The Library and Wired Communities in Rural Areas

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ABSTRACT

THE FUTURE OF LIBRARIES in rural areas of the United States is tied to the future of the communities which they serve. As the telecommunications landscape continues to shift, these communities have opportunities to decrease their isolation, increase their connectedness, and affect the overall health of small towns and even whole regions through the innovative use of new technologies and new regulatory structures. By understanding the options, the changes in technologies, and the funding sources to help start and sustain some of these projects, those librarians who help serve rural communities will also strengthen their own position in the community and in the profession.

THE PAST

Because it is more expensive to build infrastructure in rural areas than in towns, rural libraries have usually lagged behind urban and suburban libraries in their ability to adopt computer and networking technologies. This was true for something even more basic: electricity.

Most librarians assume that electricity is a given, something not to worry about (except the bills), but this basic technology reached some rural areas of the United States less that forty years ago, many decades after the urban areas were using it. Nye (1990), the Danish historian who wrote about the social effects of the spread of electricity in the United States, observed that America treated electricity as a commodity in the marketplace, whereas in Europe it was treated as a service that was frequently subsidized and supported through government intervention. In

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the United States, the municipal power companies stayed isolated and were unable to grow in the same way that the private companies did—across counties and state lines. While this did make the United States a leader in world electrical production (we bragged about consuming over half of the world's electricity), Nye notes that power was concentrated in the hands of a few powerful firms and individuals, there was little rural service, and rates favored big customers.

While much of Europe and New Zealand had near universal electrical service, the map of the United States in 1935 shows many states with less than 5 percent coverage for rural electrical subscribers, and any figure above 45 percent was at the top of the scale. There were pockets of innovation around the country, usually in the form of cooperatives to provide electricity where the big companies would not go (see Figure1).

Although people were leaving the farm in large numbers, there was still a strong ideal of the independent home farm, and the depression of the 1930s led the federal government to try to lessen the growing gap in electrical service on the farm and in the city. Farmers had been exposed to the wonders of electric lights, water pumps, milking machines, irons, and even butter churns for decades of county and state fairs. The labor-saving aspects were well known to the men and women in rural areas, but it still took years and government programs to bring electricity to rural areas.

In 1933, the Tennessee Valley Authority (TVA) was created and, in 1935, the Rural Electrification Administration (REA) was established. The TVA was the more controversial of the two, and we are not likely to see any parallel effort to establish telecommunications projects in an area of the United States in the 1990s. The REA's goal to bring electricity to farms also boosted local economies by creating jobs and stimulating sales of electrical appliances. However, the power companies responded by dragging their feet and installing "snake" or "spite" lines in their service areas. These were electrical lines targeted at small pockets of customers that bypassed more isolated ones, and this tactic tended to inhibit the formation of cooperatives. By 1941, 12,000 schools received electricity. By 1946, about 50 percent of the farms had been wired.

At the local level, enthusiastic novices had a great impact. Clark Woody, a schoolteacher turned farmer, could not afford the fee to hook up his property, so he hopped in a car with some friends, drove from Indiana to Washington, met with REA officials, returned home, organized a cooperative, and got one of the first REA loans. In 1936, the *Lebanon Reporter* put out a thirty-two page supplement that contained all the basic information farmers needed to make decisions about electricity. This "electricity FAQ" was so popular with readers, that the copies printed were more than twice the average circulation of the paper.

