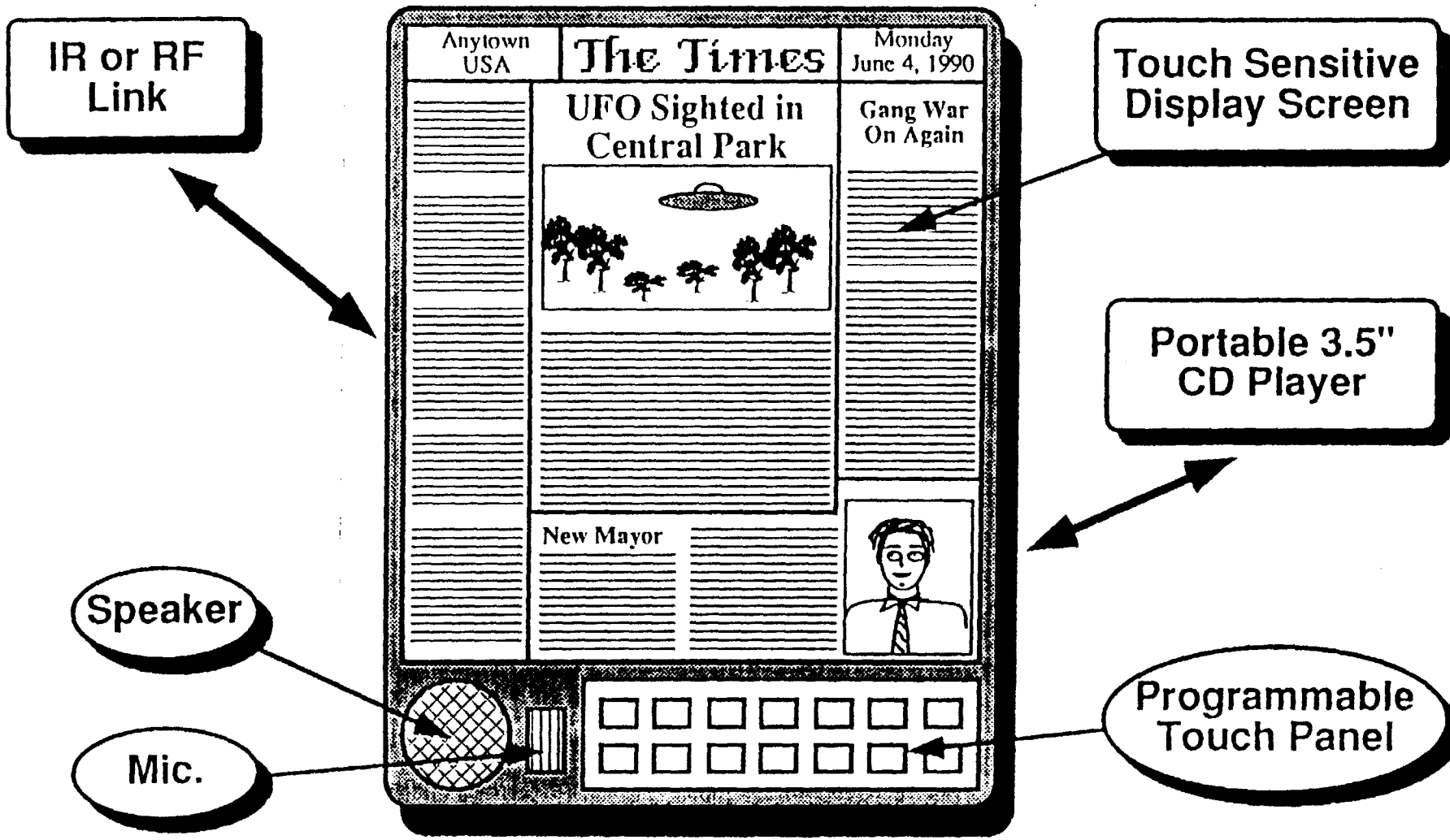
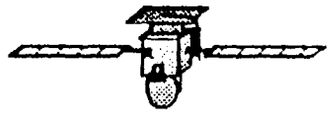
The "ELTRON"



Advanced Communications Engineering, Inc.



Star-Schools Reviewers' Comments

- "Strong technical proposal. Far-reaching potential."
- "This is a daring project which could have significant payoff across the country. This needs to be seriously considered."
- "Strong proposal related to the future technology of satellite delivery."
- "Application spells out a strong partnership."
- "The concept and technical plan for Gutenberg II is excellent and has great potential for meeting the priorities of the Star-Schools RFP."
- "The technical design is comprehensive. Administration of the proposal appears solid."
- "The implications for this network are far-reaching potential. There is a need for this type of service."

EXECUTIVE SUMMARY

ADVANCED COMMUNICATIONS CORPORATION

Purpose

This brief overview prepared by management of the Company is not a prospectus and should not be used for investment decisions. It is provided for informational purposes only. Its intention is to provide a synopsis of the direct broadcast satellite (DBS) industry, the state of DBS technology and capability, and an introduction to Advanced Communications Corporation (the Company). It will also show how the Company plans to position itself for profitability as the emerging DBS industry unfolds.

There are approximately 90 million television households in the United States. A DBS system has the potential of reaching every one of them. In addition, there are substantial numbers of business locations of all categories and educational markets that may utilize services provided through the Company.

The Company

Advanced Communications Corporation is a multi-dimensional communications company engaged in the development and marketing of DBS services to the American public for profit. The services the Company proposes to provide are extensive. Most are innovative and many are unique.

Founded in 1982, Advanced Communications Corporation is the surviving company of several mergers and consolidations. Its experiences are founded in many phases of broadcasting, entertainment and education, among others, and span a twenty-six year period.

