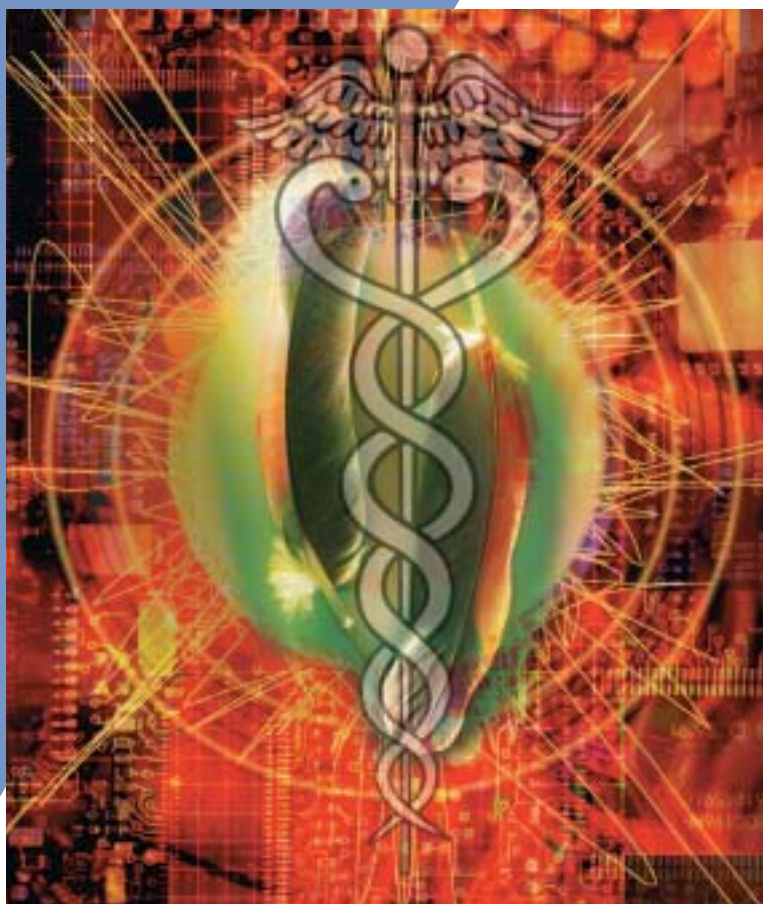
Telesat Report

TELESAT CANADA SATELLITE COMMUNICATIONS NEWSLETTER Summer/2003

High-speed satellite Internet service bridges the Aboriginal healthcare communications gap



Working in a remote community can be difficult at the best of times, but when you're responsible for people's health, the challenges can be a matter of life and death. Fortunately, healthcare professionals in 148 remote First Nations communities will soon have a powerful new tool to help master those challenges.

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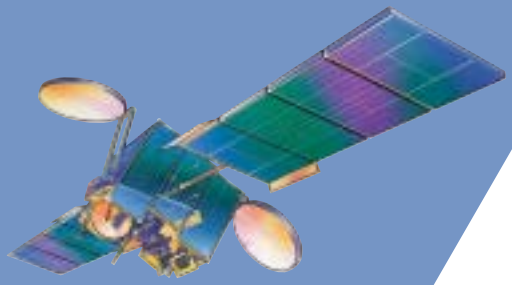

Sixdion

Information Management

Telesat and Sixdion, an Aboriginal information management solutions company, have partnered to provide high-speed satellite Internet service to Health Canada's First Nations and Inuit Health Branch (FNIHB). Healthcare professionals who work in these 148 Aboriginal communities will have access to community-based health applications, the Internet, and web mail, bridging the communications gap that exists in these isolated areas.

"The majority of remote First Nations communities cannot get high-speed Internet connectivity today," says Health Canada's Ernie Dal Grande, National Program Manager, e-Health Solutions Unit Ottawa. "We needed a solution that would meet our immediate requirements and that would be up and running quickly. Telesat and Sixdion provided that solution to us."

Helping healthcare workers feel less isolated

Valued at $2.3 million, the contract with Health Canada will bring satellite high-speed Internet service to the initial 148 FNIHB sites by June 2003. A potential second phase slated for the fall of 2003 would expand services to 354 other sites.

Under the program, hospitals, nursing stations, clinics, and treatment centres from BC to Newfoundland and as far north as Inuvik will have access to special medical applications such as the First Nations and Inuit Health Information System, the Home and Community Care and Diabetes System, as well as portals and virtual health libraries. Nurses, community health representatives, visiting specialists, home care specialists, and addiction counsellors—not to mention patients—all stand to gain.

"By using the service to offer portals and e-learning, we hope to make healthcare workers feel less professionally isolated and more involved," says Mr. Dal Grande. "We also hope to retain healthcare professionals for longer periods."

