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OFFICE OF SECRETARY

Biographical Sketch

Melinda Crowley

Ms. Crowley is currently the Secretary-Treasurer of The Florida Distance Learning Network. In that capacity she manages the administrative functions of the Network and provides technical support to the network as a Distance Learning Specialist. Ms. Crowley attained a Master of Science degree in Telecommunications from the Center of Telecommunications Study in the Computer and Electrical Engineering College at the University of Southwestern Louisiana. Her work as a Distance Learning Specialist in higher education followed a career as a classroom teacher at all levels in the K-12 system. For 16 years during this period Ms. Crowley developed programs which integrated technology into the K-12 and adult education curricula. In 1994 she was honored as the Middle School Educator of the Year by the Louisiana Computer Using Educators Association.

In the early 1990's Ms. Crowley conceived, designed and implemented one of the first models in Louisiana for delivering video, data, and telephone communications to the classroom utilizing cable, ISDN and Internet resources. In 1995, Ms. Crowley served as the Project Manager on behalf of the Florida Department of Education for a joint public-private desktop videoconferencing pilot project requiring the creation of a private telephone network using hub switches to link several locations.

Ms. Crowley has served on various panels and task forces related to the technical aspects of communications and she has lectured extensively on the current and future uses of technology in education.

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Russell I. Rothstein

Summary of Remarks to the Federal Communications Commission

June 19, 1996

At the U.S. Department of Education and the Massachusetts Institute of Technology, I used empirical data from schools to develop five technology models that describe different levels of connectivity and costs for schools. The models included not only costs for telecommunications services and costs for PCs and other computer hardware to connect to the network, but also costs for a professional support staff, costs for teacher training, and costs for retrofitting old school buildings.

The research indicates that for the model that provides schools with sufficient infrastructure to utilize the services similar to those envisioned by the administration for the NII, per pupil costs range from \$209-\$501 in one-time installation costs and \$39-\$105 in annual ongoing costs.

In this model, telecommunications services for all 85,000 public schools in the U.S. would require between \$298 million and \$725 million in one-time installation costs and between \$115 million and \$500 million in annual ongoing costs. In the first five years, telecommunications costs represent 11% of the total costs to network schools. Other cost factors are significant as well; support and training represent 46% of the total networking costs.

Reduced telecommunications rates for schools would be significant in reducing total costs. For example, in the model, a sixty-percent discount in telecommunications rates for schools would save schools between \$179 million and \$435 million in one-time costs and between \$69 million and \$300 million in ongoing costs. However, telecommunications is only one cost factor; programs that reduce school costs for support, training, and hardware may be as effective or more effective in lowering costs for schools.

In addition, a major obstacle in obtaining full classroom connectivity is the dearth of networkable PCs in schools. While the administration has set forth to network every classroom by the year 2000, it is unclear whether schools will have enough PCs that are sufficiently powerful to fully utilize the networking infrastructure.

In conclusion, a reduced, affordable telecommunications rate for schools is one of a number of significant cost-saving programs to help America's schools connect to the information highway.

VICKI MARIE HOBBS

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Birthdate: June 26, 1951

Education: University of Missouri-Columbia
Columbia, Missouri
B.A. in Sociology, 1972

University of Missouri-Columbia
30 semester hours of graduate training in Sociology. All
coursework completed for M.A. in Sociology, 1972-73

Work Experience:

- 1972-73** Secretary/Research Assistant, University of Missouri-Columbia, Department of Community Health and Medical Practice, Section of Behavioral Sciences
- 1973-74** Research Assistant, Office of Rural Development, University of Missouri-Columbia
- 1975-78** Assistant Director/Research Analyst, Office of Rural Development, University of Missouri-Columbia
- 1975** Established and taught Adult Basic Education High School Equivalency classes in three rural communities in the Missouri Ozarks
- 1978-84** Administrative Coordinator/Project Director, Rural Student Employability Project, Salem-Steelville-Potosi (Missouri) School District Consortium
- 1984 - Present** Rural Education Consultant (private)
- 1993 - Present** Network Director, Missouri Interactive Telecommunications Education (MIT-E) Network

Long-term Educational Consulting/Research Positions Held:

- September 1984 -
May 1985**
- Computer consultant to Midway Heights Elementary School, Columbia, Missouri; provided weekly assistance in inputting data on gradebook record-keeping software; provided periodic computer instruction to 6th grade students; instructed teachers in basic computer use and word processing software
- August 1984 -
May 1985**
- Educational Consultant for Mid-Continent Regional Educational Laboratory (Denver, Colorado):
 - provided research data and input on formation of video-taped/independent study Spanish Course in Keytesville and Salisbury, Missouri school districts; maintained liaison with University of Missouri Center for Independent Study; conducted ongoing evaluation of two-semester Spanish course

**Proceedings Before the Joint Federal-State Panel
Federal Communications Commission
June 19, 1996**

Presentation by Melinda Crowley

The Florida Distance Learning Network

The Florida Distance Learning Network (FDLN) was created by the Florida Legislature in 1995 as part of Florida's telecommunications deregulation bill. The purpose of the enactment of FDLN was to assure that Florida's citizens have access to advanced telecommunications services in order to enhance educational opportunities. The FDLN's enabling legislation requires that private providers of telecommunications services furnish connectivity, without charge, to all public schools, colleges, universities, libraries, and rural and teaching hospitals in the state. The FDLN is governed by a board of directors with representatives from both government and private industry. Its mission is to improve student learning, achievement and instructional techniques through increased access to distance learning. This is accomplished by drawing upon all possible funding sources for the delivery of advanced telecommunications services in the most cost effective way.