Authority and Regulation

The Company has been awarded authority from the Federal Communications Commission (FCC) of the United States of America to construct, launch, and operate a two satellite DBS system to serve the United States. The satellites will operate with sixteen channels of broadcast television and have the capability to carry numerous radio and data channels as well. The FCC derives its authority from the International Telecommunications Union (ITU) Region 2, Geneva, Switzerland, an affiliate of the United Nations. The FCC's authority includes certain frequency and channel allocations along with specified geosynchronous orbital "real property" locations 22,300 miles above the earth's equator. Authorities are granted for a six-year period and are renewable on a continuing basis not unlike television and radio station licenses.

Technology

DBS technology is the evolution from highly successful low power C band satellites - five watts of power per transponder (transmitter) to that of high power Ku band satellites - 125 to 150 watts per transponder. The tremendous advantages of this new technology are, at least, twofold. First, the quality and signal strength is greatly enhanced over C or low power Ku band. Second, and perhaps even more important, is the ease at which the signal can be received. No longer are large and obtrusive eight or ten feet backyard dishes required to tune in to satellite signals. With the power and enhancements of DBS, the size of the receiving antenna is dramatically reduced to two feet in

diameter or less (similar to the new Matsushita one foot square flat plate indoor/outdoor antenna). Each DBS subscriber will be singularly addressable. Hence, a smorgasbord of services might be offered and maintained under computer control for select broadcasting and billing.

The Company has informed the FCC that it seeks to develop and utilize a digital transmission format rather than copy traditional analog methods currently in use or proposed in C or low power Ku band transmission. Through its engineering relationships the Company feels that the technology and opportunity exist for the introduction of a completely integrated digital broadcast system from project outset. Advancing the quality and content of the DBS system in such a way would serve both public and private interests and preclude premature obsolescence. Receiving antennas and associated electronics are anticipated to retail for under 500 U.S. dollars.

A successful experimental two-channel DBS system is currently operational in Japan and has been met with wide acceptance and high a~~cc~~laim. European DBS systems from Luxemburg, Sweden and France have recently begun operations and the British DBS system will begin operations in the fall of 1989.

The Company has a contractual arrangement with General Electric to design and construct two sixteen-channel, high power satellites as well as provide launch services and other launch related technical expertise. In addition, the Company has the option to purchase two additional identical satellites from GE.

Preferred Locations

The Company selected premier orbital "real property" location(s) for its satellites which will enable it to provide broadcast services to the American public at the least cost and highest reliability of reception capability. The Company originally chose orbital positions 110 and 119 degrees West Longitude for its satellites. Subsequent amendments will most likely lead to the co-location of both satellites at 110 degrees West Longitude. The Company believes that it has positioned itself for leadership due, in part, to this location(s). Other strategies and/or admendments may be considered if in the Company's best interest.

Core Business/Services

The core business consists of rebroadcasting channels of existing off-air television programming and the broadcast of numerous additional channels of non-television (radio and/or data) programming directly into American homes on a monthly subscription basis. Programming would include a combination of network television affiliates (for example, ABC, NBC, CBS), public broadcasting (PBS), and "Superstation" channels (like WTBS, WGN, WOR and a FOX affiliate).

Many of the best television stations from across America will be included. A marketing concept might be to promote the initial service as the "Best of American TV." Improved capabilities such as HDTV (high-definition television), PPV (pay-per-view), and 3-D (three dimensional) television will be introduced. The remaining channels would be utilized for those services best identified by continued market research and analysis, perhaps including joint ventures with other entities.

Other examples would include:

- o Home shopping network(s) and programs
- o Cable and/or headline news network or alternatives
- o Educational/informational network(s)
- o Multi-channel (15-20) stereo music listening and sales channels/video music channel
- o Electronic publishing/high speed data delivery
- o Pay per view/premium channel(s)
- o Schedules and listing services/info-mercial channel(s)
- o Yet undiscovered or undisclosed services or uses

Markets

A. Home Television and Music

There are approximately 90 million television households in the United States. 54.8% of these are passed by cable television with basic cable subscription currently at 49.54 million households. 82% of all cable subscribers (37.82 million) purchase at least one premium channel such as HBO or Showtime.

New ideas like pay-per-view (PPV) are evolving. There are currently 6.1 million (August 1988) television homes accessing PPV through local cable companies anticipating approximately 25 million by 1993 with annual revenues exceeding 1 billion. (Paul Kagan). Surveys conducted by Hughes Communications among others reflect strong interest from both cable subscribers and non-subscribers alike in direct broadcasting. There are some 30 million unserved and underserved TV households in the U.S.

Multichannel music delivery and digital music sales offer substantial opportunities, as well.

HDTV offers opportunities of a magnitude yet to be realized in the immediate future. The implications are substantial in a variety of ways.

B. Business

Although the initial thrust of DBS will be in the area of home entertainment there are significant business applications. These include video conferencing and high-speed data transmission, among others, that can be greatly enhanced or initiated by the superior quality of a digital DBS signal. Digital technology and DBS will open new doors and help pioneer new markets in information transfer.

C. Education

The era of "electronic education" is still in its infancy. There exists an almost unlimited and untapped market for educational services broadcast directly into schools and homes from public and private educational sources alike.

The YES (Your Educational Services) Networks is one example of a strong commitment to offer extensive educational and informational services via DBS satellites.

Organizations Directly Involved

Advanced Communications Corporation (ACC): A Federal Communications Commission licensed DBS permittee with authority to construct, launch, and operate two high-powered 16 transponder satellites covering the U.S. ACC has contracted with the General Electric Company to construct these two satellites.

Foundation for Educational Advancement Today (FEAT or Foundation): A 501(c)3 public charity formed to hold transponder (2) broadcasting rights on board ACC's DBS system, acquire and donate miniature digital receiving antennas for every public and private school and library in the U.S., and to assist the YES Networks in its programming activities in appropriate ways.

