followed: Alouette II, ISIS I and ISIS II. They added much to our knowledge of the ionosphere. At the same time, the design, development and construction of these satellites encouraged the development of scientific and engineering space teams and a fledgling space industry.

Internationally, Canada joined the club of space communicators. In 1964, with 10 other nations, Canada became party to the first agreement for an international communications system using satellite technology. Called Intelsat, this international organization has launched a series of satellites for commercial use. Canada's carrier of their signals is a crown corporation called Teleglobe Canada.

For domestic communications via satellite, a different kind of organization was formed in 1969. Telesat Canada is neither a crown corporation nor an agency of the government, but a partnership between Canadian telecommunications carriers and the federal government. Its facilities are used for national television relay with local distribution, telephone service, computer data transfer, teletype, facsimile and all forms of electronic information. It is the owner and operator of the Anik satellites.

Hermes

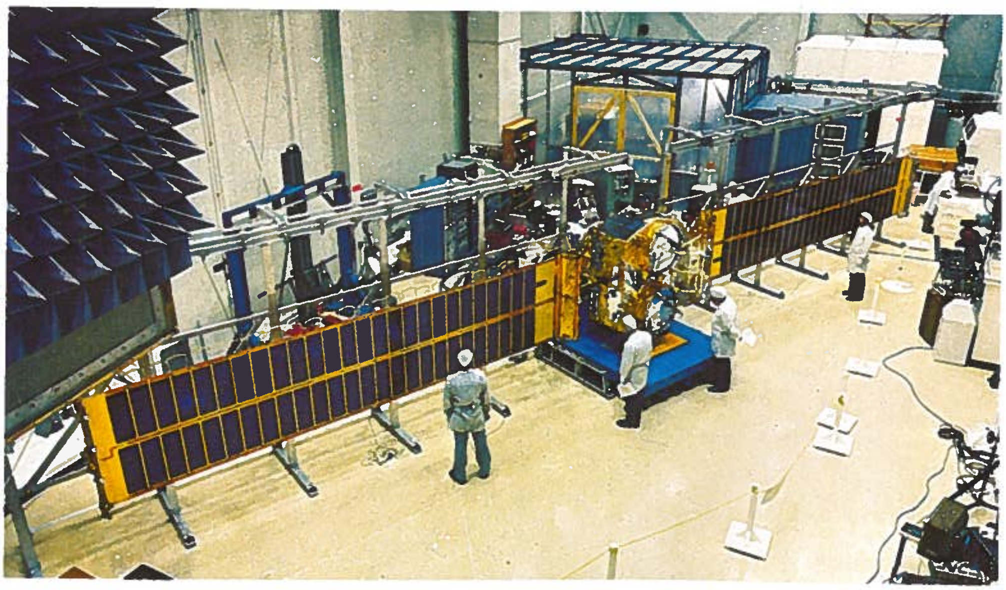
Before the first of the Aniks was launched, planning began on what would be the world's most powerful communications satellite, Hermes. The Department of Communications designed, integrated and tested Hermes at its Communications Research Centre in Ottawa. Eighty per cent of the industrial contracts went to Canadian industry. Canada invested $60 million in Hermes; the United States invested $11.4 million plus the launch vehicle. The European Space Agency provided several components.

With Hermes, Canada was the first to use the new 14/12 gigahertz (GHz) frequency bands for communications: that is, it received signals from earth at a frequency of about 14 billion cycles per second (or 14 GHz) and transmitted them back at about 12 billion cycles per second (12 GHz). Unlike Hermes, the Anik A satellites operate in the lower frequency bands of 6/4 GHz, the same bands used by the terrestrial microwave system to carry telephone traffic. The engineers who developed Hermes wanted to use the 14/12 GHz bands to avoid any interference with the terrestrial microwave system. One of the striking successes of Hermes was vindication of the Canadian belief that the higher frequency can be used successfully for various satellite communications services. Following the pioneering lead of Hermes, Anik B and the Anik C satellites have a 14/12 GHz capability.