The FDLN began its mission by undertaking an assessment of currently available distance learning programs and infrastructure in the state. The Needs Assessment Report found that current capabilities are insufficient to meet future needs and there exists unequal access to distance learning opportunities across the state. In response to the Needs Assessment Report, the FDLN developed a Preliminary Technology Plan with each section of the technology plan addressing a different aspect of distance learning. Included in the plan are master technology plans of colleges, universities, public schools, libraries, rural and teaching hospitals. The Technology Plan also calls for the creation of a task force to examine the technical aspects of connectivity and interoperability of the current infrastructure.

The FDLN exists as an ongoing body to stay abreast of the development of new technologies and to coordinate distance learning initiatives in the state.

Russell Rothstein recently completed his graduate work at the Massachusetts Institute of Technology. At MIT, he was research assistant at the MIT Research Program on Communications Policy and he received degrees from the Technology and Policy Program and the Sloan School of Management.

Mr. Rothstein has spent the past three years examining the technical, financial, and policy issues in networking K-12 schools. In the summer of 1994 he was a Visiting Researcher at the Office of Educational Technology in the U.S. Department of Education. During that time, he conducted an extensive study of schools, school districts, and state departments of education in the U.S. that had successfully implemented school networking. Based on his research, he authored a Department of Education Working Paper entitled "Connecting K-12 Schools to the NII: A Preliminary Analysis of Technology Models and Their Associated Costs."

Mr. Rothstein has authored subsequent reports, including his MIT graduate thesis, updating the costs of networking schools. (These documents are available on the Internet at <http://rpcp.mit.edu/People/rir.html>.) Mr. Rothstein has been invited to speak on numerous occasions to discuss his research, and he has consulted the Brazilian Ministry of Education and the United Nations Development Program on the costs of networking schools.

Mr. Rothstein holds a bachelor's degree in computer science from Harvard University. He has worked at Oracle and at BBN. He currently lives in Cambridge, Massachusetts and can be reached by email at rir@rpcp.mit.edu.

Educational Consulting/Research Positions, cont.:

- April 1985
 - Designed and taught a 4-week intensive introductory computer course for 1st graders at Midway Heights Elementary School, Columbia, Missouri

- May-June 1985
 - Educational Consultant for Mid-Continent Regional Educational Laboratory (Denver, Colorado)
 - wrote, produced, and directed videotape depicting use of computers and role of the computer consortia in the Hallsville and New Franklin, Missouri school districts

- October 1987-
August 1988
 - provided consulting, research, and technical assistance to North Dakota Department of Public Instruction and local school districts exploring implementation of Distance Learning Projects

- December 1987-
April 1989
 - conducted a comparative distance learning evaluation study of instruction by satellite implementation in Missouri and North Dakota

- April 1990-
September 1990
 - conducted a cross-technology study of distance learning in North Dakota as educational consultant with the "North Dakota Decisions About Technology" Project

- February 1990-
August 1991
 - conducted ongoing evaluative research of the "South Dakota Rural Science and Math School Without Walls" Project

- July 1991-
November 1994
 - provided educational consulting support to the Mid-Missouri Restructuring Consortium, including: (1) organizational support and evaluation of joint consortium program using School Psychologist Interns to provide special needs student assessment and drug/alcohol counseling in rural schools; and (2) organizational support for development of the Mid-Missouri Interactive TV Network, the first two-way interactive TV network in Missouri.

- August 1984 -
present
 - Educational Consultant with the New Franklin R-I School District; consulting areas have included:
 - expansion of K-12 computer curriculum
 - integration of computers into the classroom
 - development and pilot teaching of elementary (K-6) keyboarding program
 - development of computerized K-12 attendance, grade reporting, scheduling, data base, and instructional management system
 - assisting with the K-12 delineation of learning objectives in core and non-core subject areas (curriculum development)
 - research, development, and evaluation of instruction by satellite program in German I, German II, and Physics
 - development and writing of multiple successfully funded state Incentive Grant programs: "The Integrated Arts", "School Without Walls Writing Project", "Ready, Set, Grow Preschool" (initial and continuation grants), "Instruction by Satellite", "Mastery Assistance Program", "Reluctant Readers as Reading Tutors", "Occupational and Career Development", etc.
 - writing of federal/state entitlement applications and/or competitive grants, e.g., Chapter I, Chapter 2, Title II/ Eisenhower, Drug and Alcohol, Carl Perkins Vocational, Arts as Basic, Home Economics, Re:Learning, and A+ Schools

Educational Consulting/Research Positions, cont:

