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SatCom Today in Canada: Current Systems/Customers/ Consulting

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Current Systems/Customers/Consulting

Broadcast

Telesat is the world's most experienced commercial fixed satellite operator, and a highly respected consultant and partner in satellite ventures around the globe. The Company competes with other top international satellite fleets in providing telecommunications and broadcasting services to more than 275 customers throughout the Americas.

With over thirty years of engineering and technical experience, Telesat is a diversified, end-to-end satellite services company with some 500 employees stationed throughout the Americas and on international assignment.

Telesat's experience is rooted in the unique challenge of bridging Canada's vast distances. Because satellites are the most cost-effective way to transmit television signals to numerous, widely-dispersed sites, most of the nation's broadcasters rely on Telesat to deliver their programming to cable operators from coast to coast.

Telesat Canada has played a unique role in the growth of the broadcast industry and, in particular, its application to the North and to remote areas of Canada.

Today, many small communities and remote resource camps have access via Telesat satellites to a complete package of Canadian television signals, including: the CBC and Radio Canada public networks; major private networks, such as CTV, Global and TVA; educational networks such as TV Ontario and Knowledge Network; and a host of specialty channels including Newsworld, Much Music and

TSN. Radio signals from the CBC, Radio Canada and private broadcasters are also available for off-air rebroadcast or cable distribution.

The launch of Direct-to-Home services in the late 1990's by StarChoice and ExpressVu further revolutionized the Canadian broadcast industry. Today, DTH services reach over 2.1 million Canadian households.

Canadians rely on information and news sources using Telesat satellites as the delivery vehicle, no matter whether these sources are accessed by cable, DTH transmission, or via the Internet.

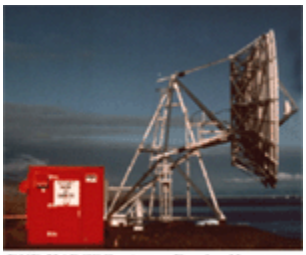
Business and Government

Many corporate and government clients have made use of Telesat services to provide the most modern communications capabilities to their remote locations. Customers such as the Canadian Imperial Bank of Commerce, National Research Council, Aeronautical Radio, Inc. and the RCMP have used the Telesat Anikom 200 service to extend their corporate data networks to remote locations.

Clients with specialized applications and requirements, such as Nav Canada, the Atmospheric Environment Service (AES) and the Department of National Defence (DND) have used Telesat services for extension of their data networks.

AES makes use of Telesat services for the transmission of weather information - a vital service for aviation and safety in remote areas of the country. Other uses of Telesat satellites by AES include the transmission of data from Doppler radar sites located across the country, and for data collection from the 81 site lightning detection network used to track thunderstorms.

Nav Canada transmits critical information to Canadian airports via a custom-built network, and also makes use of satellite links in their network used to communicate with aircrews flying within Canadian airspace.



DND HADCS Station at Eureka, Nunavut

DND has used Telesat services for various data connectivity requirements within the Canadian military, including: High Arctic Data Communications System (HADCS), North Warning System (NWS), Forward Operating Locations Satellite Communications System (FOLSATCOM), Defense Integrated Services Digital Network (DISDN), as well as Operation ABACUS, which provided a Y2K back-up network.

GTIS, Public Works, Correctional Services, and the Nunavut Territorial Government all make use of Telesat satellite services between Ottawa and Iqaluit, to extend government services to the new Nunavut Territory. Telesat satellites provide the only reliable communications link to this territorial capital.

Other customers such as the Canadian Department of Fisheries and Oceans and the Canadian Space Agency have opted to purchase Telesat satellite space capacity to fill their needs for data communications requirements.

Telephone Company Networks

Telesat has been instrumental in assisting telephone companies in serving communities within their service territories, particularly in under-served remote areas. Services provided not only include telephony and data but are also evolving to support Internet applications.

Telesat provides voice, data and image services to TÉlÉbec, QuÉbec TÉlÉphone, Aliant, ONTel, MTS, Sasktel, Telus, NWTel and Bell. Canada's telephone companies have selected Telesat facilities to expand their networks into remote areas of their serving territory because of the optimized coverage; the advantages of dealing with a Canadian company; and, most importantly, Telesat's willingness to contribute its expertise and experience in the development of new products to modernize their service offerings.

Using Telesat's satellite facilities, NorthwesTel's earth station network presently consists of 59 earth stations that can be categorized as follows:

Master Control Station, Montreal Teleport

- 26 community earth stations in Nunavut providing basic telephony, frame relay data (including telehealth and distance learning), and private wire services.
- 22 community earth stations throughout the Northwest Territories providing basic telephony, frame relay data (including telehealth and distance learning), and private wire services.
- 5 community earth stations in British Columbia providing basic telephony and private wire services.
- 1 community earth station in Yukon providing basic telephony, frame relay data (including telemedicine), and private wire services.
- 3 additional earth stations in Yukon extending a regional telemedicine network.

