



# The Early Road to Direct Broadcast Satellite

By Robert B. Taggart

Nearly 50 years ago on a clear October night, Bob and Marge Taggart piloted their three kids, Bob Jr., Sue and Barbara, into the family car and drove to the nearby Aurora Country Club. Many other Aurora, Illinois, residents had the same idea and over 100 people were standing near the first tee staring into the heavens away from the city lights. Soon we saw a blinking light in the western sky moving slowly eastward through the stars until it disappeared behind the trees. We waited another hour with a mixture of amazement and fear until the man's first artificial satellite returned. We watched again. At age 14, I was familiar with the emergency drills at school in preparation for nuclear attack. It was a scary night for me and one that changed the world.

In the fall of 1960 Senator John F. Kennedy campaigned in Aurora and we all gathered near the steps of city hall to hear him speak. His vitality and youth inspired us as never before.

On May 25, 1961, President Kennedy challenged the nation in his "Our Urgent Tasks" speech with the goal of landing a man on the moon by the end of the decade and tying the space program and the development of communications satellites together thereby "accelerating the use of space satellites for worldwide communications." (1)

On August 31, 1962, President Kennedy signed into law the Communications Satellite Act of 1962. The Act's purpose clearly states that:

*"It is the policy of the United States to establish in conjunction and in cooperation with other countries, as expeditiously as practicable a commercial communications satellite system, as part of an improved global communications network, which will be responsive to public needs and objectives, which will serve the communications needs of the United States and other countries and which will contribute to world peace and understanding."*

Intelsat was formed in 1964 and following the success of Syncom II in 1974, developed by the team of Dr. Harold Rosen, Early Bird 1 (renamed Intelsat 1) was launched on April 6, 1965.1

The Intelsat earth stations were 100 feet in diameter and cost over \$500,000. However, Professor Bruce B. Lusignan at Stanford University was imagining a new system using very high powered satellites and thousands of small low cost earth stations to bring education and information directly to schools and community centers in developing

nations. His idea was to use television as an educational tool and uplift developing nations using satellite technology. In 1967 Professor Lusignan, working with a group of 37 graduate students, developed a satellite television system for developing nations that would bring them into the modern world. Satellites offered the unique capability of broadcasting information, education and entertainment to millions of people in remote areas without needing the traditional communications infrastructure. In June 1967 the ASCEND Report (2) was published. ASCEND stood for Advanced System for Communications and Education in National Development.

In 1968, NASA and Stanford selected two graduate students, Bob Taggart and James M. Janky to develop the low cost earth stations. Janky had been a team leader in the ASCEND project. To make the ASCEND system feasible required a very high powered satellite and very inexpensive earth stations. NASA was formulating plans for a high powered experimental satellite as part of the Application Technology Satellite (ATS) program. Taggart and Janky were to develop the earth stations that not only worked but were producible in quantities of 500,000 for less than \$200. At the time satellites had low power requiring very large and expensive earth stations.

Janky and Taggart presented their design (3) in June 1970 at IEEE meeting called International Communications Conference '70 (ICC'70). Their earth station included a seven foot diameter antenna made from ten aluminum or steel petals that could be manufactured for under \$30. All electronics including the receiver were located in a die-cast housing located at the focal point of the antenna. The factory cost was estimated at \$170. A single coaxial cable from the receiver connected directly to the television. Many people laughed, believing it was impractical. Al Horley decided to prove them wrong.

In 1971, Dr. Albert L. Horley, Assistant Secretary of Health, Education and Welfare under the Nixon Administration, working with NASA and with the Federation of Rocky Mountain States, spearheaded the implementation of educational satellite television on the ATS-6 satellite. Horley had been a team leader in the ASCEND project at Stanford in 1967. This system was composed of 120 seven and ten foot earth stations located at schools in the Rocky Mountain states, Appalachian areas and Alaska. The frequency was S-Band (2.63 GHz). Jim Janky managed the acquisition and installation of the small earth stations.