- development of a school-based preschool program, an after-school child care program, a reluctant readers program, a student-published community magazine, and an alternative model for special services program operation
 - needs assessment and mentor training for a Professional Development Program within the district
 - annual analysis of achievement and criterion-referenced test data
 - longitudinal analysis of Missouri Mastery Achievement Data
 - development of a Curriculum Improvement Process involving the annual analysis of student objective mastery with local IMS and state MMAT test results
 - assisting teachers with use of telecommunications in the classroom
 - problem-solving and curriculum assistance with individual teachers on computer use, mastery learning, cooperative learning, equipment troubleshooting, instructional management, test bank development, whole language instruction, etc.
 - planning for and development of a district-wide video distribution network
 - feasibility research on two-way interactive video technology
 - creation of professional development library for teachers
 - numerous teacher in-service workshops on various topics
 - development and implementation of a district restructuring plan including administrative structure, Project Construct (K-2) Unit, Gr. 3-5 Multi-grade Unit, and Middle School
 - implementation of and teacher training for the two-way interactive TV network
 - ongoing support of technology integration, training, and troubleshooting
- 1988
- Other long-term educational consulting work
 - University of Missouri-Rolla--conducted national distance learning program identification and inventory at post-secondary level
- 1993 and 1994
- Rural Utilities Service (formerly Rural Electric Administration)--acted as reader for US regional "Distance Learning and Medical Link" grant applications
- 1993-present
- Moberly, MO School District--provided organizational support, teacher training, and ongoing evaluation of implementation of a multi-age primary program; assisted district in development of an "A+ program" (a combination Tech Prep, integrated learning, and school-to-work initiative); assisted district in preparing for Missouri School Improvement Review; and worked with district personnel in forming a pre-school program.
- 1994-95
- Slater, MO School District--conducted curriculum development workshops and assisted in writing the district's School Improvement Plan
- 1994-95
- NEMO Net Consortium--provided organizational, technical, and educational planning assistance in development of a two-way interactive TV network across six rural Missouri schools and communities.

Research Experience:

- 1974 - Field Director and Research Analyst, Research Study of 270 high school dropouts in the Missouri Ozarks
- 1975 - Evaluation of Occupational and Training Counselor Program, a rural school-based vocational counseling program for high school dropouts
- 1976 - Evaluation of the first year of a locality relevant career education program in three rural Missouri school districts
- 1976 - Designed research study and conducted analysis of data on occupational aspirations of 400 high school students
- 1977 - Field director and research analyst for state-wide craft cooperative feasibility study
- 1980 - Designed research study and conducted analysis of data on access to services and competitive funding for all rural Missouri high schools
- 1982 - Designed research study and conducted analysis of career education needs assessment data on 800 rural Missouri high school students
- 1980-83 - Conducted longitudinal follow-up study of 180 graduates of Contract Vocational Education program, a program in which school districts contracted with local employers to train students in vocational areas
- 1984-85 - Conducted evaluation study of joint videotaped/ independent study Spanish course in Chariton County, Missouri
- 1986 - Conducted study of student aspirations and interest in alternative secondary courses among 211 rural Missouri junior and senior high students
- 1987 - Provided analysis for a Drug Use Survey conducted with 250 junior and senior high students
- 1986-89 - Assisted in designing research instruments and provided data analysis for an annual "School Effectiveness Planning Study", New Franklin Elementary School, New Franklin, Missouri. (Each year a different focus concerning "Effective Schools Literature" was selected.)
- 1987-89 - Designed research study and provided data analysis for comparative distance learning study of all schools implementing German I Instruction by Satellite in Missouri and North Dakota
- 1990 - Conducted a cross-technology research study of all North Dakota schools having implemented distance learning
- 1993-4 - Conducted an implementation evaluation study of the first three, two-way interactive TV networks in Missouri
- 1995-present - Conducting ongoing evaluation of acceptance and effectiveness of two-way interactive television technology in Missouri

Reports and Publications:

Annual Plans of Work, Annual Progress Reports, Three-Year Progress and Evaluation Report, and Interim Reports, Missouri Title V Rural Development Office, University of Missouri-Columbia, 1974-77

Interim and Final Report -- Occupational and Training Field Work Program, 1975

Quarterly and Annual Reports -- Community Occupational and Training Counseling Program, 1977

The Community Survey: A Means of Need Assessment, Manual 108, 12/77/2M, University of Missouri-Columbia and Missouri Division of Community Betterment, 1977 (co-author)

Missouri Title V Rural Development High School Dropout Project (unpublished), three-year project summary, 1977

Reports and Publications, cont.:

"A Research and Development Approach to Rural Education", a paper presented at the annual meeting of the American Vocational Education Association, San Francisco, California, April 1979 (co-author)

Math Learning Series for G.E.D. students (unpublished), developed in conjunction with teaching G.E.D. classes in rural Missouri, 1975

"Rural Development Dropout Survey", Missouri Valley Adult Education Association Newsletter, Vol. III, No. 1, December, 1975

"Title V in Missouri: A Diversity of Social and Economic Development Projects", Rural Development News, Vol. 1, No. 4, July 1975

"Some Myths and Assumptions Affecting Rural Education", an unpublished paper presented upon request to Youthwork, Inc., Washington, D.C., June 1979

"Job Developer Manual" (unpublished), written for Rural Student Employability Project staff, 1982

"Community Occupational and Training Counselors Manual" (unpublished), written for Rural Student Employability Project staff, 1982

"Workshop on Designing Contract Vocational Education Contracts" (unpublished), written for Rural Student Employability Project staff, 1982

"Community Occupational and Training Counselor Workshop on Designing a Competency-Based Career Counseling Curriculum" (unpublished), written for Rural Student Employability Project counseling staff, 1982

"A Competency-Based Counseling Curriculum" (unpublished), implemented in three rural Missouri high schools, 1983

"Contract Vocational Education: The Missouri Model", paper commissioned under contract with Mid-Continent Regional Educational Laboratory, ERIC Document: ED 250 113, 1983

"Evaluation Report of Chariton County Spanish Project" requested by University of Missouri-Columbia Center for Independent Study, 1985

"Computer Software Resource Guide", written for New Franklin, Missouri Elementary School faculty, critiquing 80 major elementary software programs including content description and suggestions for classroom use, 1985-86

"Initiating Mastery Management: An Instructional Guide for Teachers", a guide written for secondary level teachers in the New Franklin, Missouri school district outlining a step-by-step approach to implementing an Instructional Management System utilizing Mastery Management System software, 1986