Advanced Communications Engineering, Inc. (ACE): An affiliate of ACC which is designing transmission and reception capabilities for digital TV, digital HDTV, and related educational initiatives among other services for broadcast through ACC's DBS system.

YES Networks, Inc. (YES): The operational and programming arm for the comprehensive educational and informational services.

Management

Active directors, officers, and principal advisors to the above include:

Honorable Wilbur D. Mills: Chairman and Trustee, FEAT; Chairman Emeritus, ACC; former Chairman, United States House of Representatives Committee on Ways and Means.

Mr. Daniel H. Garner, Jr.: President and Board Member, ACC; Board Member, ACE; Trustee, YES; former broadcasting and investment banking executive.

Mr. James M. Beggs: Chairman, ACE; Senior Advisor, ACC; former NASA Administrator; Chairman, Spacehab, Inc.

Mr. Donald K. Dement: Senior Vice President and Board Member, ACC; Vice Chairman, ACE; Senior Advisor, YES; former Director, NASA Communications Programs.

Dr. G. Gordon Apple: President, ACE; Vice President, ACC; Senior Advisor, YES: former TRW Senior Engineer and Bell Labs Engineer; Mgr. of digital HDTV project for CBS (1982-1983).

Mr. Wayne Wells: Treasurer and Trustee, FEAT; Senior Financial Advisor, ACC; former Treasurer and Board Member, General Dynamics Company.

Mr. Jackson T. Stephens, Jr.: Founding Board Member and Senior Financial Advisor, ACC; Senior Advisor, YES: CEO, Stephens Enterprises and related activities.

Professional

Corporate legal matters are handled by Hogan & Hartson, Washington, D.C. Insurance experts and consultants are Corroon & Black Inspace, a subsidiary of Corroon & Black Corp., Washington, D.C. Certain discussions regarding a financial advisory role are continuing with Citicorp, New York, New York. Certain management consulting is provided by KPMG Peat Marwick, of Little Rock, Arkansas.

Financial

Among other financial considerations, at least four are worth noting in this overview.

A. Capitol requirements may not be considered a substantial sum when viewed from the perspective of a well-documented and proven current market of households subscribing to similar services with monthly expenditures of $15-30 or more.

B. The initial success of the two-channel Japanese system with subscription/penetration levels of approximately 1% inside six months with a three percent level in the first year of operation is significant. The Company's system broadcasts 32 channels.

C. Insurance markets are available to secure coverage covering envisionable problems regarding system operational requirements.

D. The elementary segments of this business have proven to be recession proof. Judging from historical financial data, they may be depression proof as well. This implication should not be ignored.

I. Projected capital expenditures: see Schedule A.

II. Revenue and expense estimates: see Schedule B.

March 31, 1989

FEDERAL EXPRESS

The Honorable Robert A. Roe
House Committee on Space
Science and Technology
Rayburn House Office Building
Washington, D. C. 20515

Dear Mr. Chairman:

I congratulate you on your leadership in the recent hearings on HDTV and the profound and revolutionary consequences associated with its development.

I have been closely associated with the Company's Direct Broadcast Satellite (DBS) and related HDTV and Educational initiatives for more than six years.

The continued progress and enormous promise offered by this exciting new technology with its many applications, benefits, and services for the nation is the most compelling opportunity that I have seen.

I understand our respective staff members have spoken and requested the attached paper for inclusion in the printed record of your recent hearings. We look forward to visiting with you, members of the Committee, and/or your staff at an appropriate time regarding the enclosed program.

