

**U.S. DEPARTMENT OF COMMERCE  
National Telecommunications & Information Administration**

Evaluation of the  
Telecommunications and Information Infrastructure Assistance Program

**Case Study Report**

**Los Angeles Free-Net  
94026**

**Tarzana, California**

Site Visitors: Paul Tuss and Laurie Somers

Dates of Visit: December 11-12, 1997

## **PREFACE**

On behalf of the National Telecommunications and Information (NTIA), I am pleased to share the following report that is one of a series of case studies conducted on grants awarded by the Telecommunications and Information Infrastructure Assistance Program (TIIAP) in 1994 and 1995. The case studies are part of the program's evaluation effort designed to gain knowledge about the effects and lessons of TIIAP-funded projects. NTIA contracted Westat, a research and consulting firm, to perform an independent evaluation of the program's first two years of grants. The evaluation consisted of a mail survey of 206 grant recipient organizations and in-depth case studies of selected projects. In February, 1999, the Commerce Department released Westat's evaluation report.

The projects selected for the case studies cover a broad range of program types and sizes, planning grants as well as demonstration grants, and they show varying degrees of implementation, sustainability, and replication. Westat selected the projects to represent a cross-section of all projects funded in the program's first two years. Specific selection criteria included geographic region, target population, project application area, project category, and size of award. To conduct each case study, Westat reviewed all project files, including progress reports and the final report, and conducted site visits. The site visits consisted of project demonstrations and interviews with project staff, representatives of partner organizations, and project end users.

NTIA thanks the case study participants for their time and their willingness to share not only their successes but their difficulties, too. Most of all, we applaud their pioneering efforts to bring the benefits of advanced telecommunications and information technologies to communities in need. We are excited about the case studies and lessons they contain. It is through the dissemination of these lessons that we extend the benefits of TIIAP-funded projects nationwide.

We hope you find this case study report valuable and encourage you to read other TIIAP case studies. You may obtain additional case studies and other TIIAP publications, including the final Westat evaluation report, through the NTIA web site ([www.ntia.doc.gov](http://www.ntia.doc.gov)) or by calling the TIIAP office at (202) 482-2048. We also are interested in your feedback. If you have comments on this case study or suggestions on how TIIAP can better provide information on the results and lessons of its grants, please contact Francine E. Jefferson, Ph.D. at (202) 482-2048 or by email at [fjefferson@ntia.doc.gov](mailto:fjefferson@ntia.doc.gov).

Larry Irving  
Assistant Secretary for Communications and Information

## **TIIAP CASE STUDY**

### **Los Angeles Free-Net**

#### **A. EXECUTIVE SUMMARY**

The TIIAP project represents the expansion of an existing network, the Los Angeles Free-Net (LAFN). LAFN is a nonprofit organization providing communication, education, and information services for the nearly 19 million residents of greater Los Angeles via interactive computer and telecommunications technology. However, the majority of Los Angeles residents were discouraged from using LAFN resources because the connection required a long distance telephone call. The TIIAP grant funded the development of a frame-relay network with four external nodes at strategic locations throughout Los Angeles County, thereby allowing residents near each location to make a local call to the node rather than a long distance call to main server.

The work done under the TIIAP grant has led to thousands of Los Angeles residents, schools, and libraries subscribing to the network. As of December 1997, there were over 15,000 paid accounts to LAFN, approximately three times the number of paid accounts in 1994 before the TIIAP grant was awarded. The numbers of free accounts to schools, libraries, and individuals without computers who use the library accounts have demonstrated comparable growth. Along with the expansion of the network's user base, LAFN has continued to expand its special interest group bulletin boards, access to local, state, and federal legislative information, special K-12 interactive education programs, medical bulletin boards, electronic mail, and other services. It is impossible to determine how much of this growth is due to the frame-relay system and how much is simply due to the longevity of the LAFN and the quality of its service, but there is little doubt that the TIIAP grant played a critical role in the network's growth and success. Other critical factors in the success of this project are the enthusiasm and dedication of the volunteers who keep the network operating and the decision (made prior to the TIIAP award) to break from the traditional free-net philosophy and charge subscribers a nominal annual fee for accounts.