Two other features of Hermes have been used in the follow-on Anik B. Hermes was the first satellite to carry a pair of ultra lightweight sails, known to the experts as deployable solar arrays. They were studded with 27,000 solar power cells providing 1.2 kilowatts of power for the satellite. The sails were folded like an

Hermes, first communications satellite to use 14/12 GHz bands, during solar array deployment tests at DOC's David Florida Laboratory.

Photo: Scientific Imagery, Department of Communications



accordion inside the spacecraft during the launch and were unfurled when the satellite was in orbit. Hermes also had a three-axis stabilization system to keep its antennas pointing steadily earthward. The Hermes system included 21 earth stations.

More than twenty Canadian organizations conducted 15 technical and 22 social experiments, including direct-to-home television and radio broadcasting, tele-education, telemedicine, community interaction and administrative services. These were forerunners of the Anik B communications pilot projects.

Anik A

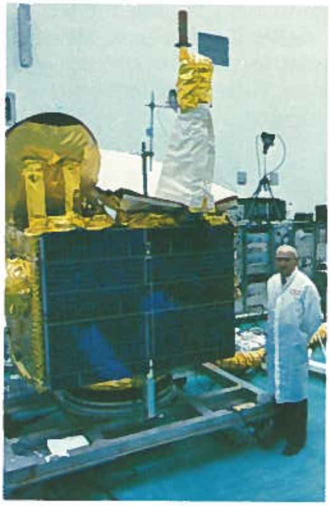
Anik A, Canada's first commercial domestic communications satellite, had been launched in 1972, four years before Hermes. It was the world's first domestic communications satellite to be placed in a geostationary orbit: such satellites rotate with the earth so that their positions are fixed relative to the earth stations which receive signals from the spacecraft. Since no complex tracking equipment is needed at receiving earth stations, cost is greatly reduced. There were three Anik A satellites, each with a planned life of seven years.

The Anik A satellites were built by Hughes Aircraft of California with major Canadian components. At launch, the satellites weighed 560 kg and stood 3.4 m high.

Anik A, world's first domestic communications satellite to be placed in geostationary orbit.

Photo: Department of Communications

Anik B



Anik B, the world's first hybrid communications satellite operating in 6/4 GHz and 14/12 GHz bands, is readied for launch at the Kennedy Space Center.
Photo: NASA

The launch of Anik B, on December 15, 1978, ushered in the era of the world's first direct commercial broadcasting from satellite to earth. Anik B was also the world's first hybrid satellite, carrying 12 channels in the 6/4 GHz band and six in the 14/12 GHz band. It serves both as a commercial satellite and as an experimental vehicle following up the Hermes experiments.

Anik B may not be a Star Wars idea of a space vehicle. On the ground, it is a somewhat ungainly box just over two metres in each dimension and weighing 920 kg. The panels are made of aluminum honeycomb. Two reflectors, one for the 14/12 GHz bands and a larger one for the 6/4 GHz bands, are mounted on top, and on two of the sides are cylinders for the propellant tanks.

In space, Anik B's most obvious feature is the two sails which stretch out to 9.54 m. The sails rotate one revolution a day to get maximum sunlight control on the 20,000 silicon solar cells. Batteries ensure uninterrupted power during lift-off and solar eclipses.

So accurate is the three-axis stabilization and control system that Anik B can be held in position within a tolerance of one-twentieth of a degree of latitude and longitude. Thus only one of the earth stations using Anik B is equipped with tracking antenna. Many of the earth station dishes receiving signals from the satellite are just 1.2 m in diameter.

Telesat Canada leased to the Department of Communications (DOC) all of Anik B's 14/12 GHz capacity for 16 pilot projects over a two-year period: the lease was later extended to carry out 19 pilot projects, some of which were extensions of those begun in the first two years. One of these channels was leased back in 1980 to Telesat which re-leased it to La SETTE, a consortium of Québec cable companies. The channel was used by La SETTE to distribute videotaped programming from France to cable stations in Quebec. This was the world's first commercial service in the 14/12 GHz band.