The diagnosis: a job for high-speed satellite

Health Canada considered a number of technology alternatives including DSL and community-based cable ISPs, but no other type of high-speed service could offer FNIHB the reach and value that satellite does.

Specifically, Telesat is using its High-Speed Internet (HSi) service to provide reliable connectivity to FNIHB health centres across Canada. Supporting virtually any data and IP multicast application, HSi includes an embedded web-page accelerator that rushes web content to users, so waiting time is virtually non-existent. This "always on" service offers ADSL-type speeds, robust network security, and 24/7 technical support. Moreover, HSi uses small, unobtrusive Ku-band antennas, which can be quickly installed.

With Telesat providing the technology, Sixdion handles the program management, capitalizing on its extensive project management expertise and broad experience delivering IT solutions to Aboriginal communities. "Having an Aboriginal partner is key for FNIHB to maximize value for their communities," says Murray Dion, President and CEO of Sixdion. "Our involvement helps FNIHB effectively deliver new healthcare solutions and services."

A solid success

Ernie Dal Grande of Health Canada agrees: "Sixdion and Telesat have dedicated a team of professionals to ensure that the service meets our expectations and the expectations of the end clients," he says. "Consequently, the remote satellite distribution project has been a solid success based on the seamless implementation and services that end clients are now enjoying."

Telesat and Storm Internet bring big bandwidth to small communities

Usually when a storm rolls into town, people run for cover, but in this case, the 6500 residents and business owners of North Stormont, Ontario, are running for their computers.

Located just 40 minutes southeast of Ottawa, North Stormont is the first municipality to benefit from a joint agreement between Telesat and Storm Internet that delivers high-speed Internet services to Canada's rural areas.

The two companies will use the North Stormont project to both evaluate and showcase the rural broadband service, which combines Telesat's satellite technology with Storm's last-mile terrestrial wireless service. The high-speed Internet service operates from the town of Crysler in the township of North Stormont.

"People in rural and remote communities want high-speed Internet access and the quality-of-life improvements that come with it," says Barry Williams, president and CEO of Storm Internet. "This venture with Telesat offers us a way to deliver those benefits."

Although Telesat and Storm Internet had discussed working together in past, the North Stormont project represented the first opportunity for the two companies to launch a joint service. Owned by International Datacasting Corporation, Storm Internet operates one of the largest broadband access networks in North America. This network covers approximately 35,000 square kilometers, spans more than 50 communities and municipalities, and serves some 150,000 businesses and residential users throughout Eastern Ontario.

Telesat and Storm Internet introduced the service in North Stormont, in part because of the community's proximity to Ottawa. Potential customers from the nation's capital can visit North Stormont to see the rural-broadband service in action more easily than they can visit sites further afield.

"We want to demonstrate how Telesat's Broadband Community Access Solutions can bring reliable high-speed Internet access to remote, isolated, and rural areas," says Hubert Janssen, IP Product Manager with Telesat. "Our service can literally reach every community in Canada, bar none, and the North Stormont project lets people see firsthand how the service operates in an actual underserved area."

Integrating satellite and terrestrial wireless technology

Here's how the service works: lightweight, unobtrusive reflectors located on customers' premises transmit Internet commands—requests for web pages or email, for instance—to one of four transmitters located on the water tower in Crysler, Ontario. These transmitters collect requests from all area subscribers and feed the signals into a Storm Internet mini-network operations centre located in Crysler. From there, the signals pass to a co-located Telesat earth station, which aggregates the traffic and sends it by satellite to a Telesat gateway. Here the signals are connected to the Internet. Content from the Internet follows the reverse path back to customers.

"Satellite is well suited to the applications that we're delivering in North Stormont," says Mr. Williams. "It's ideal for high-speed Internet access, browsing, and email. As well, Telesat has been great to work with. They're a supportive partner with lots of good ideas and practical implementation experience."

Providing reliable transmission is half the battle; the other half involves properly and efficiently routing traffic to and from customers. This role falls to Storm's remotely controlled mini-network operations centre, which includes mail and caching systems and a router to direct traffic to its proper destination. Storm uses a proprietary, intelligent last-mile wireless solution to manage client traffic and optimize performance.

"Ours is basically a shared service," says Mr. Williams, "but unlike cable-modem services, at peak hours customers still get good performance."

The way of the future

Telesat's Broadband Community Access Solutions offer three service models, allowing the company to provide high-speed service to communities or directly to enterprises that require dedicated IP bandwidth. Either way, these C-band services will prove attractive in areas too remote to serve cost-effectively with terrestrial broadband services.

Do Storm and Telesat plan to bring their rural broadband service to other remote areas? "Absolutely," says Mr. Williams. "We're looking at repeating this process many times and are looking to expand beyond North Stormont into other underserved areas."