The biggest challenge currently facing the project concerns meeting the constantly increasing demand for services and content as the user base continuously expands. However, it appears nearly certain that the money generated from LAFN will allow the network to continue to improve its services and expand the service area receiving local call access.

#### **B. OVERVIEW**

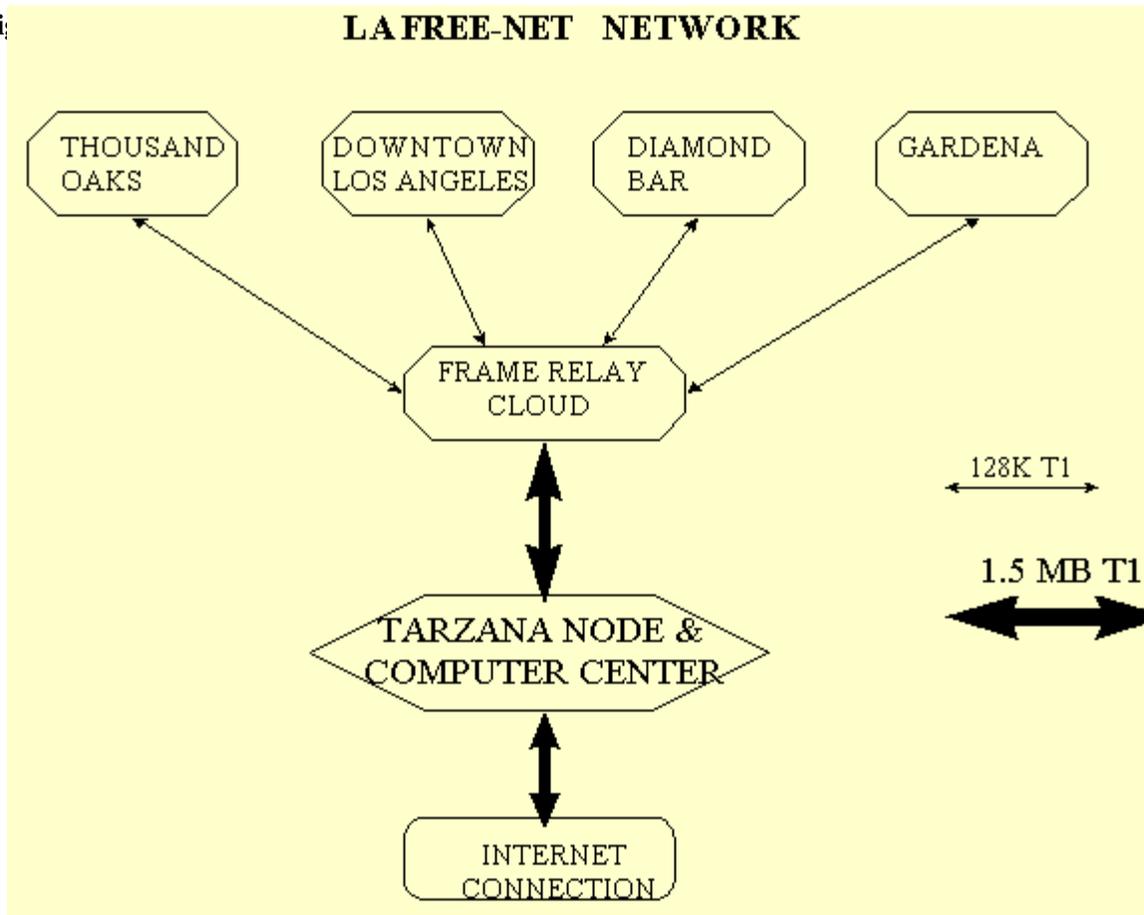
##### **Purpose and General Approach**

**Goals of the Project.** The objective of this project was to demonstrate a low-cost communications infrastructure that would allow toll-free access to the Los Angeles Free-Net (LAFN) and the Internet from most parts of Los Angeles County. LAFN is a volunteer nonprofit organization dedicated to bringing people together, providing community information, and offering Internet access at the lowest possible cost. Since its inception in 1988, LAFN has offered special interest group bulletin boards, access to local, state, and federal legislative information, special K-12 interactive education programs, medical bulletin boards, electronic mail, and other services. With the assistance of the TIIAP grant in May 1994, the LAFN was able to implement a five-node, frame-relay-based network that allows toll-free access to its Free-Net and

the Internet by most of Los Angeles County's 10 million residents. Local call access was sought to expand the user base and promote use by schools and low-income users.