For the Anik B program, DOC made available satellite time, equipment, technical advice and other assistance to a range of pilot project sponsors, including public, private, community and special interest groups. The projects involved the distribution of broadcast programs, community communications, tele-education, telehealth, business and government communications and technical experiments.

Of the many Anik B projects, the one with the widest impact has been direct broadcasting service to remote areas. For these projects, the Department of Communications purchased 100 low-cost receivers from SED Systems of Saskatoon, half for use in British Columbia, the Yukon and Northwest Territories, half for Ontario. Several larger receivers were placed in fringe areas and in places where programs could be rebroadcast by local low-power transmitters or carried on cable systems. In Ontario, programming was supplied by TVOntario for 94 hours a week. In the west, 112 hours a week of programming came from the Canadian Broadcasting Corporation and 154 hours a week from BCTV, an affiliate of the commercial CTV network.

Neddrill, Petrocan drill ship, sets out on offshore exploration for oil and gas, carrying telephony terminal for Memorial University telemedicine project.
Memorial University

Telephony earth station, on shores of Black Lake, Sask., links remote mineral exploration site via satellite with Calgary head office.
Photo: Canadian Petroleum Association

The King family of McDiarmid, Ont., are world's first to receive direct-to-home TV broadcasting via satellite.

Photo: Scientific Imagery, Department of Communications

The receivers were put in private homes, mining and logging camps and in communities which have facilities for local redistribution. Questionnaires and log books were kept to record picture quality and user comments. The results have been encouraging. Almost universally, viewers have found the television images excellent and reliable. Only occasional extremes of weather, notably heavy rain or snow, seem to affect reception significantly.

The receiving equipment is simple and easy for the amateur to install. At each location was a 1.2 or 1.8 m dish antenna to which was attached a feed and electronic unit smaller than a package of coffee; a small box rested on the television set, and that was all. The Department of Communications bought these dishes for about $3,600 a unit, but with mass production, the cost could drop to about $500 a unit.

The system works. To those who benefit from it, the scientists and engineers have wrought a near miracle. Perhaps an equal miracle will be needed to solve the economic, political and social problems created by success. Extensive impact studies were therefore started when the service began. The crux of the problem lies in the Canadian broadcasting environment. In the urban south, Canada is among world leaders in variety of television channels available through the cable systems which serve 78 per cent of households. On average, each connected home receives 13 channels, and some get more than 20. About 800,000 households beyond the reach of cable receive three channels or less, often with poor quality. Some 80,000 households, comprising 260,000 people, receive no television.

In a country whose urban population takes for granted such a wide variety of channels, it has not been easy to provide remote areas with the same level of service. But there are more fundamental questions.

The availability of satellite transmission receivers within increasingly easy reach of the private home raises serious political, cultural and economic questions about national broadcasting. Should there be restrictions on foreign transmissions which could undermine the Canadian broadcasting system? Are we as a nation prepared to accept an imported culture even if it affects negatively our own cultural ambitions? These and similar questions have affected the country now for more than 50 years. There are no easy answers, but one thing is clear: we cannot prevent technological progress and we must make our own decisions as to how and when we apply technological possibilities for our national benefit.

Signals received by the 1.8 m dish on roof of Beardmore Public School are carried by cable to homes in this northern community.

Photo: Scientific Imagery,
Department of Communications

Satellite news gathering

One Anik B project promises major changes to television news broadcasting. Usually, film crews use shoulder-portable television cameras and videotape recorders in the field to record news events. Once on tape, the news item must be transported by air back to TV production centres in major cities.

But an Anik B pilot project has shown that combining satellite technology with conventional electronic news gathering equipment means that a news event taking place in a remote location can appear instantaneously on television screens across the country. Hours or even days of delay can be avoided.