In addition, telephony Master Control Stations (MCS) are located in Whitehorse and Yellowknife. These stations also serve as hubs for the data network overlay.

Telesat's satellite network is essential to the provision by Bell Canada of modern services in the more remote areas of Ontario and Quebec. Twenty-six remote communities obtain Public Switched Telephone Network (PSTN) access to the rest of the world via Telesat's Montreal Teleport. The technology utilized is based on a Demand Assigned Multiple Access (DAMA) satellite access technique that offers effective utilization of the satellite space segment resource.

This network platform has been recently upgraded so that Bell can offer enhanced services in the most remote parts of its serving area similar to those enjoyed in the urban areas of Canada. Features such as caller identification, caller name, enhanced 1-800 capabilities, express messaging, call transfer, call forward, as well as other services are now fully supported on this satellite network platform.

Satellite Restoral/Back-up Capacity

From its beginning, Telesat recognized the importance of fostering a working relationship with U.S. satellite carriers to have ready access to additional capacity

for back-up purposes or to temporarily handle unexpected growth. The 1972 Exchange of Letters between Canada and the U.S., and the amendment to these letters in 1982, allowed for back-up, restoral and cross-border services between Canadian and U.S. satellite carriers.

Since 1974, Telesat has leased surplus space segment capacity to several American operators, such as GE Americom, GTE Spacenet, Argo Communications, AT&T Skynet, GCI of Alaska, and Hughes Communications. In addition, short-term surplus capacity is leased to U.S. customers on an occasional-use basis. Telesat was able to offer the lease of these RF channel services without depriving its Canadian customers of satellite services or capacity. This arrangement for reciprocity worked well for Telesat when, in 1994 during its Anik E2 service interruption period, the Company was able to purchase Telstar 301 from AT&T Skynet and provide continued services to its Canadian broadcasters.

Cross-Border Links

The design of the Anik E satellites enabled the Company to provide cross-border services to Canadian companies and their U.S. affiliates needing private links between Canada and the U.S. Satellites have proven to be particularly effective for point-to-multipoint links, or links where one or more nodes are located in remote areas. The enhanced coverage of the Anik F satellites will strengthen Telesat's presence in this market.

In addition to private network cross-border communications, Telesat has provided service to Canadian broadcasters who need to distribute their programming services to locations in the U.S. These types of arrangements provide a valuable service to Canadian companies by improving their competitive position and easing their expansion into the U.S.

Facilities Engineering

T&C Station for Iridium® in Iqaluit, Nunavut

Telesat has actively sought out opportunities for the design, construction and operation of satellite gateways, or other large ground station networks, for other satellite operators in other countries. For example, Telesat was contracted to construct the tracking and command (T&C) earth stations for the Iridium system.

The two Canadian locations - in Yellowknife and Iqaluit - and a third site in Hawaii, were required to transmit control signals to position, monitor and

maintain the orbits of the Iridium satellites. Later, Telesat signed a contract to operate and maintain these stations and provide consulting support on a fourth earth station site in Iceland. Telesat staff later worked on 13 Iridium gateway earth stations.

VSAT Network Maintenance

In 1999, Telesat successfully competed for the installation and maintenance of a network comprising VSATs, interactive distance learning and data processing equipment for 5500 dealerships of the Ford Motor Company across the United States. Telesat has established itself as a leader in the VSAT field.

The Company is now responsible for the maintenance of more than 20,000 sites throughout North America, and has established a VSAT Control Centre at its National Operations Centre in Allan Park, Ontario to manage these networks.

South America

Given the extended coverage of Anik F1, Telesat is also concentrating on developing South American markets. The Company had initial success in the South American markets using older satellites that were no longer needed for service in Canada.

In 1993, Telesat successfully negotiated the sale of two Anik C satellites - C1 and C2 - to Paracom S.A. in Argentina. The Company also retained a ten per cent interest in the business to help secure its participation in the marketing of satellite services. Telesat operated the satellites on behalf of Paracom from its Satellite Control Centre in Ottawa. The agreement was arranged as an interim solution until Argentina successfully launched its own Nahuelsat series of satellites, whereupon the Anik C1 satellite was repurchased by Telesat.

Consistent with Telesat's transition plan, the design of Anik F1 was developed so that Telesat could expand substantially into the South American market. Consequently, in 1998 the decision was made to start serving Brazil in advance of Anik F1 by repositioning Anik C1 to serve southern Brazil. Telesat later sold Anik C1 to Loral Spacecom for service over Brazil, but still operates the satellite from the Satellite Control Centre in Ottawa. Given the capabilities of Anik F1, and its footprint covering all of South America, the Company has hired and

assigned sales managers within South America to expand its market presence. Canadian-based staff continue to provide ongoing sales, marketing, financial, legal, technical and administrative support to the Company's marketing efforts in South America.