**The Role of Technology.** At the start of the project, in October 1994, LAFN consisted of a simple network with a single computer (SunSparc 10), 16 telephone lines, 14.4K modems, and a comserver with an Ethernet connection. Local toll-free dial-up access to LAFN was available only for residents in the areas of Beverly Hills, Santa Monica, Pacific Palisades, and central and west San Fernando Valley; residents outside the local calling area were required to make a long distance telephone call to connect to the network. The TIAP grant enabled the network to establish a frame-relay network with four external nodes at strategic locations throughout Los Angeles County. At each node, equipment was installed allowing residents near that location to make a local rather than a long distance call to the node. Users transmit information via telephone to modems at the node, and those data are transmitted to the computer center. Data are sent from the computer back to the node and then back to the user's computer via the phone lines. The overall structure of the frame-relay network is shown in Figure 1.

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\* "Establishment of a Five Node Frame-Relay Network to Provide Local Call Access to the Los Angeles Free-Net for the Residents of Los Angeles County." Final Report Prepared by the Los Angeles Free-Net for Work Performed Under Grant Number: 06-40-94026.)

**Proposed End Users and Other Beneficiaries.** The potential universe of end users consists of all residents of the greater Los Angeles area. The actual population of end users is composed of the 15,000+ current subscribers to the LAFN. Figure 2 shows the geographical areas in which local call access to LAFN is available and represents the target population for end users. The circle surrounding Tarzana represents the area in which local call access was available prior to the TIIAP grant. The areas within the remaining four circles show the areas served as a result of the TIIAP grant.

Figure



\* "Establishment of a Five Node Frame-Relay Network to Provide Local Call Access to the Los Angeles Free-Net for the Residents of Los Angeles County." Final Report Prepared by the Los Angeles Free-Net for Work Performed Under Grant Number: 06-40-94026.)

Although the project is intended primarily to benefit direct users of the LAFN, project staff also expect general community benefits to result from the network's capacity to help residents keep better informed, communicate, and conduct business electronically.

**Description of Grant Recipient and Project Partners**

**Grant Recipient.** The grant recipient organization was the Los Angeles Free-Net Division of the H.O.P.E. Unit Foundation, an organization offering counseling and education for people with cancer housed at the Encino-Tarzana Regional Medical Center in Encino, California.

LAFN is staffed almost entirely by volunteers.

The three key personnel involved in the TIIAP project are:

- The LAFN President, a clinical professor of medicine at the University of Southern California and former Chief of Staff at both Encino Hospital and the Tarzana Regional Medical Center, was the founder of the LA Free-Net and remains a driving force behind its growth and its evolution.
- The Executive Director of LAFN, a physicist and entrepreneur, served as Operations Director for the TIIAP project, managing the day-to-day operations of the network.
- The Chief Scientist for LAFN, a computer scientist and technology consultant, served as technical director to the TIIAP project and was responsible for designing the frame-relay system.

Many other individuals were not expressly named as TIIAP project staff but nevertheless play a crucial role the management and operation of the LAFN:

- A retired aerospace engineer designed the physical set up of the modem rack and is currently writing the program to monitor system usage.
- A retired teacher has a broad role in the LAFN that includes content management, infrastructure maintenance, and training.
- A senior citizen coordinates the LAFN mentors, registrars, and other volunteer staff, and moderates the user suggestion box.
- A physician serves as medical advisor and Webmaster for LAFN's Health and Medical Interest Center, managing content and ensuring that the information provided is valid, current, and accurate.
- A community college instructor serves as education advisor and Webmaster for LAFN's Education and Lifelong Learning Interest Center.