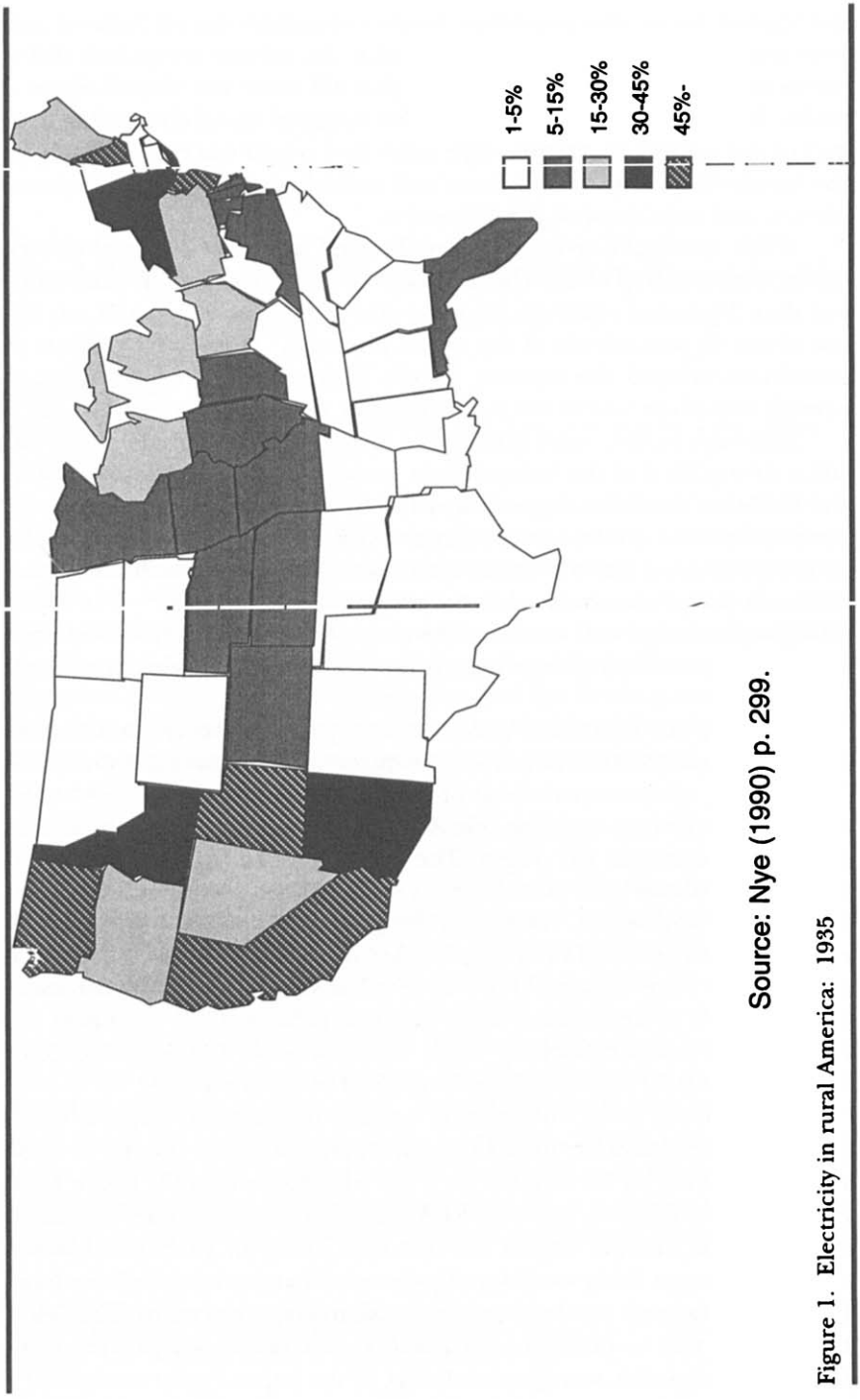

Figure 1. Electricity in rural America: 1935

The REA involved politicians in project ceremonies, and even Franklin Roosevelt dedicated a cooperative in Warm Springs, Georgia, in 1938. The saying that "all politics are local" was borne out because Roosevelt was shocked to see the high electrical rates when he first came to Warm Springs in the 1920s. He wrote: "That started my long study of proper public-utility charges for electrical current and the whole subject of getting electricity into farm homes" (Nye, 1990, p. 324).