"Planning Guide and Implementation Manual for Satellite Instructional Programs", published by Oklahoma State University, Arts and Sciences Teleconferencing Service (with partial funding provided by McREL), 1987

"Descriptive Statistical Report: Distance Learning Evaluation Study, Phase I", a study of North Dakota and Missouri Schools Implementing German I by Satellite, 1987

Reports and Publications, cont.:

"An Elaboration on the Types of, Extent of Usage of, and Policy Issues Concerning Educational Distance Learning Technologies in the United States", a paper commissioned by Ford Foundation, New York, New York, 1988

"Distance Learning Evaluation Study, Report II: An Inter- and Intra-State Comparison (published by Mid-Continent Regional Educational Laboratory), 1989

"Initiating the Role of the Educational Consultant in the Rural School", a paper commissioned by Mid-Continent Regional Educational Laboratory, 1989

"Distance Learning in North Dakota: A Cross-Technology Evaluation Study of the Schools, Administrators, Coordinators, Instructors, and Students" (published by Mid-Continent Regional Educational Laboratory), 1990

"A Guide to Instructional Development and Policy", written for New Franklin K-12 faculty on the process of curriculum development, 1990

"Distance Learning: Implications for Public Policy", a paper commissioned by Mid-Continent Regional Educational Laboratory and the National Council of State Legislators, 1991

"Distance Learning via Fiber Optic Technology", a manual commissioned by Mid-Continent Regional Educational Laboratory, 1992 (co-authored)

"A Planning Guide for an Interactive Television Network" (unpublished), utilized in the NE-MO, West-MO, and Mid-MO school district clusters, 1993

"The Missouri Initiative: A Proposal for the Development of Interactive Television Capabilities in Missouri" (unpublished), 1993

"A Cost-Benefit Analysis of Two-Way Interactive TV: A Computer Spreadsheet Model" with Curtis Braschler, University of Missouri, 1994

"An Adopters Manual for Two-Way Interactive Television: A Guide to Researching, Planning, and Implementing Distance Learning in your School and Community", March 1995

Books Written:

Virtual Classrooms: Educational Opportunity Through Two-Way Interactive Television, under contract with Technomic Publishing Company, Inc., Lancaster, PA. Anticipated publication date: August, 1996 (primary author).

Major Presentations and Workshops:

"Utilizing Community Resources for Educational Programs", co-presented at Third Annual Conference on Rural and Small Schools, Manhattan, Kansas, November 1981

"Contract Vocational Education: Expanding Vocational Offerings of Rural Schools", presented at National Rural Education Association Conference, Manhattan, Kansas, October 1983

Major Presentations and Workshops, cont.:

Faculty Workshop for combined faculties of Renick and Clark, Missouri school districts on "Initiating Mastery Management in the Elementary School", October 1985

Secondary faculty workshop on "Integration of Missouri Keyskills into the Core Curriculum and the Instructional Management System", New Franklin R-1 School District, New Franklin, Missouri, June 1986

Presentation at the Missouri CUE (Computer -Using Educators) Conference, Columbia, Missouri on "Instruction by Satellite: A New Role for Computers", February 1987

Presentation at "Midwest State Budget Officers Meeting", Bismarck, North Dakota on distance learning, August 1987

Presentation to "Five-State Legislative Conference, Bismarck, North Dakota on distance learning technologies, September 1987

Presentation to "Technology in Education Conference, Sioux Fall, South Dakota on "Implementing Technology in Your School: Key to Effective Decisions", April 1988

Co-presenter, University of Missouri-St. Louis telelecture on "Educational Technology and Diffusion", April 1988

Co-presenter, Northeast Missouri School Administrator Meeting, on "The Role of Technology in Schools", April 1988

Presenter, State of Missouri Youth 2000 Steering Committee, on "Demographics Affecting Missouri in the Year 2000", May 1988

Presenter, Colorado Rural Education Conference on distance learning, July 1988

Workshop on "Extended Teaching" for New Franklin R-1 faculty covering mastery learning, cooperative learning, community magazine production, creative keyboarding, and use of video resources, August 1988

Presenter, Missouri Principals' Satellite Leadership Academy, Columbia, Missouri on "Curriculum Alignment: A Different Approach", April 1989

Presentation to State Technology Conference, Bismarck, North Dakota on "Distance Learning Evaluation Study in Missouri and North Dakota", May 1989

Presentation on "Distance Learning" to Joint North Dakota and Minnesota Conference on Restructuring the Upper Midwest, Fargo, ND, November 1989

Presentation to North Dakota Telecommunications Council on "Preliminary Analysis of the North Dakota Cross-Technology Distance Learning Study", Bismarck, ND, May 1990

Presenter, Annual Meeting, National Council of State Legislators on "Distance Learning Policy Issues", Nashville, Tennessee, August 1990

Co-presenter, Twelfth Annual Rural and Small Schools Conference on "Distance Learning Research in Missouri and North Dakota", Kansas State University, Manhattan, Kansas, October 1990

Presenter, Two-Way Interactive Video In Education Conference on "Evaluation of Distance Learning Programs", Salina, Kansas, May 1991

Major Presentations and Workshops, cont.:

Presentation to the Fourth Annual Video Technology Conference, Osage Beach, MO, October, 1993 on "Two-Way Interactive Distance Learning for Secondary Schools"

Presentation to the Putnam County EXCEL Class (an adult leadership training seminar series), Unionville and Green City, MO via two-way I-TV, January, 1994.

