

Internet Space Race

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September 12, 2001 12:56 PM PT

URL:

Satellite-based Internet access is no longer just pie in the sky. Just ask Bill Collins, an independent telecom industry consultant. Collins credits StarBand's new two-way broadband fixed satellite service with letting him telecommute full time from a house in rural Oregon instead of spending two days a week at his DSL-outfitted condo in the city. Thanks to StarBand's 150-Kbps-uplink/500-Kbps-downlink speeds, Collins finds he's getting enough bandwidth through the satellite dish on top of his house to put his apartment in Portland, Ore., up for sale.

Satellite services with even faster Internet access speeds are already coming into play. North of the border, a high-bandwidth service from Telesat Canada is now being piloted among 20 communities, with another 20 towns on the radar screen for this year. By 2002, Telesat expects to be offering uplink rates of up to 2 Mbps for applications ranging from telemedicine to distance learning.

Unlike satellite services for mobile voice users such as Iridium or GlobalStar, the emerging Internet broadband solutions are fixed satellite services, requiring the use of a desktop PC, server or dedicated terminal hooked up to an Earth station or satellite dish. Anticipating strong customer demand across the world, companies are sweeping into this emerging space from a variety of technological perspectives.

"At least 30 percent of Canadian households currently don't have access to either DSL or cable, and about 15 to 20 percent never will," maintains Ken Gordon, Telesat Canada's director of future technology development, pointing to Canada's far-flung population distribution, rough terrain and icy winters.

Analysts estimate that as of 2002, about 32 million U.S. households likewise will remain out of reach of either DSL or cable. A recent study by Dataquest projected the number of satellite terminals in North America, Europe and Asia-Pacific will soar from fewer than 300,000 in the year 2000 to 7.2 million in 2005. On the home front, the FCC estimates that the provision of high-speed access via satellite and fixed wireless technology more than doubled to 112,000 lines last year from 50,000 the prior year.

Low, Medium, High

The satellites being deployed for Internet access differ from one another according to orbit as well as frequency range. Most initiatives for high-speed access revolve around geosynchronous Earth orbit (GEO) satellites, which stand at a point about 22,300 miles above the equator. StarBand, a venture backed by EchoStar, Gilat and Microsoft, currently uses the medium-frequency Ku-band GEO satellites, operating in the 11- to 17-GHz range.

Others, including Hughes and a new startup called WildBlue, are moving into the high-frequency Ka-band, operating at 20 GHz to 30 GHz. Some players, including Telesat Canada, plan to launch satellites carrying a mixed Ka-band, Ku-band and low-frequency C-band payload.

One notable exception to this rule is Teledesic. Spearheaded by Craig McCaw of McCaw Cellular and Microsoft's Bill Gates, Teledesic is looking to deploy a constellation of low Earth orbit (LEO) and medium Earth orbit (MEO) satellites for "3G-like" communications services. Another player in the same general category, Alcatel-backed SkyBridge, recently announced that it would lease satellite capacity instead of raising the \$6 billion needed to build its own LEO system.

All of this higher-speed access activity has been springing up fast. Up until StarBand's commercial rollout in the fall of 2000, Hughes' DirecPC was the only commercial fixed broadband satellite service publicly available in the United States. DirecPC, however, originally was just a one-way satellite service. Customers were required to dial in to the system over standard phone lines before being able to browse >> >> the Web or download content.

Other early satellite offerings were LEO systems for remote mobile telephony or telemetry. Heedless of the impending threat from competing cell phone technologies, multibillion dollar LEO efforts like Iridium and ICO failed miserably, plunging into bankruptcy. GlobalStar, another LEO satellite-based mobile phone system, continues to operate but is widely predicted to run out of cash soon.

Operators claim, though, to have learned from the mistakes of the first LEO era. On both the fixed and mobile access sides, players are trying to bend technology in the direction of meeting the real needs of targeted groups of users.

Iridium, ICO and Orbcomm, another bankrupted LEO, each are being resuscitated by new investors who bought the properties at auction for a fraction of their original worth. Launched in March 2001, Iridium Satellite's new services use the same underlying LEO technology as Iridium LLC, the predecessor company that went belly up in 1999. Newly added to Iridium, though, are data services. "Iridium 2" also has decided to concentrate strictly on users who travel beyond the bounds of less costly cell phone coverage, such as workers in maritime, mining, aviation and military defense industries.