The history of the rural development of electricity is important because it parallels much of what is happening with the spread (or lack thereof) of telecommunications in urban and rural areas in our own time. There are some important differences, too. The futurists and utility companies tended to exaggerate the benefits of electricity more than has been done with telecommunications and the Internet in this decade, aside from some writers such as George Gilder. Thomas Edison thought electricity would eliminate sleep, and magazines such as *Popular Mechanics* and *Popular Science* extrapolated from reports about electrical experiments to announce the radio transmission of electrical power (eliminating long extension cords for electric airplanes), electromagnetic levitation devices and solar electric power "just around the corner." *Science Wonder Stories* published "City of the Living Dead" "where machines not only do all the work but provide synthetic experience to many citizens who are permanently wired to a 'vast library of recorded adventures'" (Nye, 1990, p. 343).

In spite of this hype, electricity was revolutionary, and we must understand some of the changes in computer and networking technology to comprehend what form the revolution may take in the 1990s.

The Big Changes

Big technological changes are happening, and all of these will affect users in rural areas if only because they are denied access to the options many urban users will have. There will continue to be relentless progress in hardware and software. CPU power will continue to double about every eighteen months so that designers can look ahead and know the approximate time that a feature on an expensive machine will be added to a consumer-priced device. The assumption is that the features of these powerful devices will be so attractive that the market will increase and the economies of scale will increase to lower the price of components. What is not changing as fast is the speed of the networks that link up these ever faster, ever cheaper Power Macs, Pentiums, and Unix machines. ISDN (Integrated Services Digital Network) has been around since the 1970s and is only now being tariffed for home use. Ethernet is nominally 10 mbps and has not changed for many years. Modem speeds are climbing, and prices are dropping drastically, but most modems in use are still 2400 bps. Certainly, many enterprises are planning faster networks using Asynchronous Transfer Mode (ATM), but rural areas may not benefit from this technology for a long time.

In software, there are four important changes: (1) digital compression; (2) intelligent agents; (3) better navigation tools; and (4) user configurable software. Digital compression is already used in many cases—e.g., to compress a text file, a photograph, or other binary file. Sophisticated compression techniques will allow full motion video to run over medium speed transmission media and will make high resolution images available over medium speed modems. Because of the lure of profits from movies on demand, considerable engineering efforts are being expended on the problems and challenges of digital compression, decompression, and transmission. Many people believe that the services for the public good (education, libraries, and health) will ride the coattails of such entertainment services.

Intelligent agents are far off, but semi-intelligent agents that carry out repetitive tasks are already being used in different products. AppleSearch is a text-retrieval system for dynamic and static sources of information that uses "reporters" to search databases and then compose the answers into newspapers that are displayed on the desktop at a set time each day. At the 1994 Apple Library Users Group meeting in Miami, Florida, Bonnie Nardi, an anthropologist who works in the Apple Advanced Technology Group, reported on her study of the Apple Library reference services and found the complexity of the reference interview indicated that the human factor would not be replaced by software agents for the foreseeable future.

If anyone has attempted to search DIALOG in the past or navigate around the Internet, you are aware of the problems, especially for untrained novices, in finding your way on the Internet, and the challenge of doing more than serendipitous browsing of Internet sources is one that is being answered by various software firms, universities, and individual programmers. Recently, Apple Computer decided to recognize the efforts of the programmers who had provided a wide spectrum of navigation tools without thought of monetary reward. In September 1994, Apple announced the Cool Tools Awards for Internet programs.

User configurable software allows the nonprogrammer to control and adjust a program to the same degree that a professional programmer could. Some tools and languages, such as HyperTalk and Visual Basic, indicate that many people will become programmers if the barriers are lowered to learning the language. In the future, the decision to modify a program will be part of using the software, not an extra leap after an investment in hundreds of hours of learning a new language. Through document architectures such as OpenDoc and Microsoft's OLE 2.0, developers are making the computing experience for the end-user much more flexible and customizable. Some of the new computing technologies make little sense for rural areas without a telecommunications infrastructure, and the gap between those who can use them and those who cannot or do not use them will continue to grow.