Presentation to the Regional Consortium for Educational Technology Conference, St. Louis, MO, March 1-2, 1994 on "Two-Way Interactive TV in Missouri"

Workshop developer and presenter, "An I-TV Teacher Training Workshop for MIT-E Network Teachers", Fayette, MO, August, 1994

Presentation to the Missouri Agricultural Leadership Council, Bennett Springs, MO, September, 1994 on "A Community Perspective of Telecommunications"

Presentation to Annual Meeting of the WeMET I-TV Consortium, Warrensburg, MO, November, 1994

Presentation at the Missouri DESE Educational Technology Conference, Osage Beach, MO on "Issues in Implementing Two-Way I-TV Technology", October, 1995

Presentation to Missouri Community Development Conference, Columbia, MO, October, 1995 on "Integrating Telecommunications Technology Across Educational, Telemedicine, and Community Sectors"

Professional Organizations/Affiliations:

Member, National Rural Education Association

Member, Association for Supervision and Curriculum Development

Organizer and Member, Missouri I-TV Information Alliance

Member, Missouri Goals 2000 Technology Task Force

Member, University of Missouri Partnership Schools Communications Task Force

OUTLINE
Testimony before the
Federal-State Joint Board on Universal Service
June 19, 1996

Vicki M. Hobbs
Panelist
"Functions and Costs of Telecommunications
Services for Schools and Libraries"

- I. **Relevant Background of Panelist**
 - A. **Current position--Director, MIT-E I-TV Network and Educational Consultant to schools re: educational technology adoption assistance**
 - B. **Relevant experiential background**

- II. **An Opportunity of Historic Proportions**
 - A. **Comparison with the rural electrification and interstate highway initiatives**
 - B. **Comparison to deregulation in the transportation industry**
 - C. **The public education sector as a serious player in the telecommunications market place**
 - E. **The diseconomies of scale and the impact of telecommunications**

- III. **Functional Requirements of Schools and Libraries with Respect to Telecommunications**
 - A. **The Goal: Predictable, affordable access to those telecommunications technologies which meet the individual educational and information needs of school children and library patrons wherever they are located**
 - 1. **Reliable access to those telecommunications services which meet their individual needs**
 - 2. **Predictable pricing for telecommunications services**
 - 3. **Affordable pricing for telecommunications services**
 - 4. **Graduated discounts based on type of service and wealth of district;**
 - 5. **Functionality, rather than specific technology, as the goal**
 - 6. **Broadband tariffed rates must include the option for leasing transmission equipment in addition to the transmission line lease**
 - 7. **Distance learning services must provide for interconnectivity, i.e., gateways, across carriers and across technologies**
 - 8. **Professional development for teachers in the use of technology and purchase of classroom equipment--while serious needs--fall outside the domain of this proceeding. Connectivity--not equipment nor training--is the issue**
 - 9. **The central focus of the Universal Service Fund should be on providing assistance with the installation and ongoing operational costs of telecommunications to school districts and libraries**
 - 10. **Technology as a means to achieve equity in education NOT achieving technological equity should be our goal**

IV. The Determination of Costs Associated with Telecommunications Delivery to Schools and Libraries: The Fundamental Issues

- A. It is cheaper to transport information than it is to transport people**
- B. The cost of telecommunications access for schools/libraries must be weighed against the far greater costs of lost educational opportunity, inability to provide needed instruction in areas of limited demand, and community demise**
- C. Costs associated with the "necessarily existent" school**
- D. Telecommunications services should come at a price--services should not be free--but that price should be adjusted according to each service provided and according to wealth of district, e.g., affordability**
- E. Insuring the availability of telecommunications services in rural America is an investment in the future**

Testimony before the
Federal-State Joint Board on Universal Service
June 19, 1996

Vicki M. Hobbs
Panelist
"Functions and Costs of Telecommunications
Services for Schools and Libraries"

My name is Vicki Hobbs. I am currently the Director of the Missouri Intertactive Telecommunications Education (MIT-E) Network and have worked as a program director and consultant with rural schools in Missouri and the midwest for the past ten years, the last ten of which has been largely in the area of technology adoption and the curriculum integration of technology.

The MIT-E Network is a two-way I-TV network involving five small rural K-12 school districts and a private, liberal arts college in central Missouri. The network has been in operation for three years, preceded by a five-year period of discussions with telecommunications carriers and pricing requests, negotiations over technology capabilities and seamless interconnectivity across multiple carriers, negotiating demands for educational functionality, and negotiating prices including the provision of transmission equipment and line costs within the monthly lease. The last 1-1/2 years of this 5-year period was with the assistance of the state Public Service Commission, the PSC having authorized the telco donation of classroom equipment to MIT-E as one of three initial "pilot I-TV sites" in the state. Even with the donation of classroom equipment, the number of obstacles to be overcome and the extent of negotiation required, left only the hardiest adopters willing to undergo the process. That process of negotiations is still ongoing. We are operating under a one-year contract. The cost for the T-1 quad-split network inclusive of codec and switching equipment is an average of \$1800/site/month for four sites and \$590/site/month for each of the two sites served by a second carrier. I am here today to urge that the process of telecommunications technology adoption, insofar as this proceeding can impact it, must be simplified. The pricing must be predictable; to the extent possible, it must be standardized.

It must be affordable and the technologies required to meet the educational needs of individual schools and libraries must be readily accessible within a reasonable implementation time frame.