Orbcomm, on the other hand, uses much smaller satellites than Iridium, so its costs are lower. The revived Orbcomm is expected to keep honing in on telemetry and short messaging applications such as vehicle tracking and automated meter reading.

ICO, for its part, is about to merge with Teledesic. The company known as New ICO plans to launch 12 MEOs, orbiting about 8,000 miles above the Earth in the 2-GHz frequency range, for service in 2003. Teledesic already expected to deploy 250 LEOs for service in 2005. The company has long been eyeing "Mega-LEOs" in the 20-GHz to 30-GHz range, which provide more information-carrying capacity than other LEOs, for its new breed of

high-speed mobile services.

Although new companies seem to be the rule here, established entities are retooling for satellite Internet access. Case in point: the 40-year-old, treaty-based cooperative Intelsat went private as Intelsat, Ltd. in July 2001, claiming that privatization was the only viable way to address developing markets such as the Internet and broadband services. While the cooperative could provide only the satellite portion of the communications link, the new company can focus on delivering more end-to-end solutions for its customers.

Rural Focus

Taking a cue from the satellite TV industry, most of the current players in satellite broadband are focusing first on "bridging the divide," bringing Internet access to geographic regions where DSL and cable lines fail to go.

For example, three Native >> >> American tribes in Arizona are now readying an online hospitality training program aimed at preparing members of the reservation to work at a new casino/ resort. When the program rolls out in September, StarBand's broadband satellite network will deliver services to computer rooms at three training centers, located 250 miles from one another. One of the training centers is at the bottom of the Grand Canyon, a spot physically accessible by only a mule ride or an eight-hour walk.

Don Eddy, director of the state's Employment and Training Office in Parker, Ariz., is already experimenting with the satellite system from the training center in Parker, located some 100 miles from the canyon. Eddy has found, for instance, that he can now download RealPlayer in about three minutes, a far cry from the 90 minutes this process used to take over standard phone lines.

In April 2001, DirecPC matched StarBand by introducing its own two-way broadband satellite service. Both companies initially are targeting the two-way services at consumers, but both also have packages in the works for small businesses/home offices. Hughes, meanwhile, already has rolled out DirecPC Enterprise Edition (EE), an enterprise-oriented service that combines the company's legacy VSAT services with broadband Internet access.

The early broadband leaders are also at work on raising bandwidth, bringing down costs, and reducing the size and complexity of end user equipment. StarBand's first-generation broadband service required customers to purchase a special computer with embedded software. In the second generation, StarBand brought out a satellite modem, the model 180. The company is now beta testing a sleeker satellite modem, the model 360, which will be multicast-enabled for faster download times.

Can It Compete?

Operators can't escape from pricing issues, either. Outside of satellite hardware and installation fees, StarBand and DirecPC each cost roughly the same as DSL in terms of their monthly service fees (about \$60 per month for DirecPC and \$70 per month for

StarBand). At this point, though, access times for most satellite companies are a lot slower. One cost-containment approach StarBand is taking is leasing transponders on existing satellites, as opposed to building out its own "birds."

The emerging Ka-band (20+ GHz) technology, however, will call for new investments on the part of satellite service providers. Telesat Canada is now piloting its high-bandwidth services on the Anik F-1, a GEO satellite that uses Ku-band and C-band transponders. By the end of 2002, Telesat expects to launch Anik F-2, a satellite that will be equipped with Ka-band capability.

Meanwhile, U.S.-based WildBlue is currently testing its own services on Telesat's Anik F-1, while preparing to launch its own Ka-band satellite at the start of 2002.

Hughes is readying its own Ka-band service, dubbed Spaceway, for international deployment. The first regional Spaceway satellite, for North America, probably won't go up until 2003. Projected uplink times for Spaceway, however, range up to 16 Mbps with an optional broadband terminal, and even faster with gateway support. In Europe, an initiative called Astrolink is planning a GEO satellite that will carry a combined Ka/Ku-band payload.