Consulting

With the launch of Anik A1 in 1972, Telesat became the first company in the world to place a domestic geostationary communications satellite into commercial service. It soon became apparent that Telesat had developed an expertise unique in the new area of satellite communications.

Prior to 1980, Telesat's space systems technology services were already in high demand and the Company had undertaken a number of consulting contracts in various areas of satellite communications for a number of organizations. Consulting contracts were carried out for U.S. domestic satellite operators, including RCA and Western Union. The Company had undertaken work for spacecraft manufacturers such as the Astro-Electronics Division of RCA; for governmental space agencies such as the European Space Agency; for broadcasters who use satellite system such as the Government of Brazil and for a private broadcasting system in Luxembourg.

Telesat, today, has leveraged its initial consulting contracts, and the continuing development of skills related to its own network, into a growing and profitable business providing consulting and satellite services worldwide.

Telesat has successfully operated the Anik satellites, including spin- and three-axis stabilized types, since 1972. The Company has simultaneously managed multiple satellites and satellite generations, including satellites in normal operating assignments, collocated satellites, inclined-orbit satellites and satellites in storage orbits. Over the years, Telesat has been active in providing operations support to other satellite operators who wanted to minimize the investment in satellite control equipment and staff. Operations support can consist of full-up satellite control support and/or emergency back-up services. Such services have been provided to GE Americom, Paracomsat (Argentina), ARABSAT, MSV, and XM Satellite Radio, Inc.

Telesat closely monitors spacecraft construction for its clients

Telesat has invested to develop the skills and expertise of its satellite engineering team. Telesat engineers are now among the best available for the complex and painstaking task of evaluating and monitoring a satellite manufacturer's performance. This team includes many engineers who are considered industry experts in the areas of satellite design, systems analysis, subsystems design, transfer orbit services and satellite operations.

The work that Telesat performs in its consulting business runs from the initial business plan development through to in-orbit satellite operations. Telesat provides business plan development services based on a client's business objectives. Once the business plan has been finalized, Telesat then assumes the responsibility of designing a satellite that meets the client's business plan. This specification then forms the basis of a request for proposal to be issued to the various satellite prime contractors. When the final proposals are received, Telesat will perform a full evaluation of the manufacturers' responses, both technically and commercially, and advise the client as to the acceptability of the proposal.

After the evaluations have been completed, Telesat assists the client in negotiating the full procurement specification, again both technically and commercially. After a satellite procurement contract has been signed, Telesat establishes a field office at the manufacturer's facilities where the performance of the manufacturer is monitored throughout the entire procurement phase. Upon completion of the satellite, the satellite is shipped to a launch site where Telesat monitors the integration of the satellite to the launch vehicle.

Following launch, Telesat assists the client in monitoring the performance of the satellite manufacturer in measuring the technical performance of the satellite at its orbital position and makes recommendations concerning final acceptance of the satellite. In parallel with the procurement process, Telesat can provide to the client its expertise on the ITU frequency coordination process.

Telesat has also developed the expertise to plan and conduct the launch mission for the satellite. This involves planning of the mission orbits and the firing of the satellite motors during the transfer orbit phase. This expertise is unique for an operator, as it is normally found only with satellite prime contractors. Telesat's expertise in this area is so highly regarded that manufacturers use the service from time to time to validate their own mission planning. With the expertise developed in this area, Telesat was able to further develop its provision of transfer orbit services and has also established a worldwide tracking network.

1985, Telesat's transfer orbit mission team has supported over sixty (60) satellites from launch vehicle separation into geostationary orbit for a number of international clients and spacecraft manufacturers. TOS services have been provided to Boeing, Space Systems/Loral, CNES and Israel Aircraft Industries. Telesat also sells complete tracking stations and facilities to other satellite operators around the world.

Telesat has always designed and built the required software for the operation of its Anik satellites. Part of this software suite includes a flight dynamics system that manages the day-to-day support of all aspects of geosynchronous missions: transfer orbit injection, arrival at the orbital location, equatorial and inclined stationkeeping, orbital relocation, and finally, satellite retirement. Four years ago it was decided to commercialize the software. Telesat was successful in selling this software to other satellite operators and to Hughes Satellite Corporation (today known as Boeing Satellite Systems) for satellites that are being sold to other satellite operators around the world.

As part of its consulting services, Telesat also offers training programs to clients interested either in entering the satellite business as operators or users of satellite services. These training courses were initially developed for Telesat's internal use, but have now been customized for delivery to clients around the world. Telesat's training programs have been presented in more than ten countries.

Through its international activity, Telesat has extended its knowledge base, tapped additional sources of revenue and amortized its fixed costs over a larger market base. This has strengthened its ability to provide services in Canada and opened up export opportunities for its Canadian suppliers and subcontractors.