The new satellite news gathering (SNG) technique uses a portable earth station mounted on a truck to send electronic news signals to Anik B. The satellite then relays them to earth stations in Montreal or Toronto. The Canadian Broadcasting Corporation (CBC) has used a dish developed by the Department of Communications in covering major news stories and American television networks have expressed an interest in the project. Work has begun on a commercial version of the earth station used for the SNG project.

When news breaks in remote areas, this portable earth station can transmit video signals via satellite within 30 minutes of arriving on the scene.

Photo: Scientific Imagery,
Department of Communications

Tele-education

Although, in the public mind, direct broadcasting from satellites most often means television dramas in the living room, other uses of the technology have no less potential. In the urban south, educational television is a useful and interesting supplement to classroom activities, libraries and other sources of education. In remote regions, tele-education by satellite may be almost the only means of extending education both for the young and for adults. It can substantially reduce the disadvantages of living far from the mainstream of academic life.

Tele-education can provide lectures which academics have prepared for conventional television. It can take the viewer into the classroom to provide a more vivid educational environment. The learning process can be enhanced if the community organizes viewing groups to discuss the program. By far the most effective and innovative approach is interactive television communication which enables remote viewers not only to see and hear but to question, comment and speak.

Tele-education has made available undergraduate university courses, adult education courses or professional training in a variety of subjects. It has done more. It has linked teachers in remote communities to share experience and resources of small colleges by links with large institutions. It has provided services in regional languages and dialects, notably for the Inuit of the high Arctic, with their communities preparing and producing material. And, in the heart of North America, it has linked academic institutions for shared classes, seminars and conferences.

All of these possibilities have been demonstrated in a variety of Anik B pilot projects. Their success points to an early future when satellites will make such educational tools commonplace.

Telemedicine

It was not so long ago that a fading voice on the crackling radio in an Arctic settlement marked a breakthrough in medical diagnosis and treatment. Anik B has moved medical care in remote areas immeasurably forward from those days.

Telemedicine narrows the gap in service between a remote hospital centre and a large urban medical institution with its access to specialists, research and testing facilities. The young practitioner in the frontier hospital or the nurse manning a lonely station are no longer professionally on their own. Through sharing professional responsibilities with their colleagues, they have reduced costly and possibly hazardous evacuations by air to the South. In one Anik B pilot project, a nurse was able to remain safely at her post instead of leaving it for treatment "outside." The availability of such resources not only lightens the heavy responsibility of isolated medical staff, but increases public confidence in treatment. This in turn is bound to ease the problem of attracting good people to frontier areas and creating stable settlements there.

Some of the direct services of telemedicine are dramatic. In a large city teaching centre, a team of specialists has been able to examine on their television screen x-rays, cardiograms or fluoroscopy made 5,000 km away before the patient has time to be returned to his room. A nurse in a large city hospital has monitored the heart actions of patients in clinics scattered across the North. Tele-visits have been arranged between patients and relatives or friends several days' travel away.

Telemedicine has linked large hospitals for teaching purposes and it has brought together outpost medical facilities to share resources. It has placed the latest medical research in the hands of practitioners who would not otherwise have the opportunity to follow it closely or to benefit from it. Equally, it feeds back quickly to medical research the experience of treatment under the widest variety of conditions. The Anik B communications program has demonstrated that telemedicine can be a revolutionary tool for isolated medical staff.

Using Anik B link, Montreal radiologist advises on x-ray of patient at LG-2 site in Northern Quebec, 1500 km away.

Photo: L'Institut de génie biomédical, université de Montréal

Telemedicine via satellite makes diagnostic consultation possible instantly. Here, Ottawa pathologists study cancer cell slides under microscope in Vancouver, B.C.

Photo: Ottawa Citizen

Community communications

For the 80 per cent of Canadians who live within 200 km of the southern border, it is difficult to grasp the implications of living beyond this fringe. It is less a matter of the time and money for occasional long distance travel than the isolation of daily living—the lack of shared experience, fresh ideas, and new faces. This sense of isolation may be greatest among those whose cultural traditions are different from most in North America and who therefore look beyond the written word, film or the popular radio and television programs prepared for southern Canadians.