With kindest personal regards and best wishes, I am

Sincerely,

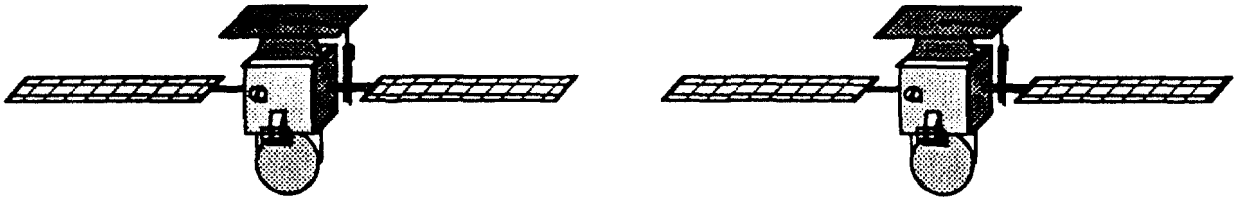
W D Mills

Wilbur D. Mills
Chairman

cc: President George Bush
Members of the Committee
Jim Turner

ADVANCED COMMUNICATIONS CORPORATION
6803 CANTRELL, SUITE 200
LITTLE ROCK, AR 72207
(501) ~~375-9292~~
377-1493

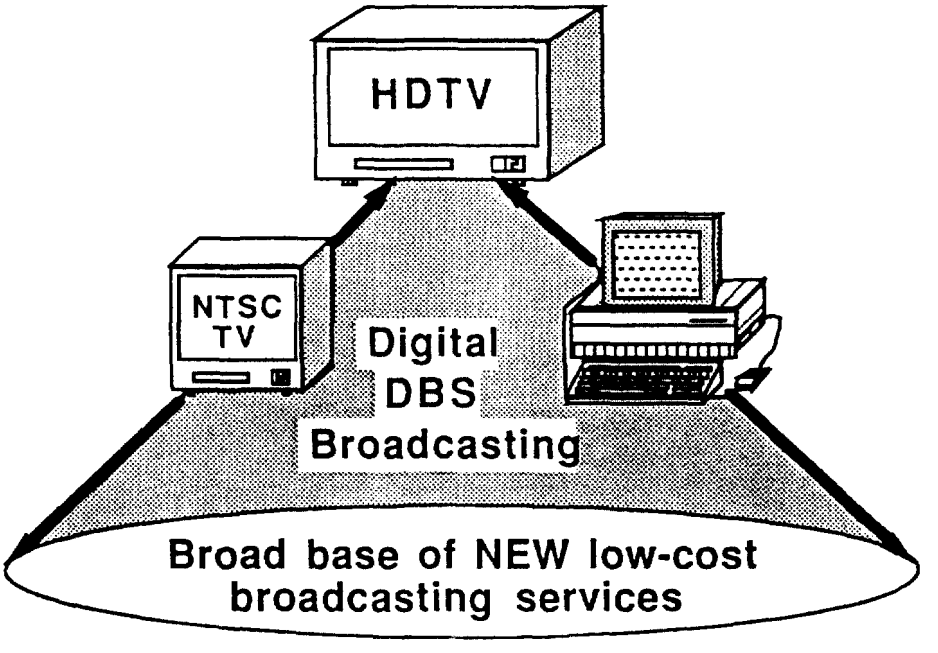
Advanced Communications Corporation



March 1989

HDTV, DBS and Education*

Prepared for:
The United States House of Representatives
Committee on Science, Space and Technology
The Honorable Robert A. Roe
Chairman

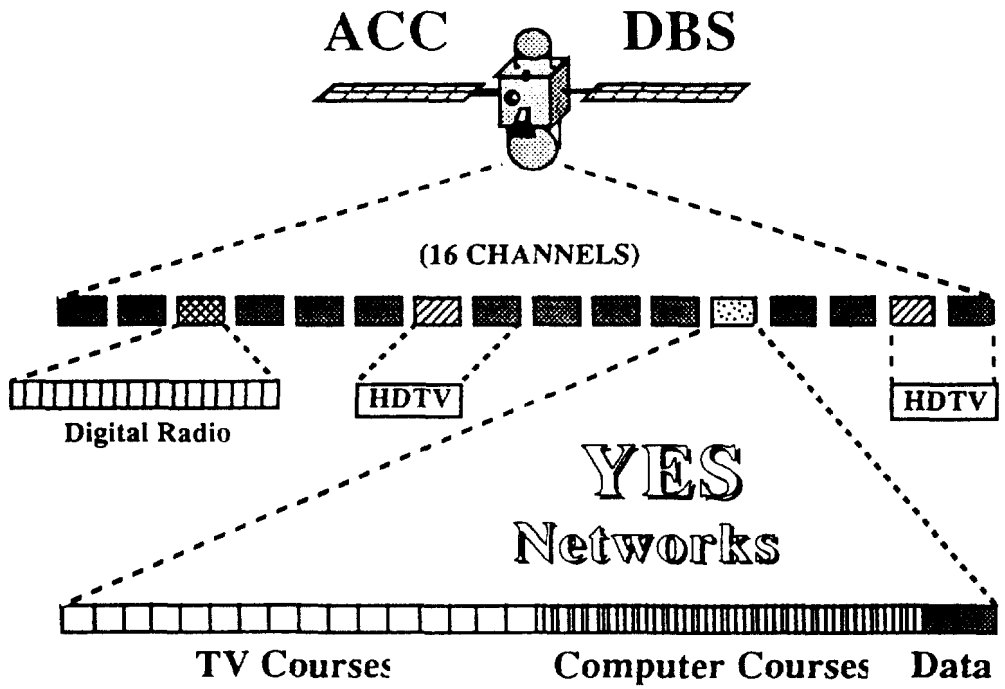


* High Definition Television, Direct Broadcast Satellites.

Summary

America's educational shortcomings and America's ability to compete in the upcoming High Definition Television (**HDTV**) market are compelling issues of national concern. Educational deficiencies in math, science and technologies are the root of our escalating problems in competing with an increasingly technologically oriented world. At the same time, the technological dilemmas presented by the inevitable market transition to HDTV present an unprecedented opportunity to mold this technology and achieve a quantum leap in the universal availability of quality educational programs and services.

Direct Broadcast Satellites (**DBS**), such as those of Advanced Communications Corporation (ACC), using digital transmission and reception designed by Advanced Communications Engineering, Inc. (ACE)[1], will deliver compatible TV and HDTV (regardless of the yet-to-be-chosen format standard) to inexpensive 2' dish antennas anywhere in the nation. The same technology and hardware used in HDTV sets can be used for reception of new types of services. The YES (Your Educational Services) Networks is a totally new concept in educational services offering over 100 simultaneous video courses (plus auxiliary materials) where only one TV course has been possible previously.



[1]For further information contact Daniel H. Garner, ACC, 6803 Cantrell, Suite 200, Little Rock, AR 72207 (501-377-1493), or G. Gordon Apple, ACE, 722 S. Broadway # 30, Redondo Beach, CA 90277 (213-540-6532).

Critical Needs in Technology and Education for the United States:

First, the United States of America is rapidly losing its leadership in the areas of science and technology, in which it was once the undisputed leader and envy of the entire world. As noted in many recent studies, science and technology provide the basis of our economy and well being, the strength of our defense, and even the hope of the planet. Superior education, especially in math and science, is absolutely essential to the nation's future vitality and defense. However, the nation's schools have declined to a point where former Secretary William Bennett described some as reaching "total melt-down."

The critical need to reverse this decline and offer quality education to everyone (including adults), regardless of their present status or living area, is the basis of this paper. While we must teach the students, where will we find the teachers? Qualified science teachers are rare. Qualified mathematics teachers are virtually non-existent in many school systems. A recent study[1] repeatedly emphasizes the need and the lack of teacher training in the effective use of technology. The solution lies in the judicious use of our available electronics technology to increase the availability of high-quality instruction (Master Teachers) and innovative learning techniques.

