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Historical Development: Anik B Hybrid Systems

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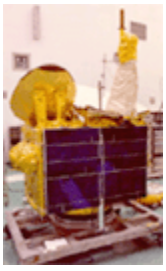
Anik B Hybrid Systems

Introduction

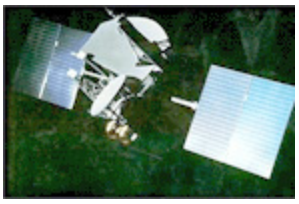
Because of the success of the Hermes program and under an arrangement between Telesat Canada and the federal government, the next satellite commissioned by Telesat-Anik B-was equipped with 4 experimental 14/12 GHz transponders in addition to 12 commercial radio frequency channels in the 6/4 GHz band used by the earlier Anik A satellites. Spacecraft construction was awarded to RCA Astro-Electronics Division.

The launch of ANIK-B, on December 5, 1978 ushered in the first commercial Direct Broadcast Satellite Service (DBS). It was also the first hybrid satellite having channels in both the 6/4 GHz band and in the 14/12 GHz band. It was both a commercial satellite and an experimental platform for the Government of Canada. The former Department of Communications (DOC), in particular the Communications Research Centre (CRC), now an agency of Industry Canada, leased all of the four 14/12 GHz transponders for a two-year period, to carry on work started with the Hermes/CTS satellite. The 6/4 GHz system was used by Telesat to replace the operational capacity provided by one of the ANIK-A series satellites.

The Anik-B Satellite



ANIK-B used a 3-axis stabilized spacecraft which was station-kept to within ±0.05∞ North-South and East-West. As a result, ground station antennas did not need to track the satellite. In the 14/12 GHz portion of the spacecraft, there were four 20W TWTAs which feed four spot beams. Two TWTAs were used for two western beams and two were used for two eastern beams, for all Canada coverage.



The four fixed beams each had a beamwidth of approximately 2∞. The EIRP of 51 dBw maximum was considerably less than that of Hermes but was typical of the power levels of commercial satellites that operated in the fixed service.

The 14/12 GHz Anik-B Experimental Program

The goals of the ANIK-B experimental program were:

1. to determine the viability of telecommunications services designed to meet identified public service requirements.
2. to develop the knowledge and expertise to better utilize 14/12 GHz satellite communications technology.
3. to develop expertise and create awareness in user institutions of the potential of telecommunications to deliver new services.
4. to assess the operational feasibility and desirability of a variety of new telecommunications services.

Based on the Hermes program, potential areas were identified for pilot projects in telemedicine, tele-education, community communications, commercial services, TV distribution, and technology development. The DOC/CRC invited agencies to propose pilot projects and selected a number for implementation which best met the goals of the program. The mandate and capability of a proposer to sponsor a future operational service were major considerations in the selection of pilot projects. The DOC/CRC provided the use of the satellite free of charge for non-commercial users and terminals were loaned to users to carry out accepted projects.

Sixteen pilot projects were selected by the Department to be carried out during 1979 and 1980. The ground terminals employed in these projects were again mostly provided by DOC/CRC, with the exception of some of the more technical projects where terminal designs needed to be much more specialized.

Of the many ANIK-B projects, the one with the widest impact was direct broadcasting service to remote areas. For these projects, the DOC/CRC 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 hour a week of programming came from the Canadian Broadcasting

Corporation and 154 hours a week from BCTV, an affiliate of the commercial CTV network.

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

The receiving equipment was simple and easy for the amateur to install. At each location there was a 1.2 or 1.8m dish antenna to which was attached a feed and an electronic unit smaller than a package of coffee. Inside, a small box rested on the television set.

1.2 m TVRO Terminal

One ANIK-B project pioneered major changes to television news broadcasting. At that time, film crews normally used shoulder-portable television cameras and videotape recorders in the field to record news events. Once on tape, the news item was transported by air back to TV production centres in major cities.

But an ANIK-B pilot project showed that combining satellite technology with conventional electronic news gathering equipment meant that a news event taking place in a remote location could appear instantaneously on television screens across the country. Hours or even days of delay were avoided.

First SNG earth station in 1981 developed by CRC for CBC trials led to commercially built SNG trucks

The new satellite news gather (SNG) technique used a portable earth station mounted on a truck to send electronic news signals to ANIK-B. The satellite then relayed them to earth stations in Montreal or Toronto. The Canadian Broadcasting

Corporation (CBC) used a system developed by the DOC/CRC in covering major news stories.

Conclusions

With the launch of Anik B, Telesat's move into the 14/12 GHz Ku-band began. Initially, experiments were carried out in close co-operation with the Communications Research Centre. By 1980, the French language broadcaster SETTE began commercial programming services to 25 locations throughout Quebec using this new technology. In the same year, the Knowledge Network and TV Ontario began English language educational programming services, also using Ku-band. And the Globe and Mail began to use data transmission of their national edition to printing plants in Montreal and Calgary, to enable the timely daily distribution of the Globe and Mail across Canada.

The experience gained in the ANIK-B projects lead to operational utilization of satellites for several social services such as tele-health and tele-education. These experiments had proved to be highly successful. A general result of the ANIK-B program is that the highly sophisticated technology of space communications was reduced to an operational communication link, be it telephony or one-way or two-way TV, or combinations of voice or video, to be used by non-skilled people with real communications needs. The results of the program also led way to the DBS service that is now offered globally.

For more information see the following links and references:

- The Friends of CRC Association
- Communications Research Centre (CRC)
- "Report on Memorial University of Newfoundland's Experimental Use of the Communications Satellite Hermes in Telemedicine" by Judy Roberts, A.M. House, W. C. McNamara, and Eric Keough, The Journal of Distance Education / Revue de l'Éducation á Distance, Vol 8, No 1 (1993)
- "Applications Development for Education: Using Communications Satellites" by W. T. (Terry) Kerr, The Journal of Distance Education / Revue de l'Éducation á Distance, Vol 8, No 1 (1993)
- Davies, N. George (1979) Overview of 12 GHz experiments with Hermes and ANIK-B. Australian Satellite Communications Conference University of West Australia Nedlands, W. A December 4-6 1979.
- Jelly, Doris (?) Canada: 25 Years in Space; Polyscience Publications; 188 pages paperback.
- Summary Record of the ANIK-B Users Meeting Ottawa Ont. June 5, 1980