CABLE AND SATELLITES--NEW OPPORTUNITIES FOR SERVICE

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A review of the similarities and differences between existing commercial satellite configurations and the NASA experimental communications satellites ATS-6 and CTS. CATV system operators are urged to consider experimentation on the latter, particularly in the area of continuing education--a movement gaining increased momentum in this country.

At the 1969 NCTA convention there was a major Engineering and Management session on "CATV via Satellite." Fred Ford and Irving Kahn were on that panel and I was too. The argument was made that it was both desirable and inevitable that CATV systems would soon be linked together by satellite. Now, with the added ingredient of pay television providing the catalyst, that prediction is coming true.

My contribution to the 1969 panel was to call attention to the fact that education's interest in the new technologies are complementary to your own and that linking cable and satellites must surely open up new opportunities for us to cooperate to our mutual advantage.

I believe that now even more strongly than I did in 1969. Let me cite one significant example--the technology of communication satellites.

Domestic communications satellite services currently available are more marked by their similarities than their differences. The common configuration, 5-watt transponders at 4 GHz, makes compelling sense for communications systems whose primary mission is long-haul traffic between and among major population centers. The constraints such a configuration puts upon ground requirements are as familiar to you as they are to me: "small" earth stations require 30-foot antennas and cost upwards of $70,000. In major urban areas, problems of frequency coordination require earth station siting at locations far from the user's premises and add the costly burden of microwave "tails" to the system requirements.

This is not to be critical of the domsat carriers or the satellite designers. Current systems are appropriately sized for the work they were designed to do. Earth station installations at $100,000 apiece are not prohibitively expensive if 99.99% reliability is required and if only a limited number of ground terminals is needed. Those of us in education, health and other public service fields, however, find such costs well beyond our reach. In addition, schools, universities, hospitals and the like--especially those which most need the help that communications can bring--are not neatly clustered in the nation's major metropolitan areas.

Our constituents--and there are many of them--are scattered all across the 50 states. I trust you're beginning to sense that there is an interesting parallel here between our constituency and yours. Cable television head-ends are also widely dispersed, and there are many of them. A satellite communications system when configured to meet the needs of education and health would resemble pretty closely the kind of system which would be required if satellite interconnection of <u>all</u> cable systems should become a reality.

One of our prime criteria is low earth station cost. Not only is that important in terms of bringing the benefits of satellite communications to small institutions at a price they can afford, but because earth station costs have an enormous impact on "the bottom line." There are more

than 22,000 school districts in the United States. If a satellite system were to serve one school in each district, a $1,000 reduction in the cost of earth terminals would save $22,000,000. For satellite systems requiring more than a few thousand terminals, it is the cost of the ground stations, not the cost of the satellite, which drives the system.

For that reason, we in education have been keenly interested in the possibilities which new communications satellite technology has opened up. The National Aeronautics and Space Administration's ATS-6 delivered color television signals of more-than-acceptable quality into earth stations with antennas only ten feet in diameter and stations of the same size could be used to transmit television programming back to the satellite. (Such two-way "intensive terminals" were permissible only in Alaska: their use was precluded from the Lower 48 not by the limitations of the technology but by insurmountable problems of frequency coordination).

What makes such a startlingly different television service available via ATS-6 are the satellite's greater power, the ability of its 30-foot space-deployed antenna to concentrate all of the available energy into a relatively small footprint, and the fact that ATS-6 transmitted not at 4 GHz but at 2.5.

What satellite experts call the 2.5 GHz band, instructional television users refer to as 2500 MHz. Terrestrially, the band is assigned to the Instructional Television Fixed Service but the sharing criteria are such that interference problems are no where near so horrendous as at 4 GHz. In the ATS-6 experiments, two satellite receive points were in cities with ITFS installations. In Huntsville, Alabama, the space and terrestrial services were able to operate without difficulty. In Las Vegas, Nevada, one ATS terminal was located at the city schools' headquarters where the schools' ITFS transmitter is also located. When the terrestrial system was operating, reception of space signals was impossible. However, the satellite receiver at the University of Nevada-Las Vegas, a few miles away, could receive the satellite signal without interference.

At the 1971 World Administrative Radio Conference, the United States was successful in securing reservation of the 2.5 GHz band for satellite broadcasting for education and community development. While that allocation precludes the use of the band for relaying commercial entertainment to CATV systems, a first step in cooperation between our two communities was taken in the Satellite Technology Demonstration project of the Federation of Rocky Mountain States. STD school and community programming transmitted on ATS-6 went directly to 56 rural schools and to public television stations in the Rocky Mountain area, but in Osburn, Idaho, and Elko, Nevada, the ATS-6 terminals were located at the head end of the local cable systems. They are the true pioneers of satellite cable interconnection.

ATS-6's 15-watt transponders are three times more powerful than those of WESTAR and SATCOM. The Communications Technology Satellite, launched in January, carries two television transponders, one at 20-watts and one at 200. CTS, a joint venture of NASA and Canada's Department of Communication, will soon be providing television into small terminals, similar to those used for ATS-6. The coverage area of CTS, however, will be far larger than those of the earlier satellite. Each of its two independently-steerable beams can cover an entire U.S. time zone.

During the first year of its operation, a variety of experiments in education and health care will fill CTS's schedule. SECA--the Southern Educational Communications Association --plans to explore the use of CTS for regional TV networking. SECA is the largest of public television's regional associations and its Southern Educational Network extends from Virginia to Texas.