Second, commercial electronics technology is rapidly advancing and is having a substantial impact on the economies of nations and their defense capabilities. A concern recently receiving much attention is that the next generation of television systems (High Definition Television, or "HDTV") will be dominated by the Japanese and others. The realization that these new televisions are packed with digital computer-type electronics has even prompted the U.S. Dept. of Defense (i.e., DARPA) to become significantly involved in this technology in the hope of salvaging the remaining U.S. integrated circuit industry and preventing foreign domination and U.S. dependence on related computer technologies.

To insure orderly transition to HDTV, the FCC decreed that terrestrial broadcasts in the U.S. be "compatible" with existing TV broadcasts. HDTV inherently is a huge user of valuable and limited radio spectrum, requiring about five of today's standard TV channels. A multitude of new transmission standards have been proposed for "compressed" HDTV that instead would only occupy one or two standard TV channels.

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1 "Power On! New Tools for Teaching and Learning,"Congress of the United States, Office of Technology Assessment, OTA-SET-379, September, 1988.

Any new TV standard will require new TV stations, transmitters and other major investments in all the major metropolitan areas. Service area "critical market mass" must be derived from individual local broadcast areas. Even so, HDTV via terrestrial broadcasting will not be available for a long time, if ever, in many remote areas. The inevitable transition to HDTV would be much smoother and more rapid if a means were available to initially reach all areas (urban and rural) of the country simultaneously. This also would guarantee a uniquely American system that would place U.S. industry on at least an equal, if not advantageous, footing with foreign competition.

Ways and Means to Solve Both Problems (and others):

DBS/HDTV: A few years ago, the ITU (International Telecommunications Union), through its mechanisms of conferences (1977 World Administrative Radio Conference, and 1983 Region 2 Administrative Radio Conference) established international agreements for satellite orbital locations, radio frequencies, and ground coverage areas for a new type of satellite television service called "Direct Broadcast Satellites" (DBS). These are high-power satellites which provide a signal strong enough to be received with a user antenna less than two feet in diameter in a system costing only a few hundred dollars. The FCC has been active in support of this new public benefit, assisting in clearing frequencies, setting standards, and granting several DBS satellite construction permits.

When these permits were issued several years ago, it was assumed that the service would use analog transmission. However, as the advantages of **digital** transmission and signal processing became more pronounced and apparent, one DBS permittee, Advanced Communications Corporation (ACC), proposed to use totally digital transmission to bring these efficient, modern capabilities into many needed applications. Advanced Communications Engineering, Inc. (ACE) was formed for the purpose of providing the systems engineering, designs, and hardware necessary for implementing digital DBS transmission and services.

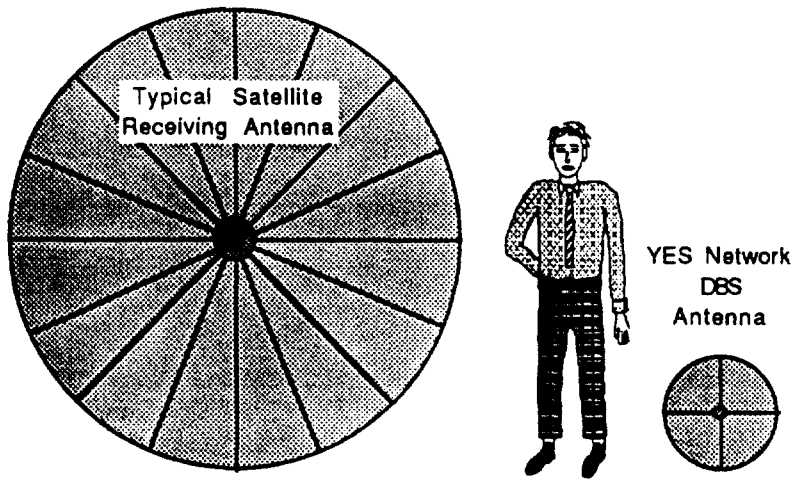
Although DBS originally was envisaged as a medium for standard (analog) television transmission, digital DBS is an obvious medium for making HDTV instantly available throughout the entire nation. Any satellite receiver requires signal conversion circuitry for use with a standard TV receiver. The flexibility of digital transmission and processing will allow DBS HDTV to be totally compatible with today's standard TV, while also being compatible with any terrestrial broadcast standard for HDTV that may be issued.

Because DBS service will draw its market from the entire nation, it will be much easier to get an early "critical market mass" than would terrestrial broadcast in establishing the U.S. HDTV market.

HDTV sets are internally much like computers or workstations containing digital processors and computer memories. On the other side of the coin, today's personal computers are becoming more like advanced TV sets or even HDTV sets. There is a rapidly growing use of personal computers to create, output, control, and modify TV images. Seminar and classroom presentations are being created on computers and then presented directly by projection or on TV screens, often with animated graphics.

Innovative Education Today: There are two significant trends in today's education. One is the innovative and very effective use of computers and laserdisks at all levels of education. When used properly, computers and computer-controlled laserdisks can vastly enhance the student's learning experience, ease the teacher's workload, and provide totally new teaching and administrative tools. Unfortunately, there are too few classroom computers and even fewer teachers that are adequately trained in their usage.

The other trend is a rapid increase in "**distance learning.**" This term covers everything from microwave remote-campus TV lectures to telephone lines carrying voice and electronic blackboards, or even electronic computer bulletin-boards for students to ask questions of their instructors. Several universities, some international groups, and many corporations are using satellites for very effective TV distance learning.