That's one storm that residents and businesses will gladly welcome.

Saluting a thoroughbred's space odyssey: Anik C1 is finally put out to pasture

Originally expected to last fewer than nine years, the venerable Anik C1 satellite operated twice that long despite seven moves and four different owners.

Telesat officially bid adieu to the well-travelled Anik C1 on 5 May 2003. Recently retired Telesat satellite engineer Paul Margittai, who had helped Hughes Aircraft Corporation design and test the satellite in the early 1980s, was invited to send the final computer commands that silenced Anik C1 forever.

"It was a bit emotional," said Mr. Margittai, who was in charge of Anik C1 and five other satellites during his 26 years with Telesat. "But I have no regrets—it's a lifecycle—birth, life, death. And I have the satisfaction of having played a substantial part in operating the Anik C's and D's during my career."

Monitoring Anik C1's ascent into space from Telesat's satellite control centre on 12 April 1985, Mr. Margittai could little have predicted that the satellite would last 18 years. But putting the satellite in an initial three-year storage orbit, shifting it to an inclined orbit in 1997, and raising its aft solar array drum in 1997 allowed Telesat to conserve the precious on-board fuel that ultimately doubled Anik C1's expected longevity.

A Ku-band pioneer

Anik C1 can trace its origins to a satellite-development program that the Canadian Department of Communications (DOC) and the American National Aeronautics and Space Administration (NASA) co-sponsored at the Communications Research Centre in Ottawa in the 1970s. Under the program, DOC commissioned the world's first Ku-band high-power satellite, and NASA launched it on 17 January 1976.

Known initially as the Communications Technology Satellite, this experimental spacecraft enabled both DOC and NASA to test a new concept in satellite communications: using high-powered 14/12 GHz Ku-band satellites to communicate with small antennas on Earth. This concept underpins today's highly popular direct-broadcast satellite (DBS) television services and very small aperture terminal (VSAT) data services, but in the mid 1970s, it was ground-breaking technology.

Jeanne Sauvé, then Canada's Minister of Communications, christened the experimental Ku-band satellite Hermes—the messenger of the gods in Greek mythology. The subsequent success of the Hermes trials prompted the Canadian government to fund six experimental Ku-band transponders on Telesat's Anik B1 satellite, which also contained 12 C-band transponders.

After launching Anik B1 in December 1978 and conducting further Ku-band trials, Telesat commissioned five new satellites: three Ku-band Anik C's and two C-band Anik D's. Hughes Aircraft Company (today known as Boeing Satellite Systems) was prime contractor

Anik C1 Quick Facts

Manufacturer: . . . . . .Hughes Aircraft Company
Spacecraft type: . . . . . .Hughes HS376
Weight: . . . . . .1160 kg
Transponders: . . . . . .16 Ku-band
Launched: . . . . . .12 April 1985
Vehicle: . . . . . .Space Shuttle Discovery
Decommissioned: . . . . . .5 May 2003
Length of service: . . . . . .18 years, 23 days

The popular and versatile Boeing 376 spin-stabilized spacecraft is one of the world's most-purchased commercial communications satellite models. Fifty-eight Boeing 376 spacecraft have been built or ordered for more than a dozen customers on five continents.

for the Anik C's and Spar Aerospace for the Anik D's. The design of each satellite was based on Hughes' HS376 spin-stabilized spacecraft.

Launching Anik C1

Building the satellites was only the first milestone. Telesat then had to get them into orbit. In the early 1980s, the company struck a highly attractive deal with NASA to use its fledgling space shuttles to launch the three Anik C's and one of the two Anik D's. Telesat would save millions of dollars by launching these satellites on space shuttles rather than on standard launch rockets.

Interestingly, the three Anik C's were launched in reverse order of their construction. Anik C1 and Anik C2 were finished ahead of schedule and were temporarily stored. Anik C3's completion coincided with the availability of Telesat's first contracted space-shuttle flight, so the spacecraft moved directly from the testing lab to the launch pad at Florida's John F. Kennedy Space Center.

Anik C3 was launched on 11 November 1982, and Anik C2 followed on 18 June 1983. Almost two years later, Anik C1 got its turn. Sitting upright in the Space Shuttle Discovery's cargo bay on 12 April 1985, Anik C1 lifted off in a mighty explosion of smoke and flames and ground-shaking noise.

Anik C1's inclined orbit saved precious fuel

With two Ku-band satellites already operating, however, Telesat had no immediate need for Anik C1. The company therefore stored it at 107.5° W in an inclined orbit for three years rather than in a geostationary orbit. This decision reduced Anik C1's fuel consumption by more than 90 percent during the three year period and allowed Telesat to delay depreciating the asset, an accounting advantage that added to the company's bottom line.