It was therefore natural that among the first participants in Anik B pilot projects in community communications were native groups and linguistic minorities. Typical subjects for interactive television among native groups have been housing, health, roads, jobs, legal aid, Indian councils and firearms control. Particularly in the Arctic, the success of these community exchanges created a sharp demand for television production in the far North by Inuit in the Inuit language, on themes of special interest to the Inuit. This has led to the development of new communications skills in Arctic production centres and creation of the Inuit Broadcasting Corporation which produces and distributes its own programming to native communities across Canada's North.

Inuit in remote Arctic communities produce and distribute TV programming via satellite in their own language, to meet their own needs.

Photos: Inuit Broadcasting Corporation

Administrative services

Governments with responsibility for administration in vast and sparsely settled areas have found Anik B communications a valuable resource. Routine communications have been used for voice, facsimile, teletype and video. In more urgent circumstances, such as police work and forest fire control, satellite communications have proven to be most effective. Two-way video teleconferencing via satellite has been demonstrated as a reliable means of communication between government administrative offices and their clients—one that will become an increasingly attractive alternative to travel, particularly as energy costs rise.

From pilot project to practice

The potential of satellite communications is no longer locked in the dreams of planners. Hermes first established the feasibility of many approaches. It was the marked success of the first 16 projects in the Anik B communications program which led the Department of Communications to extend its lease of Anik B's 14/12 GHz capability and to continue some of these projects and add new ones for a total of 19 projects.

Some of these applications of the Anik B program established services which could later be provided by Telesat on a commercial basis.

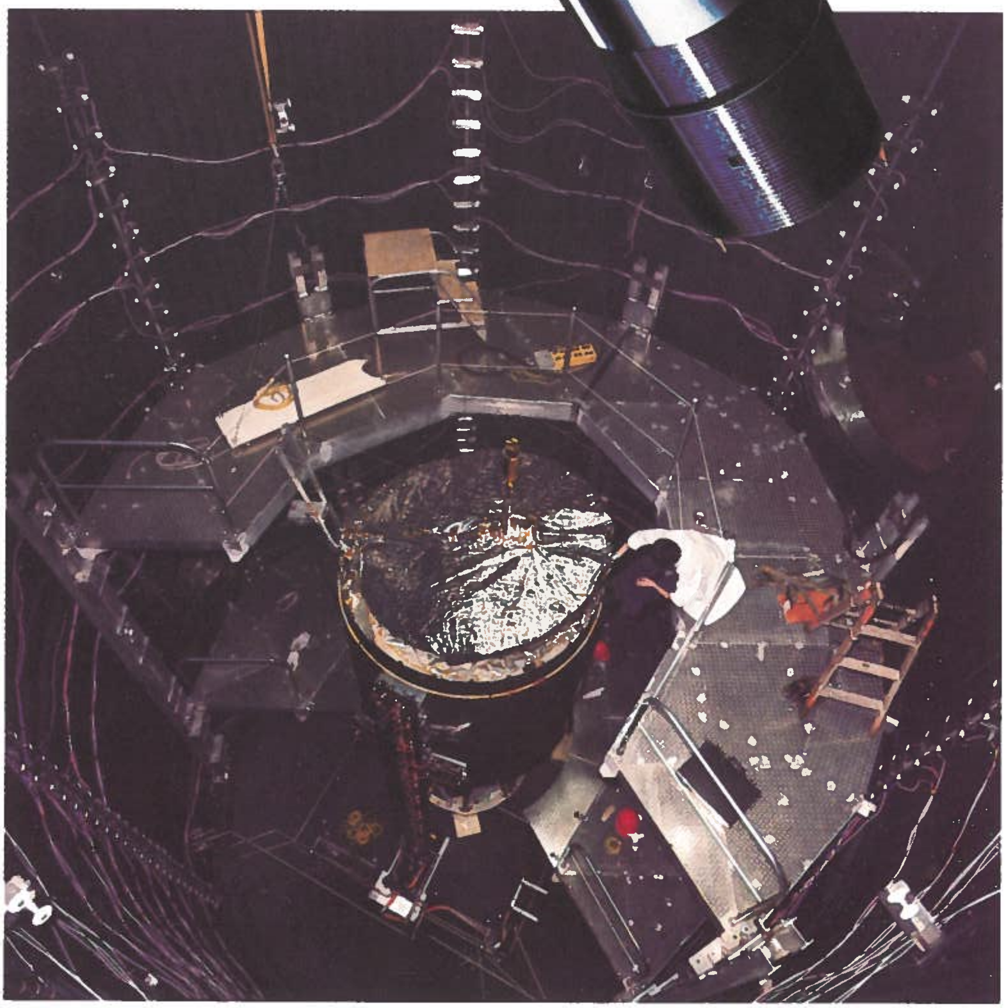
Control room during teleconference via Anik B linking government officials with remote Northern Ontario.