The SECA experiment is not to be confused with the plans of the Corporation for Public Broadcasting and the Public Broadcasting Service to interconnect PBS stations on an operational basis via WESTAR transponders leased from Western Union. Nationally, public broadcasting like pay cable, must look to existing systems with established technology as a basis of any operational enterprise. Like all CTS users, SECA is engaging in an experi-

ment and the results of that experiment may be of considerable use in developing the next generation of communications satellite systems.

The Joint Council on Educational Telecommunications works closely with NASA on both ATS-6 and CTS experiments and if any of the U.S. or Canadian CTS experiments proposed for the first year involve cable television, I am not aware of it. Albert Whalen and others are better qualified to speak to the technological considerations, but it appears to me that cable television should be as interested in gaining first hand experience with satellites at the 12 GHz band as we in education are.

The opportunities to explore what high power satellites can do for cable and education (separately or together) are too attractive to resist. The CTS schedule is only firm for its first year of operation and, while the satellite has a design life of two years, the launch last January was so nearly perfect that there is enough fuel on board to maintain station-keeping for an additional two years. Further, ATS-6 becomes available for its third year of operation after the conclusion of India's Satellite Instructional Television Experiment.

While members of the cable community are free to propose their own CTS or ATS-6 experiments to NASA without any assistance from us, I continue to be as enthusiastic as I was in 1969 for finding areas of common interest where we might work together and gain mutual benefits from our explorations in programming as well as in technology. Let me sketch out some areas in which I think cable and education might try out cable satellite interconnection, whether by CTS, ATS-6, WESTAR or SATCOM.

At the same time that pay cable has been drawing the increased attention of the cable industry an equally exciting development has been afoot in post-secondary education. I'm sure that most of you have read about the British Open University which is now providing tens of thousands of British citizens with a "second chance" to pursue a University degree. While the Open University of the United Kingdom is internationally known, it is a manifestation of the trend that is going on all around the world. Here in the United States there are such projects as the University of Mid-America which like the British OU makes television a principal ingredient (but not the only one) in its college-level course offerings. Other projects, here and abroad, may or may not use television but all are directed at bringing opportunities in post-secondary education to a large, eager, and previously under-served clientele: those who are past 25 and whose work and/or family responsibilities preclude them from returning to the campus to enroll in conventional college programs.

The University of Mid-America was spawned by the University of Nebraska, and its growth has taken it beyond the border of the Cornhusker State and now involves established state universities in Kansas, Iowa and Missouri as well. Another important trend is to be found in the development of college courses around such outstanding public television series as AMERICA, CLASSIC THEATRE, and THE ASCENT OF MAN. The University of California-San Diego and Miami-Dade Community College district have been leaders in seizing the opportunity which such outstanding television fare provides. Working closely with print publishers, they have developed work books, teacher guides, additional reading materials, and the like to assemble a complete "package" which enables any cooperating college or university to offer a course, on- or off-campus. The success of that approach may be measured by the fact that more than 300 colleges enrolled 23,000 students in the course based upon THE ASCENT OF MAN during its first run on PBS in the spring of 1975. During the second run, in the fall, an estimated 30,000 students were enrolled.

These programs have, of course, been on open circuit television just as their predecessors on NBC's old CONTINENTAL CLASSROOM and New York University's perennial SUNRISE SEMESTER. In the past, such educational programs had to measure their success by counting the total of viewers--and at 6 AM those numbers were never large. The number of students enrolled for credit--and paying fees--has never been more than a small percentage of the total number of viewers--some casual, but some quite as avid as those who enroll as college students.

On the college campus, interested students and citizens of the community who want to "audit" a popular course need not take nor pay for credit but in most institutions they are expected to register as "auditors" and pay at a somewhat reduced rate. Broadcast television has always "let the auditors in free" because there was no way of tapping that source of potential revenue.

University deans and business managers in public as well as private institutions are quite comfortable with the idea of charging money for the educational product their institutions offer. That pay cable could provide the necessary technology is a fact of which most of them are simply unaware.

To explore this opportunity would clearly require the participation of cable television operators, pay channel entrepreneurs, institutions of higher education, and satellite interconnection. To mount an experiment in higher education by pay cable and do it well is likely to require more than local resources. A conventional cable system and a local college are almost certainly doomed to the kind of Great Talking Face lectures which were all too characteristic of instructional television in the days before SESAME STREET and Jacob Bronowski. In this area, as in entertainment, substantial critical mass will have to be achieved before such a development has any chance of success.

On the other hand, the price of getting started is not so immense as to be beyond our combined grasp. The British Parliament charted and funded the Open University and made a long term commitment to the development of a new national institute of higher learning which would eventually give undergraduate and graduate degrees in a wide variety of disciplines. To explore what cable, higher education, and satellites might do in combination on this side of the Atlantic requires no such resources or commitment. Software now exists at the University of Mid-America, as well as the public television programs which have provided the basis for college courses. We are not talking about television programs alone; each series has its set of ancillary materials--text, course outlines, and the like.

Finally, across the country there are hundreds of colleges and universities which have already had successful experience with these materials or others like them and which have demonstrated their willingness to offer academic credit.

At a different academic level there are also several already-developed and tested television series keyed to the General Educational Development tests. The prestigious American Council on Education (one of the founding members of the JCET) administers these GED tests and in almost every state and Canadian province, local education authorities are prepared to grant a high school diploma on the basis of successful completion of these GED exams. Whether on pay or open channels the combination of these television materials and nationally accepted tests offers yet another opportunity to mount a program which could both meet a pressing national need and provide its own economic support.

In 1969, I ended my remarks by saying that "our interests are rapidly converging--in fact, they have already converged. . . . Toward establishing our broader dialogue, let me close by offering you whatever help the Joint Council on Educational Telecommunications can provide."