Technology Choices for Rural Areas

During the past year, I have become convinced that communications technology is much less important to the survival of a rural community than are the people and the policies that they put in place to deal with the challenges they face. Technologists frequently forget this. I am much indebted to the recently deceased Kenneth Wilkinson, a rural sociologist from Penn State University. His unpublished 1992 paper, "Community Development in an Information Society," has had a sobering effect on my approaches to rural telecommunications and community networking projects. He sees the challenge as being the ways new technologies are used to reverse community deterioration. In fact, he says that rural communities are rarely that: "[R]ural places tend to be locations where particular problems and issues appear and not social units where effective collective actions occur." (The inequality among local groups, lack of services and organizational structures, and uneven access to outside resources "undermine local capacity for collective action and self-help." He recognizes that a lot of the problems are caused by forces outside the community—i.e., within the national economy and political structure. One of the big changes from sixty years ago, as electricity was coming into these communities, is that physical isolation is now associated more with social isolation than with social cohesion.

We also see the increasingly fast movement of capital into and out of given geographic areas. Companies look for the best investment climate reflected in wage rates, level of education, and tax breaks from state or local governments. While a state with a low wage scale and weak trade unions may attract a factory or distribution warehouse in one year, another state or even another country may attract that same firm a few years later. It is difficult for small communities to be flexible enough to react positively to such disruptive movements.

A number of writers, including contributors to an Office of Technology Assessment (U.S. Congress, OTA, 1991) report, believe that networking technology offers some ways of fostering community development and perhaps reversing the downward slide of small towns and counties. *Rural America at the Crossroads: Networking for the Future* was issued by the OTA in April 1991. As with many of their reports, general readers from different fields only hear about their studies after they are out of print. However, OTA is running a gopher, and I have requested that the OTA report be disseminated in digital format if the agency survives budget cuts going on in 1995. The study looked at new technologies for rural areas, the kinds of communities that could make use of them, how to help rural areas get the technologies shortly after the urban areas do, what role the federal government can take, and how rural America can be competitive in a world of NAFTA agreements and mobile international markets.

There are two important trends that they observed and described. Now, more than three years later, we are seeing the results of those trends. The first is the deregulation of the telephone system, the increase in competition, and the resulting "undermining [of] the traditional system of rate averaging and subsidies for local telephone service" (U.S. Congress, OTA, 1991, p. 8). In the past, the goal of universal service, though never achieved, was not that different for a business or for a single mother living in a trailer park. Now, the variety of services offered, as well as the competition in more profitable parts of the marketplace, has weakened the monopoly status of some Bell telephone companies.

In Colorado, a number of rural telephone routes owned by US West were sold in 1993; other sales are pending. The company had several goals in mind: invest in more profitable overseas markets, pay off the debt for the investment in Time Warner, and dump the less profitable rural services. Because of the economy in California, there was a huge migration of new settlers into Colorado and, according to *The Rocky Mountain News* (Holmes, 1994), US West could not meet routine telephone requests all around the state, let alone requests for more sophisticated services such as Switched 56 (dedicated 56 kbps lines) in towns such as Telluride (p. 104).

What is the Telluride InfoZone Trying to Do, Build a Rural Area Network (RAN)?

The RAN, a term coined by the authors of the OTA report, is formed around geographic boundaries rather than a single business or function, and it links as many types of users in a community as is possible: schools, libraries, businesses, government offices, health clinics, and even individuals who want to publish information within the community or on the worldwide Internet.

Telluride is an unusual town in an unusual setting. Everything is high—land prices, rentals, and even the altitude. They claim the highest per capita of computer ownership of any town in the United States, and the income is extremely high, so many other towns of equal size discount some of the lessons that Telluride is learning with the InfoZone project. As a starting point, they are using a Macintosh-based bulletin board system called FirstClass to allow citizens to discuss local issues, send mail (also to the Internet), and plan other steps as they improve the links to the outside world. In 1993, the Colorado Advanced Technology Institute awarded Telluride the funds to establish an Internet point of presence (POP) with Colorado Supernet. The Apple Library of Tomorrow program granted the InfoZone project (including the Telluride Public Library) a number of machines and printers for public access sites around town, including the library, schools, and Telluride Institute offices.