Photo: Ontario Ministry of Government Services

Telesat Canada's Anik C satellite offers commercial services in the 14/12 GHz frequency bands.

Anik D, first spacecraft to be fully integrated and tested at DOC's David Florida Laboratory, in the 7 m x 10 m thermal vacuum chamber.

Photos: Scientific Imagery, Department of Communications



The future

The launch of Anik C-1 and Anik D-1 satellites in 1982 opens a new phase in commercial satellite communications. Anik C, operating in the 14/12 GHz bands, carries 16 channels. With 24 channels, Anik D-1 carries twice as many channels in the 6/4 GHz band as the Anik A and Anik B satellites. Anik C-1 and D-1 are expected to be in use for 10 years.

With these new Anik satellites, Canada is moving from the experimental to commercial communications services. Behind this success lies the growth of a body of space expertise in science, engineering and industry. The Canadian aerospace industry now has a proven capacity for prime contracting satellites and for providing most of their components. Only 13 per cent of the content of Anik A was Canadian; Anik D has more than 50 per cent. Forty Canadian companies have acquired competence in space work, sharing sales of more than $200 million annually. The Canadian aerospace industry will continue to grow with increasing demands for its services and resources domestically and from abroad. In addition, knowledge gained from the space industry has produced a startling range of new uses, from new techniques for refining maple syrup to improving hearing aids.

Canadian satellites providing direct broadcasts to once remote communities and families will gradually bring improved radio and television to all of Canada. Citizens in remote places will be more than spectators of the passing scene. Through interactive communications, they will be able, as never before, to make known their wishes, goals and frustrations to decision makers in government. They will also be able to participate more actively in programs and services provided by federal, provincial and territorial administrations. Most important, they will be able to make satellite communications work for them, to strengthen links between scattered communities.

They will no longer have to sacrifice educational opportunities when they choose to live and work far from the cities. They will have the opportunity not only to receive, but to contribute, while sitting with the student at the next desk—who may be 1,000 km away.

The improvement of medical services and the greater accessibility of help in medical emergencies brings closer the realization of the ideal of equal medical services for all citizens, regardless of geography. Anik is reducing the risks of life on the frontier.

The physical frontier which bounded Canada from its beginnings has taken centuries to disappear. The new frontier is in space. It has taken less than a generation for mankind to cross it.

On that new frontier, no people have worked harder with more success than Canadians. Anik is the beginning of our rewards.