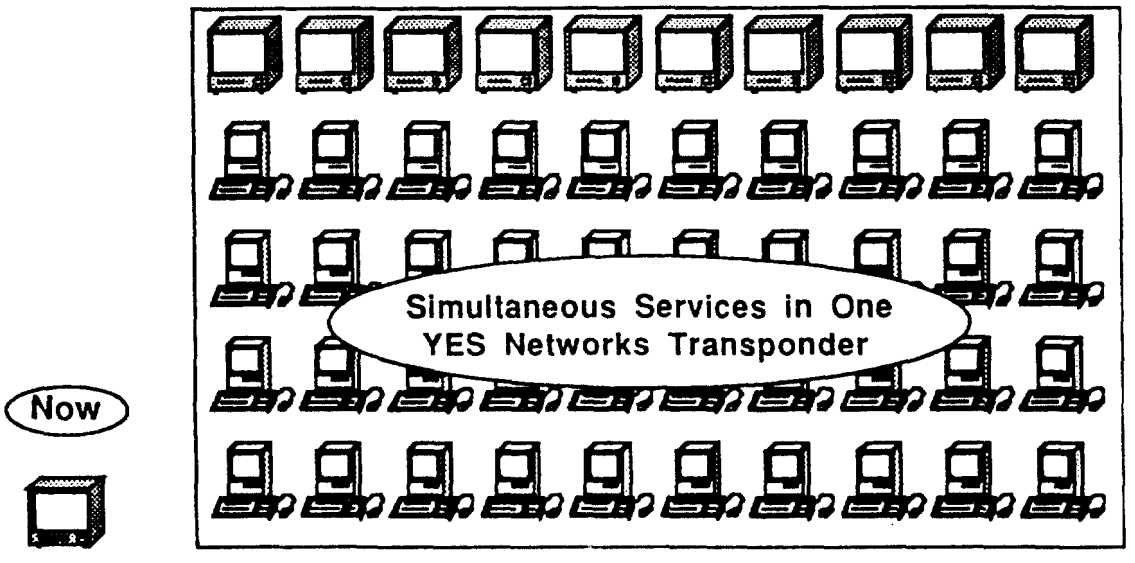


Present Antennas vs YES Networks DBS Antenna

However, satellite systems today are very expensive, both for satellite transmission (transponder) time and for the ground receiving terminals which include a permanently mounted 8- to 12-foot dish. Recently, satellite distance learning has increased substantially in the public school sector, especially prompted by last year's U.S. Dept. of Education "Star Schools" program. Existing systems include Los Angeles County's Educational Telecommunications Network (ETN), a satellite system installed

mainly for teacher training. **Distance learning is effective** and in many cases is the **only** means available to offer minimum required courses and/or optional advanced courses.

The **YES Networks**, the proposed system to establish new learning opportunities, will use digital DBS together with computer assistance techniques to allow simultaneous nationwide presentation of up to **100 or more** formal courses to **all of America's schools and homes** — each offering innovative educational services that are not possible by other means (e.g., traditional instructional television and computer networks) with each providing essential enrichment for rural and minority students.



A Comparison of Educational Services -- Present vs YES Networks

All this can occur in a **single** DBS satellite TV transmitter (transponder) which, using conventional techniques, could carry only a single video course. Reception will be by means of the same **inexpensive 2-foot antenna** used for DBS TV. Display will require a personal computer, HDTV, or TV adaptor. Optionally, distribution to additional projectors or monitors can be provided. Supplementary materials (e.g., reading, programmed learning assignments, homework, exams) will be "downloaded" to the students simultaneously during the broadcast lecture using the same channel and equipment.

This nationally-broadcast and widely-received system will serve as the obvious means to coordinate national educational enhancement programs such as that proposed by the NCTM[1] and other

1 "Curriculum and Evaluation Standards for School Mathematics", National Council of Teachers of Mathematics, October 1987.

educational organizations. The best teachers in the nation can be used to reach an extremely large complement of students, while all teachers will have access to advanced learning materials for improved individual student attention.

One of the primary uses of the system will be **teacher training**. Teachers will have easy access to training in effective classroom computer usage and to a vast repertoire of science, mathematics and other important courseware. The possible educational uses and benefits from this system are far too numerous to attempt to itemize herein, but a partial list is presented in Appendix A. A list of some of the organizations and people associated with this effort is included as Appendix B. A few scenarios, illustrating how this system might be used, are included in Appendix C.

Conclusion:

For the first time in history, all of the required technology for implementing such a capable system is available. A timely opportunity such as this may come only once in the development of civilization. Even as we write, other countries (Japan, United Kingdom, Germany, France, Sweden, and Luxembourg) that recognize the opportunities are moving forward with DBS TV services, HDTV, and educational broadcasting, to implement at least some portions of what we have described.

Establishment of a digital DBS TV, HDTV, and educational broadcasting system could put America again in the forefront of technology and provide the means to rapidly bootstrap our science, mathematics, engineering and other educational systems back to an enviable leadership position.

However, the time to develop this opportunity is relatively short. The word for the day regarding America's technology and leadership is "use it or lose it." We can use our existing technology to invest in future education, thus preserving our technology base and national security, or we will lose it, abdicating our leadership and abandoning our industrial capacity to foreign competition, which is more educated, aggressive, and aware.

This program ties together past and present national policy initiatives in education and public benefits with national technological capability and a poised regulatory stance of willing implementers that is truly unique. Action must be initiated immediately. This promise and opportunity offers one of the highest reward-to-risk ratios ever seen.

Appendix A

Opportunities in Digital DBS and HDTV Systems

(YES Networks examples.)