In addition to these key LAFN staff members, there are several additional categories of volunteers who assist with the network's operation:

- Six volunteers handle registration for new users.
- Twelve Webmasters are responsible for creating and maintaining the LAFN interest centers with extensive involvement from the users.
- Sixty-six LAFN users serve as volunteer mentors, responding to user requests for technical assistance.
- Approximately 50 moderators oversee the activities of the various LAFN newsgroups.

**Project Partners.** The original site and current home of the LAFN is the Tarzana Regional Medical Center. This for-profit facility is owned by Tenet Health Care. The network's genesis was greatly

facilitated by a no-strings grant of \$50,000 from AMI (the owners of the Tarzana Regional Medical Center at the time). In addition, the room in the computer center of the hospital was and is provided at no cost as are the 80+ phone lines at the site.

Four organizations serve as external nodes in the network by providing space for the frame-relay equipment. These are

- El Camino Community College in Gardena;
- California Lutheran University in Thousand Oaks;
- USC-Kenneth Norris Jr. Comprehensive Cancer Center in Los Angeles; and
- South Coast Air Quality Measurement District Headquarters in Diamond Bar in conjunction with the City of Hope National Comprehensive Cancer Center.

The USC-Kenneth Norris Jr. Comprehensive Cancer Center provides 15 free telephone lines in addition to the physical space for equipment. It was estimated that leasing the space required for a single frame-relay node, including security and air-conditioning, would cost about \$6,000 per year.

**Project Costs.** The amount of the federal contribution for the TIIAP project was \$95,015. Total equipment costs for the project came to \$98,419. Matching funds for the grant were provided by the Los Angeles Free-Net Division of the H.O.P.E. Unit Foundation.

LAFN charges users a small annual fee for accounts and therefore had a reliable source of income prior to receiving the TIIAP award. However, in keeping with the free-net philosophy, subscription fees are waived for anyone who cannot afford them. The annual fee is also waived automatically for classroom accounts and library accounts. The annual fee is \$20 for the text-based service and \$40 for the PPP (graphics-based) service. The income generated by the user fees has allowed the project to sustain itself beyond the grant period.

## **C. PROJECT CONTEXT**

### **Community Description**

The City of Los Angeles is the second most populous city in the United States with an estimated 1995 population in excess of 3.6 million. Los Angeles is the principal city of a metropolitan region stretching from the City of San Buenaventura to the north, the City of San Clemente to the south, and the City of San Bernardino to the east.

Both the City and its surrounding metropolitan region have continued to experience growth in population and in economic diversity. Services, wholesale and retail trade, manufacturing, government, financial service industries, transportation, utilities, and construction contribute significantly to local employment. The City's 470 square miles contain 11.5 percent of the area and 39.2 percent of the population of the County of Los Angeles. The County is the top ranked county in manufacturing in the United States, producing more than 10 percent of the nation's production of such diverse items as aircraft, aircraft equipment, aluminum, dental equipment, games and toys, gas transmission and distribution equipment, guided missiles, space vehicles and propulsion units, and women's apparel. Fueled by trade

with the Pacific Rim countries, the Port of Los Angeles/Long Beach ranks first in the nation in volume. As home to the film, television, and recording industries, as well as important cultural facilities, Los Angeles serves as a principal global cultural center. With Los Angeles International Airport serving as the new Ellis Island for foreign immigration to this country, the metropolitan region has achieved a new ethnic and cultural diversity.

Los Angeles County is served by two different telephone companies and has five area codes with more than 300 telephone exchanges. Toll calls (calls more than 12 miles) cost from 8 to 14 cents for the first minute and up to 11 cents for each additional minute. Such costs would make Internet and community computer access too expensive for schools and low-income users.