Photo: Inuit Broadcasting Corporation

Anik B pilot projects

Among the many pilot projects carried out by the Anik B communications program since February 1979 are the following:

Distribution of Broadcast Programming

Sponsor	Project	Services and activities
Canadian Broadcasting Corporation	Satellite news gathering (SNG)	"On the spot" news broadcasts via satellite using a portable TV-transmit earth station.
Canadian Broadcasting Corporation (CBC); British Columbia Television Limited (BCTV)	Program delivery pilot project	Direct-to-home TV broadcasting, bringing CBC, BCTV programs to homes, communities in remote areas of British Columbia, the Yukon, NWT.
Newfoundland Broadcasting Company (NTV)	NTV/CTV experimental satellite service	Transmission of NTV/CTV signals to remote sites in Newfoundland, for distribution by low-power transmitter.
TVOntario (TVO)	Anik B Teleacademies	Broadcasting of selected TVO programming to 4 Northern Ontario sites to test educational TV learning system including printed material, evaluation.
TVOntario (TVO), Ontario Ministry of Transportation and Communications	Northern Ontario hybrid direct broadcast operational trial	Direct-to-home TV broadcasting, bringing TVO programs to remote homes, communities.

Community Communications

Sponsor	Project	Services and activities
Inuit Tapirisat of Canada	Inukshuk	One-way video with audio return, audio-only teleconferencing, TV production and broadcasting, and facsimile transmission between one principal and five other communities.
Taqramiut Nipingat	Naalakvik II	One-way video and telephone links between five Inuit communities for Inuit TV broadcasting, production, dubbing, education and community education.

Tele-Education

Sponsor	Project	Services and activities
Alberta Educational Communications Authority; ACCESS Alberta	Distance education in Alberta	Educational broadcasts, some interactive.
Knowledge Network of the West Communications Authority	Knowledge Network of the West	Interactive career and professional education; videotaped educational series aimed at general audiences.
Quebec Department of Education	*La Grande Causerie*	Two-way video, telephone and teleconferencing between the Complexe La Grande (LG-2) site in Northern Quebec and Montreal.
Quebec Department of Education, Kativik School Board	Kativik Anik B	One-way video and telephone links between five communities; TV broadcasting, production, used to distribute educational programming and community education in remote regions of Northern Quebec.

Telemedicine

Sponsor	Project	Services and activities
Faculty of Medicine, Memorial University of Newfoundland; Newfoundland Telephone Company	Telemedicine and health (Transmissions between St. John's, Nfld., Goose Bay, Labrador, Labrador City, and Makkovik, Labrador)	Voice, data and slow-scan video connections used for consultations, transmission of medical data, community health education, continuing education for health professionals, teleconferencing. Use of earth stations for communication with off-shore drilling rig.
L'Institut de génie biomédical, l'université de Montréal	Complexe La Grande (LG-2) health service delivery	Comparison of 2-way video and slow-scan video for telemedicine in support of health service delivery, health education, diagnostic services at LG-2 in Northern Quebec.

Advanced Technology

Sponsor	Project	Services and activities
Canadian Amateur Radio Federation; Canadian Radio Relay League	Trans-Canada amateur radio packet network	Link amateur radio networks in Ottawa and Vancouver; test of computer data transmission techniques.
Department of Communications; CNCP Telecommunications	Time Division Multiple Access (TDMA)	Development and service trials of TDMA earth station equipment for business applications.
Faculty of Science and Engineering, University of Ottawa	Technical evaluation of digital modulation systems	Evaluation of new satellite earth station modems to improve satellite communications.
Microtel Pacific Research	Design and development of satellite telephony system	Development of thin-route telephone service via satellite for resource industries based in remote areas of British Columbia.
Telesat Canada; TransCanada Telephone System	Evaluation of 90 megabits per second digital link.	Test commercial feasibility of digital satellite communications system for Anik C; technical studies of system components.
University of Toronto; York University; National Research Council; the Department of Energy, Mines and Resources, Earth Physics Branch; United States Naval Research Laboratory	Very long baseline interferometer (VLBI)	Establishment, evaluation of VLBI formed by linking three radiotelescopes for radio astronomy and geophysical studies.