Getting the phone lines in town to the Internet router from these sites was not possible with US West. They could not provide the lines, so the InfoZone organizers are working with Tetherless Access Ltd. of Fremont, California, to install spread spectrum radio transceivers to form a wireless "mesh" network of Macintoshes that connects to the Cisco router and to the 56 kb line to the Internet.

Spread spectrum is a radio technology that was developed for military purposes, and now it is finding its way into lower cost devices that permit sites as much as thirteen miles apart (line-of-sight) to communicate at 56 kbps or faster. It uses special antennas, license-free transmitters that are under one watt in power, and certain classes of users (radio amateurs) can run the transmitters at higher power and push the range to more than 100 miles in any direction. Some firms are offering this wireless network at speeds of 4 megabits per second over a 2.5 mile range. While this technology can be used legally in all parts of the United States, it may be prohibited (or, at least, not well understood) in many other countries. The challenge of a decentralized technology that bypasses a government-controlled telephone system is a considerable threat to a weak central government. In 1985, the Federal Communications Commission (FCC) in the United States permitted the unlicensed use of spread spectrum technology. Tetherless Access, Ltd.'s (one of several manufacturers) World Wide Web server states the advantages:

> The FCC's ruling, contained in Part 15.247 of its Rules and Regulations, was intended to stimulate the widespread commercial use of spread spectrum technology. It is used as a lever by the FCC to extend the economic benefits of deregulation to use of the radio spectrum. The fact that a user can operate without first obtaining an FCC license is a significant breakthrough in the use of radio systems. It provides a strong incentive to choose spread spectrum over conventional radio technology. No longer does the user have to perform costly and time-consuming frequency planning and coordination to ensure that a new radio installation will not interfere with existing radio links.[1]

Tetherless Access Ltd. is also working with the nonprofit organization Volunteers in Technical Assistance in Arlington, Virginia, to blend spread spectrum and low speed satellite data communications for store-and-forward electronic mail in rural areas of the United States and developing countries without a good telecommunications infrastructure. For more information, contact Dewayne Hendricks <dewayne@warpspeed.com> or see the VITA gopher server.[2] VITA planned to launch a nongeosynchronous satellite in 1995, which will pass over each part of the earth anywhere from three times a day at the equator to fifteen times a day at the poles. During each pass, high speed modems can send batches of mail or files to the satellite for distribution

elsewhere on the orbit. While this can provide very limited interactivity with gopher or World Wide Web services by e-mail, it does provide electronic communications at a relatively low price for remote areas.

In the future, various for-profit and nonprofit firms want to launch networks of low earth orbiting satellites (LEOS) that will provide complete coverage for portable devices anywhere on earth—at a price. Naturally, a nonprofit organization, such as VITA, hopes to keep the price low to foster communications and information flow for the have-not nations, peoples, and organizations in the world. According to Gary Garriott <garyg@vita.org> of VITA, a solar-powered ground station with service policy will sell for about $2,700, and they are trying to determine the price of message traffic for the new service. This sort of service is most suited to rural locations with no telephone service nearby. A ground station allows remote libraries (or individuals in the field) to upload and download files during the times when the satellite passes over the site.

There is a growing interest in a wire- and fiber-based service known as Frame Relay.[3] This is a switching architecture for computer networks that is being offered as a commercial service by all of the regional Bell companies and GTE in parts of thirty states. The costs vary greatly, depending on what tariff has been established by the Public Utilities Commission and the phone company, but Pacific Bell in California is offering a service that permits a library system with branches all over a large county, for example, to connect to the Frame Relay cloud[4] rather than lease separate lines. What is most important for rural libraries is that they pay a flat rate for unlimited use and do not pay more when one site is further away than another. At present, a 56 kilobit per second line costs $125 per month, and speeds of 128 kbps, 384 kbps, and 1.544 megabits per second (T1) are available. T1 costs $663 per month. There are installation charges and other fees, but it can offer a great price break for librarians planning networks.