### **Status of Telecommunications/Information Infrastructure Environment Prior to the TIIAP Project**

The TIIAP project represents the expansion of an existing network, the Los Angeles Free-Net (LAFN). LAFN is a nonprofit organization that provides communication, education, and information services for the residents of greater Los Angeles using interactive computer and telecommunications technology. Anyone can access the Los Angeles Free-Net from a computer equipped with a modem. Other than a modest annual registration fee, use of the system is free. In addition to offering generic services such as the use of e-mail, access to over 2,500 newsgroups, and access to the Internet via Lynx, Gopher, and web browsers such as Netscape and Microsoft Internet Explorer, LAFN provides a vast array of services that are designed to be of particular interest to residents of Los Angeles County including:

- Extensive community service and special interest group bulletin boards
- Access to local, state, and federal legislative information
- Interactive access to local state and government officials
- Special K-12 interactive educational programs
- Emergency Network-Los Angeles
- Medical information bulletin boards
- Online access to the Los Angeles Public Library

Because LAFN maintains a text-based system in parallel to the graphic user interface system, it allows people with visual impairment (blind or less impaired) to use the system (with a text to speech accessory). Unlike the commercial systems, the Lynx engine within the LAFN software allows searches and complete access to the site resources for those people with visual disability.

The LAFN website is organized into 17 separate “interest centers.” The Education Interest Center includes links to schools, colleges, and resources for students, teachers, administrators, and parents. The Health and Medical Interest Center includes access to an extensive list of medical journals and university-sponsored consumer health newsletters, free searching of the National Library of Medicine, descriptions of most disease conditions including standard and experimental treatment options, a rich catalogue of information about every drug in the U.S. pharmacopoeia (including therapeutic effects, side effects and drug-drug interactions), emergency medicine information, travel health information, and links to medical

centers around the world that offer additional health-related information of value to the user base. Other interest centers on the site include the Media Interest Center, offering radio, TV, newspapers, magazines, and online publications; the Religion and Philosophy Interest Center offering includes local houses of worship and information about the world's religions; and the Arts and Entertainment Interest Center offers motion picture, TV, and theater information.

The idea for developing the LAFN originated in 1986 when the current LAFN President contacted a well-known telecommunications visionary at Case Western Reserve University in Cleveland, Ohio, to help him set up an online resource to facilitate the exchange of medical information between physicians and the general public. The individual at Case Western had developed a much more comprehensive online community resource called the Cleveland Free-Net and encouraged the LAFN President to develop a system in Los Angeles that offered the full range of services offered by the Cleveland Free-Net. After 8 years of effort by a dedicated team in Los Angeles, the Los Angeles Free-Net was inaugurated on May 10, 1994. It was, at the time, one of nearly 100 free-nets in existence throughout the world.

The original LAFN network consisted of 15 dial-up lines, a text-based system built by Case Western Reserve University, and a free-port SunSparc system. Because the network was established in part to help community members become more effective consumers of health care services, American Medical International Organization gave \$50,000 for the initial equipment purchases. The project received additional grants from Amgen Corporation, AECOM Technology Corporation, the Danny and Sylvia Kay Foundation, the Encino-Tarzana Regional Medical Center, and the H.O.P.E. Unit Foundation. The Encino-Tarzana Regional Medical Center supplies all space and phone lines for the main LAFN computer equipment.

## **D. PROJECT IMPLEMENTATION**

### **Activities/Milestones that Occurred Prior to the TIIAP Grant Period**

In 1993, it was clear to everyone involved in LAFN that the ultimate success of the network hinged on the ability to provide toll-free access throughout Los Angeles through the implementation of multiple dial-in or point of presence<sup>1</sup> (POP) sites throughout the region. Project administrators used information about telephone exchange boundaries provided by several local telephone companies to develop a plan to bring local call access to all of Los Angeles County by connecting 25 nodes to the main computer center in Tarzana via a frame-relay network<sup>2</sup>. As an initial step towards implementing this plan, a TIIAP proposal was developed and submitted in spring 1994 for the purpose of establishing five pilot nodes using various combinations of equipment in order to determine the optimal node configuration prior to the implementation of additional nodes. A further goal of the study was to evaluate the use of a frame-relay network.

### **Activities/Milestones that Occurred During the TIIAP Grant Period**

After the grant was awarded in October 1994, LAFN management discovered that the boundary exchange information provided by the local phone companies was inaccurate and that most of Los Angeles

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<sup>1</sup> Point of presence refers to a location where a network (such as the Internet) can be connected to, typically with dial-up phone lines.