Government and Business Applications

Sponsor	Project	Services and activities
Canadian Petroleum Association	Transportable telephony earth stations	Voice and data communications to remote and offshore resource exploration sites.
Department of Communications	Support for Australian domestic satellite (DOM-SAT) program activities	Demonstrate effectiveness of low-cost earth stations for voice traffic, TV and radio reception to remote locations.
Ontario Ministry of Government Services	Ontario government teleconferencing network	Video teleconferencing between government offices in Toronto to Northern communities for telemedicine, seminars, inter-office meetings.

A number of other approved projects may be implemented between April 1, 1982 and September 17, 1982. These include: Broadcast News' technical project to deliver teleprinter, audio and Telidon news information signals in both official languages to private radio stations, television stations and cable companies; a Telesat Canada experiment in satellite distribution of stereo radio signals; and the Université du Québec's plan to extend its existing microwave teleconferencing network by satellite to serve its remote campuses. Also planned is "À portée de voix," a project of the Quebec Department of Education and the Association canadienne d'éducation de langue française, to create video and audio links between French-speaking universities and groups.

In addition, since the Anik B communications program began in 1979, a number of firms have used low-cost earth terminals developed under the program to receive satellite broadcasts of TVO programming in Ontario or CBC and BCTV programming in the West. These activities by Dome Petroleum, the Manitoba Telephone System and RCA have demonstrated the use of low-cost earth terminals.

Anik B satellite technical data

Launch weight: 920 kg

Weight in geostationary orbit (at start of life): 470.2 kg

Launch vehicle: Delta 3914 with nine Castor IV solid propellant strap-on motors (Dec. 1978)

Height (in orbit): 3.28 m

Body width: 2.05 m

Maximum dimension (in orbit) from sail tip to sail tip: 9.54 m

Stabilization: 3 axis

Position in synchronous orbit: 109° west longitude

Design life: 7 years

Frequency band:	6/4 GHz	14/12 GHz
Number of channels:	12	6
Number of TWTAs:	12	4
Channel bandwidth:	36 MHz	72 MHz
Antenna coverage:	All Canada	4 spot beams

Rated TWT output power:
6/4 GHz. 10 watts
12/14 GHz. 20 watts

Communications services at 6/4 GHz:
TV, radio, 2-way voice (FM/FDMA, FM/SCPC and PM/TDMA), teleconferencing, facsimile and data

Experimental communications services at 14/12 GHz:
One and 2-way video, 1 and 2-way audio, video and audio broadcast, data, facsimile, ECG's, EEG's, x-ray transmissions, and other medical data.

Attitude control:
Orbit control, 0.05° accuracy in latitude and longitude. Attitude axes to 0.15° of orbit normal vector.

Attitude sensing elements:
Momentum wheel for pitch. Magnetic torque with back-up thruster control for roll and yaw. An earth sensor system provides attitude data.

Solar power system:
2 solar sails,
620 W capacity

Solar array drive mechanism
Rotates solar sails one revolution per day to keep them sun-oriented.

Batteries,
3 nickel cadmium batteries.
Nominal capacity 17 AH.

Canadian subcontractors

The following are the Canadian subcontractors and other suppliers to RCA on the Anik B procurement:

Spar Aerospace Ltd., Montreal, Quebec—provided transponders and antennas; COMDEV, Cambridge, Ontario—provided filters and multiplexers; Bristol Aerospace, Winnipeg, Manitoba—provided graphite fibre epoxy compounds.
Various companies in Montreal and Toronto provided castings, machining, etc.

Canadian milestones in space

1962 Alouette I launched
1964 Intelsat founded
1965 Alouette II launched
1968 Spar Aerospace founded
1969 Telesat Canada founded
1969 ISIS I launched
1971 ISIS II launched
1972 SED Systems founded
1972 Anik A-1 launched
1973 Anik A-2 launched
1975 Anik A-3 launched
1976 Hermes launched
1978 Anik B launched
1981 Canadarm launched with Columbia
1982 Anik C launch
1982 Anik D launch

Text prepared by Robert Phillips
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April 1982

Government of Canada
Department of Communications

Gouvernement du Canada
Ministère des Communications

Canada