Michael Schuyler (1994) of Kitsap Regional Library in Bermerton, Washington, is among the first library network administrators to make use of Frame Relay in public libraries. In the publication *LinkNet User's Manual,* Schuyler explains in some detail his rationale for choosing this technology. It makes very good sense for libraries building community networks to which a variety of information providers may connect directly to feed information to the network. It is interesting to note the different charges for the library adding another connection or by purchasing it from one of the three phone companies that serve Kitsap County. The monthly charges range from $92 to $237 and, if you have access to the service in your area, the prices may fall somewhere in that wide range. LinkNet's user manual is available on their gopher (linknet.kitsap.lib.wa.us Port 70) in the Linknet Support directory as "userman1.asc."

Most rural libraries should look to their state library for assistance in keeping up with the latest technology that makes sense in rural areas. In preparing this article, rural library and automation experts were interviewed from state agencies in Alaska, Idaho, Illinois, Kentucky, North Carolina, North Dakota, South Dakota, Tennessee, Utah, and Washington. In addition, I spoke with network and telecomms workers in California, Colorado, Indiana, Nebraska, and West Virginia.

The participants were asked a series of questions about the state of rural libraries and communities, what technologies are particularly exciting to rural libraries, exemplary projects involving libraries, as well as training options for isolated staff (both MLS and non-MLS workers).

The state of the libraries varied greatly. Lou Reinwand of the Utah State Library was the most upbeat in his assessment of his state's rural libraries. The economy is fair, Californians and retirees are pouring in, and the state's own efforts to certify libraries and provide money for equipment and materials has made an impact. In other states, budget cuts are undercutting years of building up of adequate services of all types to rural areas. The most extreme example is South Dakota, whose state library was slated to close in mid-November 1994 because of a funding battle between the legislature and the governor.

One state specifically mentioned stand-alone CD-ROMs as being a very exciting technology for rural libraries. Those of us in urban areas with many connectivity options must realize that, until decent bandwidth reaches rural areas, CD-ROMs will deliver more information than low grade phone systems can in many locations. However, most states mentioned access to the Internet as the hot topic, as are community networks in many locations. In late 1994, the Colorado State Library was awarded a large Department of Education grant for a very ambitious networking project that will extend the Access Colorado Library Information Network. Funding for Internet connections in rural areas elsewhere is coming from LSCA, private companies, foundations, and other agencies of the federal government, such as the National Telecommunications and Information Administration (NTIA) and the Rural Utilities Service.

New Roles for Libraries and Librarians

Some librarians ask me to help define their role in this rapidly changing techno-climate. There are some general guidelines that may need to be modified for your specific situation. As stated earlier, the health of libraries is tied to the communities they serve. For this reason, I have been interested, in the past few years, in ensuring that libraries are involved in the community networks that are forming in cities and towns all around the country. For a general introduction, see "Community Computer Networks: Building Electronic Greenbelts."[5] Some librarians involved may not know as much as other organizers about computers or

networks, but they know about organizing information, about helping users find it, and they know the community. Of course, many librarians know a great deal about all of those topics, but the point is that each librarian and each library can bring something to the table when a community decides that it wants to be better connected. Computer expertise is not necessarily a requirement.