The FCC has a unique opportunity with the Telecommunications Act of 1996 to impact the capacity of all schools and libraries to achieve greater educational and information equity, regardless of rural, urban, or suburban location, regardless of demographic circumstances or population density, and regardless of the myriad of factors which have separated the technological "have's" and "have not's". An extremely important aspect of telecommunications technology is its ability to reduce the cost of distance, a factor which has up until now always produced a rural deficit.

As did the rural electrification efforts of the 1930's and the interstate highway system of the 1960's, the Telecommunications Act of 1996 shares an opportunity of equally historic proportions, but significant differences exist. The same electric line turned on the lights, ran the washing machine, and operated the Victrola. Currently, no single telecommunications medium allows you to "plug in" an e-mail machine, teach a Physics course across multiple high schools, or connect classrooms around the world via desktop videoconferencing. Herein lies both the problem and the opportunity. The scope of telecommunications services is so broad, the potential for its use so diverse, and the factors involved in its pricing so complex, that a ready remedy to its unequal deployment confounds us.

The impact of deregulation in the transportation industry has been to deprive rural America of busses, trains, and air traffic. We must guard against a similar deprivation of telecommunications services in rural America with the deregulation of the telephone industry. It has been determined that it is in the public interest that no one be deprived of health care because of where they reside. Likewise electricity, access to public schools, even basic telephone service has been deemed sufficiently necessary to overcome the problems of access and cost in areas of low population density. We are here today to address equal access to telecommunications with the same commitment to the public good.

Historically, the public education sector has not been taken seriously within the telecommunications marketplace. Seen as a part-time, nine-month per year consumer, schools have never garnered the market respect of the telecommunications industry. To the contrary, in the MIT-E

Network, the system is utilized continuously 16 hours per day from 7:00 in the morning with a Zero-Hour Spanish class to 11:00 at night with college courses in Nursing and Education. Summer school classes are offered by I-TV. Community usage is significant, from nursing home administrator workshops to a 10-week course in "Self-Employment Training" across multiple small communities. The usage will only grow.

As telecommunication consumers we are asking for predictable, affordable access to telecommunications technologies. MIT-E is not alone. I am currently working with 20+ school districts who, in some cases are 2-3 years into the process of identifying costs, working with multiple carriers, and struggling with issues of interconnectivity in order to be able to take advantage of State Department of Education funding which will cover up to \$35,000 in classroom equipment costs for two-way I-TV classrooms. This opportunity, however, may be lost because of the inability or unwillingness of telecommunications providers to provide timely and reasonable pricing or functionalities required for educational use.

I believe our goal should be the predictable, affordable access to those telecommunications technologies which meet the individual educational and information needs of school children and library patrons wherever they are located. If a service is commercially available in any area, schools and libraries must be entitled to that same service at an affordable rate.

This goal presupposes several key points:

- 1) Schools and libraries must have **reliable access** to those services which meet their immediate needs. This infers that no one technology fits all and that all adopters do not need all technologies. It is a mistake to think of telecommunications technology as a hierarchy of services, the lowest of which becomes a ubiquitously deployed 'basic service' (as historically defined within the industry), while other services of more limited demand are left outside the purview of the national information infrastructure. That functionality which the individual school or library requires to meet their educational and informational goals should be the functionality to which they have reliable access. If a high school of 200 students has no way other than through distance learning to offer advanced Chemistry, the success of its college-bound pre-science majors is dependent upon that district's access to distance learning.

- 2) **Predictable pricing**, standardized to the extent possible, must be insured. How do I explain to a superintendent in Edina, MO that the rates for full-motion, continuous presence, two-way interactive television in her district were priced at \$5300/month as compared to \$2000/month for her consortium partners in the neighboring districts or that after additional pressure and renegotiating, that figure dropped to \$3250/month. Furthermore, leaving aside the issue of distance altogether, where is the rationale for hugely divergent pricing for identical services from carrier to carrier or from state to state? Why are some North Carolina schools expected to pay \$4000/mo for ATM service and \$1155 in Kansas? These differences cannot be attributed solely to the cost of providing the service.
- 3) **Rational, affordable pricing** policies must be adopted across providers and across states. Where “deals have been cut” and proactive PUC’s and state legislators have been involved, schools districts have benefited. Lacking the intermediaries rising to the forefront in those few cases--notably, Kansas--school districts in most other states are left to fight their own individual battles against an intimidating foe. The losers are invariably those schools and libraries in limited access, high cost, low density areas.

[Should a further discussion of an operational definition of affordability be requested, I can deal with that later during question and answers.]

“Special services” should be viewed as nothing less than the availability of voice, data, and video services at a multitude of bandwidths and involving several existing, emerging, and as yet non-existent transmission technologies.

Any system of vouchers or fund caps based on per pupil allotments (whether adjusted or not) fails to recognize the premise behind the USF, that is, to equalize the cost factors associated with providing services in low density, high cost areas. The notion of per pupil allotments does nothing to overcome the cost disparities associated with population density. Indeed those schools with fewest students are typically located in the lowest density, and therefore, the highest cost areas and the price of

**PREPARED STATEMENT OF ADAM M. GOLODNER
DEPUTY ADMINISTRATOR, RURAL UTILITIES SERVICE
JUNE 19, 1996 MEETING OF THE FEDERAL-STATE JOINT BOARD**

Mr. Chairman, other members of the Joint Board, health care is one of the most serious challenges facing rural America. Rural America's great open spaces and small towns do not naturally attract health care investment. This country has 3,089 counties, 2,276 of which are non-metro and, according to the Office of Rural Health Policy, approximately 1,400 of these rural counties have been Federally designated as health care professional shortage counties. A rural doctor is typically far from training centers, sub specialists and the latest equipment. The Administration and Congress recognized this problem and the Act includes a special provision for meeting this challenge. Unlike the Act's education provision which affects all of America, the health care provision is addressed solely to the challenge of rural health care.