In 1988, Telesat brought Anik C1 out of storage orbit and in May 1989, assigned the spacecraft its first traffic: 17 broadcast customers including Musique Plus, Super Ecran, TV5, YTV, Canadian Home Shopping Network, and Knowledge Network. After carrying this traffic and later some data and television occasional use services, Anik C1 was moved to 109^0 W in December 1991. Here it served to briefly back up the national telephone-company network, but by this time, Telesat had other plans for Anik C1.

Argentina bound

With the launch of its two dual-band Anik E satellites in 1991, Telesat's Ku-band capacity requirements were well in hand, and the company decided to sell Anik C1. After discussions with several potential buyers, including organizations from Saudi Arabia, Mexico, Brazil, and the United Kingdom, Telesat sold both Anik C1 and Anik C2 to Paracom Satelites of Argentina in January 1993.

Under the terms of the sale, Telesat would also provide tracking, telemetry, and control services to Paracom Satelites until 1997, when Argentina's own domestic satellite, Nahuel 1, was scheduled to launch. As part of the transaction, Telesat also bought 10 per cent of Paracom Satelites, and the

two companies owned Anik C1 and Anik C2 under a joint venture called Paracomsat. Telesat operated both satellites from Ottawa.

When the deal was finalized, Telesat turned Anik C1 upside down (inverted it) to optimally cover Argentina and moved the satellite roughly 30 degrees east to 71.8^0 W, where it arrived in April 1993. Paracomsat used Anik C1 to serve Argentinean and Uruguayan television broadcasters.

The Brazilian venture

In 1997, Telesat repurchased Anik C1 and Anik C2 when Nahuel 1 started operating in March. That sale meant moving Anik C1 again. To conserve fuel, Telesat stopped Anik C1's north-south station keeping, which started the satellite's inclined orbit.

Anik C1 was re-inverted, and in May 1997, it arrived at its new home at 118.7^0 W. Here Anik C1 carried North American television occasional use traffic, but before long, the spacecraft would again be aimed at South America.

In 1998, Telesat sold Anik C1 to Telesat Serviços de Telecommunicação S.A., a newly formed company owned by Telesat subsidiary Telesat Ltda. and Brazilian firm Partel. Throughout the year, Anik C1 drifted to the most easterly end of the Canadian orbital arc at 106.8^{0}W, a position that would allow the satellite to provide services between major centres in Brazil. In fact, by the end of 1998, Telesat and its partners had constructed hub stations in Rio de Janeiro, São Paulo, and Belo Horizonte. These hubs were used to market satellite capacity to telephone companies as well as businesses that required private network services.

In early 2000, Telesat bought out the interests of Partel, and in August 2000, sold Anik C1 to its final owner, Loral Space & Communications. Operated under the name Brazil 1(T), Anik C1 was moved to Loral Skynet's 63.0^0 W orbital position, where it was available to provide service for satellite newsgathering, trunking, Internet, corporate data, videoconferencing, and fibre-network backup applications. As it had for all of Anik C1's owners, Telesat operated the satellite on behalf of Loral.

All good things must come to an end

Even though their electronics may function perfectly, all satellites eventually run out of fuel. And that's what happened to Anik C1. On 5 May 2003, Telesat decommissioned this long-serving spacecraft, using the remaining fuel to jettison it well beyond geostationary orbit. Seven moves, four owners, and two inversions spanning an 18-year career have earned this satellite a notable place in Telesat's history books.

Innovative fuel estimating added six years to Anik C1's life

Conserving satellite fuel is vital, but so too is knowing how much fuel remains onboard a spacecraft. Telesat's traditional software-based bookkeeping method suggested that Anik C1 should have run out of fuel in 1997. This approach estimates fuel use given the frequency and duration of thruster firings.

But Telesat employed two other techniques to estimate Anik C1's fuel reserves more accurately, which increased the satellite's lifespan by six years.

The fuel-slosh frequency method involved firing a thruster and estimating fuel levels by measuring the satellite's motion. Using this technique, Telesat determined that in 1997, Anik C1 contained 3.4 kg more fuel than the bookkeeping system suggested. Rather than retiring, Anik C1 went back to work.

The second technique, the fuel-transfer method, involved moving fuel within the satellite and calculating reserves by analyzing differences in the satellite's spin characteristics. Telesat used this technique in 2000 to determine there was 0.8kg more fuel than predicted and to accurately calculate the satellite's end of life.

Telesat's Paul Margittai sends the final command to de-orbit the Anik C1 satellite.

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Patricia Kube
Editor, Telesat Report
Telesat Canada, 1601 Telesat Court, Gloucester, Ontario K1B 5P4
Phone: 613-748-0123
Toll-Free: 1-800-267-1870
info@telesat.ca
www.telesat.ca

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