<sup>2</sup> A frame-relay network relies on a frame-based technology suite optimized for the transfer of protocol-oriented data rather than leased lines. "Frame" refers to the sequence of bits and bytes in a transmission block.

County could be covered with 5 properly placed nodes rather than 25. A revised proposal was developed and approved by the TIIAP program officer, thus shifting the focus of the project toward demonstrating the feasibility of connecting up a large urban area with an effective and affordable system.

The first step in the implementation process was to identify the ideal geographic locations of the outside nodes using graphical analysis. In Los Angeles County, the local calling area is contained in a circle of 12-mile radii centered on a telephone exchange. Starting with a circle around Tarzana where LAFN's main computer center is located, project planners placed additional overlapping circles such that the majority of the population of the county would be covered. Having determined that the centers of those circles would be good node locations, planners then sought hospitals or colleges at the node locations.

Project staff did, however, attempt to use different equipment at each node to learn which was most efficient and cost effective in order to give guidance to other community networks setting up nodal configurations.

In December 1995, LAFN began to offer PPP accounts to users. These accounts provide access to web browsers such as Netscape, which incorporates e-mail and newsgroup facilities, in addition to the local bulletin boards and chat services available on the text-based system. Approximately half of the LAFN users opt for the PPP accounts.

### **Steps Taken to Sustain Project Activities Beyond the TIIAP Grant Period**

Current projections show that user fees will fully cover all operational expenses associated with maintaining the network and possibly expanding the user base and the range of services provided.

### **Activities/Milestones that Occurred Following the TIIAP Grant Period**

At the time of the site visit in December 1997, LAFN had not expanded to additional organizations, end users, or geographic areas since the grant period ended in April 1996. However, the services offered through LAFN have changed, and will continue to change, as new links are added to the network. For example, plans are underway to reinstate one of the original services offered through LAFN, Ask the Doctor, which allows users to anonymously receive answers to medical questions from experienced physicians. Ask the Doctor had been discontinued prior to the TIIAP award due to a lack of participation on the part of physicians. The network now has a large base of doctors who use the system and LAFN administrators are in the process of resurrecting this service using an online chat forum.

A CD-ROM that will automatically configure new subscribers' computer systems to access LAFN had just been developed at the time of the site visit in December 1997. Plans were being formulated to pilot test the disks before initiating full-scale distribution and implementation. The development and recording of the training disks were funded entirely by user fees and implemented in April 1998.

### **Issues**

**Comparison between Project as Originally Proposed and What Actually Happened.** Other than the previously mentioned redesign of the network from a 25-node system to a 5-node system, the main difference between the original proposal and actual implementation had to do with the rapid developments

in telecommunications at the time the grant was awarded. For example, the original proposal intended to use 56KB frame-relay connections and 14.4 Kb modems, but with the advent of the World Wide Web and its emphasis on large graphics files, project administrators were forced to redesign the system to incorporate 128KB fractional T1 lines to each of the nodes and to install a T1 line from the frame-relay cloud to the computer center.

**Utilization of Services by the Direct End Users.** LAFN has no formal system to inform the public about its services. The network relies for the most part on word-of-mouth for publicity. Project management believes that a lack of public relations savvy is one of their largest defects. As one respondent stated, “In our naivete we felt we didn’t need any PR. But in hindsight we can see that it would have been a big plus in establishing the Los Angeles Free-Net as a community presence.”

Nevertheless, there has been a great deal of positive press in Los Angeles about the LAFN. In addition to the newspaper coverage, project management personnel were interviewed on a local public radio station, KPFK, about the LAFN. This 2-hour program is reported by the station to be its most popular program ever.

Training and technical assistance to LAFN users is provided by a network of volunteers. The biggest challenge for the volunteers is establishing the initial connection for new users. A 2-hour training presentation for new users is conducted monthly in the auditorium of the Women’s Pavilion in the Tarzana Regional Medical Center. The session presents a brief overview of the text system and shows how to connect with Windows95, Windows 3.1, and Mac. Mentors are available to answer questions. Approximately 150 people, most with virtually no computer experience, participate in a typical training session.