Like the LEO satellites already launched by Iridium, Orbcomm and ICO a few years back, Ka-band GEOs will cost a pretty penny. Some observers, however, don't expect history to repeat itself.

"LEO satellites need to fly around the Earth much faster than the Earth's rotational spin to keep themselves from being sucked in by gravity," says Tony Gonsalves, WildBlue's VP for consumer >> >> marketing. "For the user to get continuous service, multiple low Earth satellites are needed, and the satellites have to keep moving and 'talking' to each other," he adds. In contrast, GEO satellites stand at a fixed point 22,300 miles above the Earth, where centrifugal force counteracts gravity.

On the down side, however, the high-flying GEO satellites are more prone to latency, also known as satellite delay. Although Collins is otherwise pleased with StarBand's services, he admits, for instance, to delays of a second or so. GEO barely supports telephony, and support for handheld mobile devices is out of the question at this point. Although Voice over IP is possible, results are kludgy, at best, notes Carey Healy, director of sales and marketing for Infosat, a systems integrator in the satellite space.

Not All Apple Pie

Ka-band satellite services face some issues of their own, including a greater tendency than Ku-band services to slow down or stop during heavy rainfall, says Clay Mowry, executive director of the Satellite Industry Association (SIA). WildBlue has been trying to repel "rain fade" by using multiple gateway sites.

The higher frequencies of Ka-band can help to overcome the latency problem, though.

Proponents also insist that Ka-band is better suited to individualized IP communications than Ku-band, a frequency range used until now largely for direct broadcast satellite (DBS) services such as Hughes' DirecTV and EchoStar's Dish TV.

WildBlue expects that its satellite will save money in the end by producing four to six times as much bandwidth per dollar as Ku-band satellites. Instead of a single beam, the satellite called "WildBlue 1" will use a large number of smaller "spot beams" pointed at various geographic regions. Multiple beams will be able to reuse the same frequencies, as long as the beams are pointed at different locations.

In fact, as Gonsalves sees it, WildBlue will be able to offer DSL-equivalent bandwidth for comparable pricing of about \$50 per month. At these speeds, users should be able to download movies on demand, for instance.

Over the Horizon

Will the industry really succeed this time around in bringing satellite-based Internet access to the masses? "Historically, many of the issues have been on the marketing side," according to Infosat's Healy.

Already, though, operators are recognizing the need for marketing help. Hughes, for example, no longer sells DirecPC directly. Instead, the services are being resold through consumer-friendly partners. EarthLink and Pegasus have already embarked on customer rollouts of DirecPC's new two-way service. AOL and Juno have signed on to follow. Meanwhile, Pegasus is applying for licensing in the FCC's second round of Ka-band licensing, says Pegasus VP Yolanda Robins. And it's unknown what a combined EchoStar/DirecPC entity could do.

Likewise, StarBand is marketing its Internet broadband services through partners Dish TV, Microsoft Network, the National Rural Telecommunications Council, Primus and Radio Shack. StarBand has also tapped partner Gilat to create user-friendly software and hardware. In the future, the company anticipates using a mix of Ka- and Ku-band gear to get the most from both frequency ranges.

Few experts doubt that satellite-based Internet access will dominate rural areas, particularly with the advent of higher bandwidth and a lower cost structure during the coming Ka-band epoch. The question that arises, however, is whether satellites will ever compete with DSL or cable in suburbs and cities. Advocates counter that Internet access is likely to follow the lead of TV coverage. Initially, most satellite TV customers were rural residents. Conversely, some 70 percent of all new satellite TV customers today live in suburban or urban areas. These customers are attracted to the wider number of satellite channels available, which is complemented by better customer service, according to the SIA's Mowry.

Hughes claims to be grabbing suburban consumers, through a package called DirecDuo, which offers entertainment and data services through a single satellite dish. For its part,

WildBlue has licensed the 109.2 degree GEO slot from the FCC, theoretically enabling customers to use a solo dish to get WildBlue's high-speed Internet access service plus either Hughes' DirecTV or EchoStar's Dish TV. EchoStar, one of WildBlue's investors, is already teaming with WildBlue on a single equipment solution for a bundled satellite TV/broadband Internet access service.

Will satellite Internet access bypass terrestrial access? A lot of partnering and positioning is going on now, but the answer remains to be seen.