- Satellite educational programming to all public and private elementary and secondary schools and Universities in America;
- Undergraduate and Graduate education in businesses and homes;
- Inservice teacher training;
- Information data streams to all libraries in America;
- Educational programming to all child-care centers in America;
- Parent education in home or school;
- Specialized programs for disadvantaged, gifted, talented youth;
- Adult literacy;
- Student remedial programs;
- Senior citizen learning opportunities;
- Transmission of informational and innovative materials to schools, PTAs, school boards, administrators, teachers;
- Specialized programs for vocational-technical schools;
- Lifelong education, including graduate studies through the University of America;
- Education and data transmission to support migrant students;
- Improved, widely-accessible USDA market data information exchange;
- Medical training programs to hospitals and clinics;
- Medical information interchange among medical facilities;
- Assist prison inmates rehabilitation programs;
- Emergency Broadcast System;
- Professional requalification as required by state laws.
- Professional training and informational services (legal, accounting, financial, medical, engineering, etc.).

Appendix B

Organizations Directly Involved

Foundation for Educational Advancement Today (FEAT or Foundation): A 501(c)3 public charity formed to hold transponder (2) broadcasting rights on-board ACC's DBS system, acquire and donate miniature digital receiving antennas for every public and private school and library in the U.S., and to assist the YES Networks in its programming activities in appropriate ways.

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Associated Individuals

Honorable Wilbur D. Mills: Chairman and Trustee, FEAT; Chairman Emeritus, ACC; former Chairman, United States House of Representatives Committee on Ways and Means.

Mr. Daniel H. Garner, Jr.: President and Board Member, ACC; Board Member, ACE; Trustee, YES; former broadcasting and investment banking executive.

Mr. James M. Beggs: Chairman, ACE; Senior Advisor, ACC; former NASA Administrator; Chairman, Spacehab, Inc.

Mr. Donald K. Dement: Senior Vice President and Board Member, ACC; Vice Chairman, ACE; Senior Advisor, YES; former Director, NASA Communications Programs.

Dr. G. Gordon Apple: President, ACE; Vice President, ACC; Senior Advisor, YES; former TRW Senior Engineer and Bell Labs Engineer; Mgr. of digital HDTV project for CBS (1982-1983).

Mr. Wayne Wells: Treasurer and Trustee, FEAT; Senior Financial Advisor, ACC; former Treasurer and Board Member, General Dynamics Company.

Mr. Jackson T. Stephens, Jr.: Founding Board Member and Senior Financial Advisor, ACC; Senior Advisor, YES; CEO, Stephens Enterprises and related activities.

Professional Services

Legal: Mr. Richard S. Rodin, Esq., Hogan and Hartson, Washington, D.C.

Financial: Mr. Jerry Walton, Managing Partner, KMG Peat Marwick, Little Rock, Arkansas.

Attachment C

Scenario #1:

Imagine, for the moment, a small-town mid-western school which previously had limited instructional capabilities in math and science. The students come into class, hand the instructor their homework assignments and sit down at their desks.

During the first few minutes, the instructor ask if there were particular difficulties with the homework. In response to each question, the instructor either directly answers the question, or enters it on a computer keyboard. The computer responds either with a direct answer or with information (received at the beginning of the class via the **YES Networks**) with which the instructor can formulate an answer. Alternatively, the computer indicates that a video response is available. Selecting the latter, the classroom **HDTV** video screens come alive with a verbal and pictorial explanation. Other questions are handled similarly.

The class then watches a half-hour lecture (on their **HDTV** monitors) which was prepared by one of the foremost educators in the nation on that particular subject. During this time, the instructor uses the computer to electronically grade part of the homework and then personally grades those portions that require written responses.

After the lecture, an additional period of questions and answers is handled by the instructor, again with the aid of the computer. The graded homework is returned along with reading material and tomorrow's homework assignment. The latter were printed automatically during the lecture. Additionally, two students are handed study hall assignments on disks which contain additional remedial programmed learning aids which have been automatically custom-prepared for them based on the homework scores. Another disk is loaned to an exceptionally bright student who wishes to pursue the subject in more depth.

At the end of class, the instructor picks up a printout (or a disk) containing the plan for the next week's classes, teacher preparatory material, and a sample exam which can be customized if desired.

Scenario #2:

A blue-collar worker comes home from a frustrating day at work. It has been difficult, but he has managed somehow to get by all these years without being able to read. He realizes that he is at a dead-end for job advancement but is too embarrassed to enroll in a local adult reading class. He turns on the television to view the listings of tonight's programs on **DBS** (his satellite receiver with a 2' antenna--

now as common as VCRs). He watches the videolog which presents a sequence of previews and short verbal descriptions of each of tonight's programs, plus selected previews for the next few days. He notices that the **YES Networks** has a beginning class starting tomorrow night on adult reading.

On the following nights he comes home, turns on the TV, and selects the class. The class consists of still-frame images, occasional full-motion windows, text, animation, and the instructor's voice. The instructor gradually leads the new student through the basics of reading. Interspersed in the lecture are multiple choice questions, such as identifying the spoken word or sentence from the displayed written choices. He uses his TV remote control to respond. A visible or audible TV response tells him whether his choice is correct or not. At the end of the program, his percentage of first-time-correct selections is displayed, verbalized, and compared with his his previous scores. He is now on the way toward becoming literate, enriching his life, and being a more productive member of society and industry.

Scenario #3:

A college student returns home to her children after working half-day. Her husband is also a student and works the other half of the day. She has already finished her Bachelor's degree (mostly through **YES Networks** classes) and is now in medical school. Through the **YES Networks** and her home computer she is able to complete most of her classes without having to leave her young children with a baby-sitter.

She is presently taking a course in communicable diseases. This afternoon she especially wants to view a seminar on the latest research results on AIDS treatments. While she is watching the seminar, her computer disk is being down-loaded with a research paper written by the seminar speaker and containing the test results and statistical analysis being discussed during the seminar broadcast.