The Department of Agriculture's Rural Utilities Service (RUS) Telecommunications Program has focused on this health care challenge. Through its telecommunications infrastructure loan program and its distance learning and telemedicine grant program, the RUS has helped build community partnerships to provide both the infrastructure needed to reach the clinic door and the equipment required inside that door. Over the last three years, loan funds have helped build fiber networks that can serve hundreds of clinics and the RUS Distance Learning and Telemedicine Program has provided 33 grants for rural telemedicine. These grants were used to help create community partnerships to purchase equipment at 112 sites, affecting 134,000 patients in 23 states.

To further leverage scarce federal resources, RUS introduced a bill in 1995 to add a loan component to this grant program. This proposal was accepted by Congress and signed into law by President Clinton in the 1996 Farm Bill. In his 1997 budget the President asked Congress for an appropriation of \$1 million for this new loan component which would power a \$150 million direct loan program to be used in conjunction with the existing grant program. For the grant portion, the President has requested \$20 million, an increase of \$12.5 million over the FY 1996 appropriation. Within the context of a balanced budget plan, these requests attempt to address the overwhelming demand for rural telemedicine. The actions of this Joint Board to address the transmission cost issue will have an even more lasting and profound effect on our rural landscape.

The Act

Section 254 (h)(1) of the Act states that rural and urban rates for telecommunications services within a state for health care must be “reasonably comparable.” The difference between this comparable rate and the rate charged to rural users for other, but similar, types of telecommunications carriage will determine the amount of universal service credit a carrier is entitled to claim. This provision gives rise to the issues the Joint Board has asked us to address today: what functions do rural health care providers need; how should we measure rural/urban comparability of cost for these functions; and what is the macro cost of universal service from this provision.

Functions

The service functions rural health care providers demand include the following:

- Initial patient evaluation, triage and transfer arrangements
- Transmission of diagnostic images
- Medical and surgical follow-up and medication checks
- Primary care at sites where a physician is not available
- Consultations and second opinions
- Extended diagnostic work-ups or short term management
- Management of chronic diseases and conditions requiring a specialist not available locally
- Transmission of medical data
- Continuing education for physicians and practitioners
- Public health, preventive medicine, and patient education

Rural health care providers also want access to the internet at rates comparable to local dial-up rates. For isolated health professionals, access to this information is vital and arguably should be part of the telecommunications services available at comparable (non-toll) rates.

Comparing these service functions on an urban to rural basis requires defining the characteristics of comparability. For health care, we must compare useful medical function to useful medical function. Let’s examine a consultation between a general practitioner with a patient and a specialist. An urban telemedicine consultation contact would most likely require a telecommunications carriage of a few miles. That same rural use, from a rural practitioner with a patient to a specialist, may require a 200 mile trip. Whether the comparison involves a voice-grade analog contact or a studio quality digital video contact, the RUS believes that the fundamental issue is function parity. For rural health professionals, function parity involves distance. When user functionality is included in the issue, it is clear rural costs exceed urban costs.

Telecommunications and Telemedicine

The bulk of the facilities used for telemedicine are ordinary telecommunications facilities. What sets them apart is the telemedicine equipment at each end of the circuit. This equipment allows the medical information to be molded into a form which can be transmitted over standard telecommunications circuits much in the way that a modem allows computers to talk over a telephone circuit intended for voice communication.

One reason that rural costs are so high is that rural loops are longer and require treatment to enable them to carry voice signals the necessary distances. Shorter urban loops generally do not require this treatment. Converting these treated loops from voice service to carry the broader bandwidth required by ISDN or T-1 circuits is expensive. This cost must be recovered either in the installation charge or in monthly service charges.

From our experience with rural telemedicine, the most desired service is interactive video. It is also the most demanding from a transmission standpoint. Network broadcast-quality full-motion video is transmitted at 45 Mbits/sec which is equivalent to 672 digital voice circuits (64 Kbits/second). Various "digital compression" techniques however can be used which allow video to be sent at lower rates. Of course, there are quality tradeoffs as rates are lowered. Great improvements in compression techniques have resulted in improved quality over time but engineers have approached the point of diminishing returns.

As a rule of thumb, 6 Mbit/sec. compressed video appears comparable to broadcast quality video and 1.5 Mbit/sec video appears comparable to VCR quality. Video can be sent at rates as low as 56 Kbit/sec but it has clear flaws in color and sharpness and is jerky.

Even though low-rate video equipment tends to be less precise and more expensive than higher rate systems, many have been employed for telemedicine because of the high cost of rural telecommunications. These systems are appreciated and are "better than nothing," but the overwhelming opinion of the medical community is that higher quality communications is directly related to usefulness and function. The RUS believes that more high rate systems (1.5 Mbit/sec. and greater) would be employed if rural rates were roughly comparable to urban rates.

Cost

Rural rates are higher than urban rates. The methodology for comparing rates, however, is not easy. The telecommunications services used for telemedicine are services that are marketed to business and commercial users. The costs of these services are generally guided by state and federal tariffs. Rates for some services, such as DS3

circuits, are often determined through negotiation. There is no standard or uniform approach, and approaches vary from state to state. Further, a number of rural telecommunications service providers already discount telemedicine services as a community service, so cost comparisons between urban and rural areas may understate the cost differentials that will actually exist when rural telemedicine becomes widespread.