The most basic role the library can assume is to serve as a meeting place for a group that is planning such a network or system. You may have no computer, you may never have used a network, but you can offer your meeting room or even your reading room after hours for initial meetings. I have attended town meetings in library meeting rooms, and it is a definite benefit to have the public associate the formation of the planning group with the library. Another role is that of facilitator. The librarian can suggest that interested parties meet to discuss changes in networks and telecommunications in their town or county. Even if the library uses no technology, the librarian should be the one to invite representatives from the cable company, cellular service, telephone company, local BBS system operators, the school, city, and perhaps even the power company. Find someone who has something to say or demonstrate and invite that person to speak. It may be an outsider, but look locally for talent before inviting others (even those who will come for free) to initial meetings. What does this do for the library? You are the one who got people together and began the dialogue. People will associate you and your library with change, with foresight. Too often I have seen talented librarians not hear about these meetings or conferences until all the arrangements have been made or until they are over. Do not let people at any level forget you or the library.

If the dialogue has already begun, as it has in many states and many towns (the lieutenant governor of Colorado held local meetings on telecomms issues in various towns around the state, for example), find out how you can help. Ensure that people know the prospective role of the library—organizer, participant, meeting place. If you are reluctant to make a public presentation, find a librarian who can. That person may be in the regional library, the state library, or someone already involved in such a project who speaks at meetings and conferences.

Some states, such as Illinois, offer workshops on community involvement. The Small Library Management Institute, organized by the Illinois State Library, is a good example of the kind of training that goes beyond basic reference and circulation and interlibrary loan essentials (which are quite necessary) to providing the skills needed to become more involved in your town.

When communities decide that they want an improved telecommunications infrastructure, they usually do so because they have a specific use in mind. However, some may do it because the county seat thirty miles

away began some project, and the neighboring town does not want to be left behind. The most frequently mentioned applications are usually voiced in sensible, but rather vague, scenarios: "Let's hook up the schoolrooms, put the hospital online, have the city council minutes for people to read, help the ranchers get agricultural information from the extension agent, and look up the library holdings in an electronic catalog." Or it might be simply, "We need an onramp to the Internet." Few people will come out and say: "I'm anxiously awaiting pay-per-view so I won't have to drive to the video store."

You, as the librarian, can help. Bring a few articles or news items that describe a system that might be a model for your area. Most meetings include people who have read about these changes, those who are using the new technologies, those who want to sell them to you, and perhaps some who are worried about the changes that will take place if your organizing group is successful. If you have the resources to talk or even interview people in your community, spend as much time as you can involving and informing others. Offer to distribute the survey at the library; post the meeting minutes on your bulletin board and help get the word out.

After a few meetings—perhaps at the first one—the group will examine the potential applications. There will be members who are focused on the technology and others who are better at relating to the people they hope to serve. It is recommended that nobody build special purpose networks. The OTA report emphasizes multiple uses for the network, so do not plan on just one for schools, or libraries, or telemedicine, or economic development. People who control money in Washington are calling these "stovepipe" networks, and they are less inclined to fund these than in the past. They are tired of hearing people say, We need funds for this library network, even though the hospitals and junior colleges around the state may have just built one. It is obvious that many of these networks will emphasize one type of application over another, and it is up to libraries to see how they can participate in the project and help the collaborators.

The National Association of Development Organizations[6] is a nonprofit organization that assists rural economic development councils, government officials, and nonprofit organizations in sharing information and ideas. Their research organization published a white paper, "Telecommunications and Its Impact on Rural America."[7] The concerns their members have and the trends they hope to encourage are similar to those of rural libraries. Because the range of projects is so wide, only two examples will be given.

In McAllen, Texas, near the Mexican border, the Lower Rio Grande Valley Development Council realized that there was a problem with arbitrary long distance calling areas in the three counties served by GTE and Southwestern Bell. It took two years, but the council helped citizens in the area obtain an optional $25 per month charge for unlimited calls

over an extended calling area that stretches about 120 miles. This flat fee over such a large area is of obvious benefit to a library establishing connections with outlying libraries for network or fax traffic, but also to schools, nonprofit organizations, and county government. Not only are monthly bills less, but the library has the beginnings of a telecommunications infrastructure where everyone has relatively low cost but broad access. Any time such a plan is proposed, testimony from libraries can help make the case for such a change in the rules.