Later, for general interest, she audits a class on "Music Appreciation." Today's lecture on "the use of vocals within the symphonic form" is interspersed with excerpts from Mahler's 4th and Beethoven's 9th. The sound quality is the same as from her compact disk player.

Scenario #4:

A teacher who is unfamiliar with computers decides to take a training course offered through the **YES Networks** on basic computer operation. She turns the power switch on. After a little bit, a screen appears which contains a button for the **YES Networks**. She moves the mouse until the arrow is within the button. She clicks and a screen appears with a list of present or shortly available courses. After she makes a choice, the computer takes over and a voice says that the course will begin

in 3 minutes. The broadcast instructor begins and the computer acts almost the same as if it were a TV set. The only difference is that occasionally the instructor asks her to do some specific action and observe the results. Toward the end of the lesson, the course instructor asks her to insert a blank floppy disk to store reference materials, a written homework assignment (which is also output to the printer), and a programmed learning assignment which she can use on her own to become more familiar with the computer.

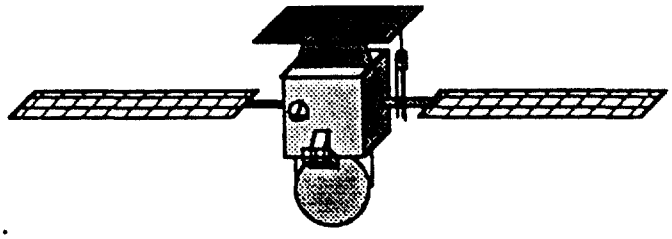
After a few lessons she decides that the computer is really not all that intimidating and she decides to try a course in improving her math teaching skills. She finds the course to be quite interesting and useful. Besides listening to the lecturer and watching the screen, the interspersed computer-interactive exercises keep her directly involved at a comfortable (but challenging) level. Besides helping her with her own level of expertise, additional materials, programs, and programmed learning are downloaded to a removable disk so that she can use them directly in her own classroom. Part of the broadcast course was devoted to showing her how to use these materials effectively in her own classroom.

Scenario #5:

Gerry is one of three students in his small high school that are taking a course in calculus. Until this year, there would have no way that this school district could offer so advanced a course. In fact, this high school was not even going to be able to offer anything beyond first year algebra this year because the school's only math instructor took a much higher paying job (outside of teaching) in the next county and no replacement had been found. The required and advanced courses are now being offered by television through the **YES Networks** using an inexpensive satellite receiver with a 2' dish antenna which was quickly installed **inside** the building by pointing it through a skylight.

The course instructor is located in the state's capitol city, 200 miles away. Several schools in the state simultaneously receive the same course broadcast. Telephone links are provided for questions and interaction with the instructor.

On this particular day Gerry is home with a cold. He doesn't want to miss his calculus class because the college board exams are coming up shortly and he wants to do well in order to insure getting into a good engineering school. His parents recently bought a new HDTV set which included a built-in DBS receiver. For an additional $200, they had also brought home a 2' DBS antenna assembly and mounting brackets which had allowed them to install and align it in about 20 min. Today, Gerry tunes his HDTV DBS receiver to the **YES Networks** broadcast of his calculus class. He watches the lecture and writes down the homework assignment for tomorrow. When he later returns to the class at the school, he is not behind the other students as otherwise might have been.



December 1988

MATH, SCIENCE, AND ENGINEERING EDUCATION:

A NEW MEANS TO ACHIEVE OUR NATIONAL GOALS

G. Gordon Apple, PhD

For: The YES* Networks Partnership

(* Your Educational Services)

Partners:

The Wilbur D. Mills Education Service Cooperative
Advanced Communications Engineering, Inc.
The Arkansas State Department of Education
The University of Arkansas at Little Rock
The University of Texas at Arlington
YES Networks, Inc.

Advisors:

The Foundation for Educational Advancement Today -
The University of Hawaii - The University of Miami Center for Interactive Learning -
National School Board Associations' Institute for the Transfer of Technology to Education -
The National Education Association - The American Association of School Administrators -
The Public Service Satellite Consortium - The American Federation of Teachers -
The Center for Rural Education and Small Schools at Kansas State University -
The National Aeronautics and Space Administration

Acknowledgements

The author would like to thank the many people who have contributed in numerous ways to the ongoing effort toward making this system a reality. Much of the material of this paper was borrowed freely (with and without modification) from the Star Schools Proposal to which the following also contributed: Dr. Samuel A. Covington, Mr. Dan Garner, and Mr. Donald K.Dement. Thanks is also due to the other members of the YES Networks Partnership. The author would like to especially thank the Hon. Wilbur D. Mills for his previous and continuing dedicated support of this very worthy cause.

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ABSTRACT

The technological leadership of the United States is being challenged as never before. We have lost much of our technological industrial base to foreign competition. Jobs, industries, capital, research and leadership which are essential to our economic and military well being are all threatened. The recent concerns about our ability to compete in the upcoming market for HDTV (High Definition Television) is only the tip of the iceberg.

Our very future depends on our nation's capabilities to compete in technology, the basis of which is math, science and engineering. These, in turn, are based on high-quality education: Education of mathematicians, scientists, and engineers; Education of the general population so they will understand and realize its significance to our well being. Yet, education in these areas has fallen woefully behind as it has recently become painfully obvious that the majority of the population doesn't even know that the earth goes around the sun and can't find their own country on a globe.

It is time to make a concerted effort to change this situation. Teacher's salaries, training, competence, and availability are all recognized issues. Substantial improvements in these areas will be expensive and slow at best, and nonexistent at worst. **We now have the technological means to make a quantum leap in universal availability of quality education in these critical areas. The described system will provide this at very modest cost.** The system is extremely flexible and will have both open architecture and open access which will allow any organization to develop its own educational broadcast services to meet any perceived need.

YES Networks Partnership:

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