The RUS has surveyed rates experienced by rural telecommunications service providers and telemedicine grant recipients and has found six states where direct comparisons between urban and rural rates can be made. We found that generally the average yearly rural costs were three to four times as high as urban costs for the same bandwidth.

Listed below are cost figures and annual cost differences. Please note that we used sample rural routes that approximated 100 miles or less (no worst cases), and for our annual cost comparisons we assumed 100 hours per month of use and 100 mile distance from a metropolitan center:

Comparison of Circuit Costs

		<u>Installation</u>	<u>Fixed Monthly</u>	<u>Per use</u>
<u>Colorado</u>				
T1				
	Urban	\$372	\$1072	Dedicated
	Rural	1758	3934	Dedicated
Annual cost difference per T1:		\$31,638		
<u>Minnesota</u>				
T1				
	Urban	625	365	\$15/hr.
	Rural	625	1158	\$42/hr.
Annual cost difference per T1:		\$41,916		
<u>Montana</u>				
T1				
	Urban	1200	216	
	Rural	1200	1187	
Annual cost difference per T1:		\$11,652		

Oklahoma

T1		
	Urban	(\$16.80/mile plus \$165/channel)
	Rural	(\$25.10/mile plus \$198/channel)

Annual cost difference per T1: \$24,912

Texas

T1		
	Urban	\$268 monthly
	Rural	1358 monthly

Annual cost difference per T1: \$13,080

Washington

ISDN Basic Rate				
	Urban	129	81	\$.53/min.
	Rural	623	475	\$.53/min.

Annual cost difference per ISDN BRI: \$5,221

At RUS' request, the National Exchange Carriers Association (NECA) provided a national average rate comparison based on August 1995 filed rates for a DS1 (T-1) circuit for urban companies (RBOCs, GTE and United) and small rural company members of NECA. An average urban telemedicine user located 30 miles from a metropolitan center would pay \$984 per month for the same service that a rural user located 100 miles from a metropolitan center would pay \$3140 per month to use (if the rural user is located 300 miles from the metropolitan center, its cost would be \$8160 per month). **The annual cost difference between the rural 100 mile circuit and the urban 30 mile circuit is \$25,872.** This figure is generally consistent with the six state survey above, and, arguably, could give some indication of an average per site differential nationally.

If internet connectivity is deemed to be part of the supported service functions, the difference between toll rate connectivity and connectivity at a local call rate must also be included in a national cost calculus.

The Joint Board has asked how much this provision of the Act costs to implement. That question is hard to answer. The Act requires a state by state balancing of rates. As we have shown, the rates vary greatly state by state. Further, there are over 2800 rural health clinics in the country and we do not have a clear idea about how many will request telecommunications services under the provision, or at what service level. Finally, the field of telemedicine is addressing major issues regarding insurance reimbursement and licensure, the outcome of which will surely affect demand. Having

said that, one could extrapolate a figure by estimating demand and using a RUS/NECA conservative average yearly cost differential per site of approximately \$25,000. The RUS does not specifically endorse that figure, but simply shares its experience and method.

This figure, and any current cost, will also be effected by other provisions of the Act. If universal service “core services,” or the “advanced services,” or the “infrastructure sharing” provisions of the Act lead to switched broadband service in rural areas, or even unloading loaded loop -- the rural telemedicine specific costs will go down. If competition drives down urban prices, but competition does not come to rural areas or prices otherwise do not fall, the cost disparity for these services, and thus the universal service cost, will go up. In the long run, however, both urban and rural costs should come down as the network infrastructure advances.

In a macro sense, these telemedicine costs are off-set by the savings to the economy from the provision of quality health care close to home: preventive care in the community; fewer critical care cases; less travel time and expense; fewer worker-hours lost; and, of course, lives saved.

Conclusion

The rural need is clear. The Act’s direction is clear. The functions required can be defined. The RUS believes that for purposes of determining reasonable comparability, the services must be compared on a useful function to useful function basis. This comparison shows that rural rates are multiplies higher than urban rates on a yearly basis and that universal service credits can create comparability.

Walter F. Patterson

Walter F. Patterson is vice president-corporate communications for Southwestern Bell Mobile Systems. In his current assignment, he is responsible for coordinating SBMS' public relations, corporate communications and customer satisfaction research programs throughout the company's 63 service areas in the United States.

Patterson, a 22-year veteran of Southwestern Bell, has worked closely with the CTIA (Cellular Telecommunications Industry Association) Foundation for Wireless Telecommunications to develop the ClassLink concept as part of an industry-wide initiative to improve education. Southwestern Bell Mobile Systems launched the first wireless school in the United States in 1994 at Richardson West Junior High in Richardson, Texas, a suburb of Dallas.

In March of 1996, Patterson received the CTIA President's Award for his contribution in bringing wireless technology into the classroom through the ClassLink concept.

Patterson has a BA degree in TV and Radio Production at Sam Houston State University. He serves on the board of the Center for the Study of Electromagnetic Compatibility at the University of Oklahoma and the ArtCentre of Plano, Texas, a Dallas suburb.

Patterson also is active in the Boy Scouts of America and is an usher in his church. He and his wife Rosie have one son.

Wireless Presentation

Patterson will discuss specific wireless functions and benefits that are at work in classrooms today. By means of a "virtual field trip," people will be able to visualize how wireless technology fills a communications void that exists in most classrooms today.

He also will describe what it costs to bring this technology into the classroom providing estimates for schools with a large number of faculty and staff and those with smaller staff numbers.