The Bethel Distance Delivery Consortium[8] in Bethel, Alaska, is a consortium of KYUK, a PBS station; several school districts; and a hospital corporation that encompasses fifty-two villages, some of them over 150 miles from Bethel, which itself is far from Anchorage and is accessible only by dogsled and plane. They are using a FirstClass[9] BBS to link up participants involved in distance education and telemedicine. At present, they use a very expensive satellite for 2400 bps access among villages at a cost of $25 per hour, but dedicated lines and new wireless connections could provide the connectivity for new multimedia services. Many of the improvements they are planning are made possible by a $500,000 grant from the Rural Electrification Administration, a federal entity that funds new technology to improve rural delivery of health care and distance education. Although no library is involved in this project, it is the very sort that libraries could ally themselves with during the planning stages and not after the grant is awarded.

At the 1994 conference for small and rural libraries held in Bismarck, North Dakota, the provincial librarian for Manitoba mentioned that people in rural parts of the province were calling and asking if the library was going to provide Internet access. These were areas where no group was supporting a library, but some users' desire for electronic information and communications should enable a few communities to leapfrog over the predominantly print-based rural library and connect directly to the Internet. One state library employee predicted that marginal rural libraries would shut down as rural inhabitants had their information needs met by commercial (or perhaps government subsidized) network services. It is time to examine the library's role in providing these services, perhaps even if there is no building or part-time staff in the area where potential users live.

Even if libraries do not have the resources to become a network provider, the roles of trainer and online support staff are already being taken by some libraries. Helen Moeller, director of the Leon County Public Library System in Tallahassee, Florida, is guiding the training efforts for Internet users in the town. Each month there are several training sessions, and the demand for this grows along with the interest in network access.

Another option that can be considered is to allow the library building to serve as a holding site for telecommunications equipment. The security, accessibility, and centrality of many library buildings may make them ideal locations for routers, terminal access points, and other back room equipment.

Finally, I have not encountered any community network operation that did not want to have the library participate. The Santa Fe Public Library[10] in New Mexico has a World Wide Web page that is hosted by a small commercial firm that is planning to offer Internet access in that part of the state. Having library information online lends it some stature, and guest accounts for the staff can generate good word of mouth advertising.

CONCLUSION

This article has tried to show how slowly some popular technologies have spread in rural areas as well as discussing some new technologies that will affect rural areas, if only because they do not have them and the urban areas do (this happened with electricity a century ago). Finally, the new roles for libraries and librarians included examples of collaborative projects and efforts where librarians were involved or could have been, even if they were absent. What works in rural Texas may not apply to North Dakota or the villages of rural Alaska. Potential causes, grant partners, and network collaborators will vary, but individual efforts to reach out, learn more, become involved, and offer the best services your library can manage will win friends, support, prestige, and perhaps an important place in the growing web of networks.

NOTES

1. http://www.tetherless.net/ is the URL for Tetherless Access, Ltd. World Wide Web pages.
2. gopher://vita.org/
3. Frame Relay Forum home page: http://frame-relay.indiana.edu
4. Cloud, in network terms, is a concept that indicates the reach of a network and is usually drawn as a cloud in diagrams. Pacific Bell's Frame Relay cloud in California reaches all over the state. The Internet cloud reaches more than eighty countries. The idea is that by connecting to the cloud, you have access to all other parties connecting to the cloud.
5. Available by anonymous ftp from: <ftp.apple.com> in the alug/communet directory
6. NADO, 444 N. Capitol St. NW, Suite 630, Washington, DC 20001. (202) 624 7806
7. April 1994. Available from NADO. $10 for nonmembers.
8. Contact Jim Schaefer at: <Jim_Schaefer@ddc-alaska.org>, Distance Delivery Consortium, P.O. Box 2401, Bethel, AK 99559 (907) 543-4069, FAX (907) 543-3130.
9. SoftArc Inc. 905/415-7000.
10. http://spy.org:70/0/Users/sfpublib/html/sfpublib.html

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