The ATS-6 satellite was launched on May 30, 1974, into synchronous orbit at 94.4 degrees west longitude. NASA said, "ATS-6 was the first direct broadcast satellite (4)." Janky and Taggart installed one of the ASCEND seven foot antennas in Denver, Colorado, and received satellite TV in June 1974. Another seven foot ASCEND antenna was installed later in 1974 at a rural school in Roundup, Montana.

The ATS-6 satellite was located over the U.S. from May 30, 1974, until May 20, 1975, when it was moved to 35 degrees east longitude. There it would be used to support the Indian Government's year-long SITE program, transmitting educational television to about 2400 schools across India. The frequency was 860 MHz. It was at this time in late 1975 that Steve Birkill, a BBC transmitter manager, built his own satellite dish and receiver, and received satellite television from ATS-6 at his home in England. Birkill pioneered the home satellite television business in the U.K and Europe.

The most significant accomplishment of the ATS-6 mission was demonstrating the practicality of broadcasting satellite television to small, simple and expensive ground stations. In November 1975, Richard B. Marsten, NASA's Director of Research and Development, was commenting on the success of ATS-6, and said, "High power satellite services incorporating small, simple inexpensive ground terminals may be the next major change in characterizing domestic satellite communication systems." (5)

Although the success of ATS-6 proved that direct broadcast satellite TV would work, something else was needed to make it a product that people would buy. That "something else" was cable television programming, which started with the "Open Skies" decision.

The FCC issued its landmark "Open Skies" decision in June of 1972. This paved the way for the introduction of domestic satellite systems. Eight companies applied for domestic satellite services including: COMSAT, Fairchild, GTE, Hughes, RCA Globecom and Western Union.1

The United States' first domestic satellite was Western Union's WESTAR I, launched on April 13, 1974, and then SATCOM F-1, in December 1975. This led to the HBO broadcast of the "Thrilla in Manila" on September 30, 1975, on WESTAR I, and to Ted Turner's launch of Superstation WTCS (later named WTBS) on SATCOM F-1 on December 17, 1976.1

Scientific Atlanta had introduced a 10 meter dish that made it affordable for cable systems to receive satellite programs (before that a 30 meter dish was needed).

Being able to receive cable programs on smaller diameter dishes started the C-band home satellite business. Although 10 meter dishes were not consumer friendly, innovators like Taylor Howard, Bob Cooper and others, were soon trying smaller dishes, inventing simpler electronics and teaching others how to do it.

Now there were interesting programs to see on satellite and we all wanted to watch them!



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From Left to Right:

1. Professor Bruce B. Lusignan, 1967
2. Jim Janky, 1970
3. Bob Taggart, 1970
4. Seven Foot Antenna and Receiver at Stanford, 1970
5. The ATS-6 Satellite, 1974
6. Receiving TV from ATS-6 in June 1974, Bob Taggart in Denver, Colorado



Watch "Satellite Industry Pioneers", a nine minute movie, on the Chaparral Communications web site: [www.chaparral.com](http://www.chaparral.com).

References:

1. Wight S. Labrosdor and Peter J. Grace. Heavens Fill with Commerce: A Brief History of the Communications Satellite Industry 2005.
2. Stanford University, School of Engineering. Advanced System for Communications and Education in National Development, June 1967. [Hereinafter called ASCEND Report.]
3. James M. Janky, Robert B. Taggart, Jr., Bruce B. Lusignan, "Low Cost Receivers for Use in Instructional Broadcasting Via Satellites," a paper presented at the International Conference on Communications, IEEE, on June 16-18, 1970, in San Francisco.
4. NASA web site: QUICK LOOK, ATS-6. <http://msl.jpl.nasa.gov/QuickLooks/ats6QL.html>
5. PAPERS, Applications Technology Satellite-6, IEEE Transactions on Aerospace and Electronic Systems, November 1975, Volume AES-11, NUMBER 6, pages 982-1047.