Ongoing technical assistance is typically provided upon request via e-mail although volunteer mentors also provide assistance via telephone or home visits when necessary. The most frequently requested type of assistance concerns the configuration of modems. A toll-free number for users to call for help is being funded by a local company, Atomics Sports Equipment.

LAFN management receives a great deal of positive feedback about both the new user training and ongoing technical assistance efforts. The following message is reflective of the majority of user comments:

*Now, unlike many of your members, I am NOT an engineer. I’m a writer, and ex-advertising agency owner and a man endowed with ten thumbs. But because of Jerry’s kind, thoughtful, patient and generous counsel, I can now maneuver around LAFN, Eudora, Netscape, the web with more confidence than I’ve had in the seven months of my struggle to understand the inner workings and hidden mechanisms of this marvelous machine. He’s a wonderful teacher. Over the period of four or five days, we spent at least six-eight hours together. If all your volunteers are as dedicated and genuinely concerned and thorough as this man is, you are a very fortunate fellow.*

## **Problems**

The biggest challenge facing the project concerns meeting the constantly increasing demand for services and content as the user base continuously expands. Because LAFN is a nonprofit organization, it has been able to economically provide access, but delivering content that is of value to the users has proven to require a great deal of thought and effort for a volunteer-based organization.

Users getting busy signals was a recurring problem at times when the number of users per telephone line reached a certain level. To permit everyone a chance at the system, the network automatically terminates every connection after 60 minutes and any connection in which there is no activity on the connection for 15 minutes. These terminations do not pose a problem for 98 percent of the users, although it does make large file transfers difficult.

A related problem had to do with system response getting unreasonably slow, especially during peak usage times such as weeknight evenings. Several actions were taken in 1995 to alleviate this problem. The threshold for refusing incoming e-mail was lowered from 10 to 8, thus allowing the system to give greater priority to other system processes. When this solution began to interfere with mail flow, in that remote systems would have to wait longer for the system to become less active, a new computer was obtained to off-load some of the other processes. By manipulating the MX records in the domain name service (DNS), the new system could accept incoming e-mail and hold it locally for later delivery.

With the exception of modems, failure of system components has not been a problem. With the arrival of PPP accounts, the system needed to provide faster access in order to handle the images associated with the World Wide Web. LAFN purchased 28.8 USR Sportster external modems, which are sensitive to heat buildup and resulted in modem failures leading to significant logon problems for large numbers of people. In order to control this problem, LAFN management developed programs, which record the lines, which are actually connected to the system at each node. By routinely implementing this recording run, system administrators can determine if a given phone line is not connecting and respond with any of several temporary fixes:

- Request the phone company to “busy out “ that line so that it always seems busy.
- Insert a plug into the line to “busy it out.”
- Cycle the modem power on and off.
- Send a signal through the comserver to the modem to reset it.

Because LAFN equipment is widely dispersed, it was difficult to travel to the site to power- cycle the modem whenever a modem hung up. In order to improve the reliability of the system, LAFN management located two systems, at a cost of \$30,000, to remotely control the modems.

Project administrators had several problems working with local telephone companies, describing them as amorphous organizations in which it is hard to determine anyone’s responsibility. As mentioned previously, local telephone companies assisting in the network design obfuscated their exchange boundaries, resulting in a very inefficient initial network design. As another example, a local telephone company was unable to properly install, configure, and maintain the frame-relay connections being requested by project staff. In multiple instances, telephone company technicians configured connections to the wrong physical destinations.

There was a short time period in the beginning of the LAFN’s history when the network was considered to be a threat by some of the larger ISPs such as America Online and CompuServe. But because the LAFN only offers a limited range of specialized services (for example, it will probably never allow open telnet or FTP access outside the system or provide streaming video and real audio), it is no longer

considered to be a direct competitor with the larger ISPs. In fact, the LAFN has come to be viewed as a gateway to the larger ISPs, serving an important role in exposing people to the Internet, who will later “outgrow” the LAFN and want access to the broader spectrum of services provided by the larger ISPs. In fact, it could be argued that LAFN absorbs some of the burden of training new users that is often faced by the larger ISPs.

**E. PROJECT ACCOMPLISHMENTS AND IMPACT**

*Our real strength is as a community presence. We are L.A.’s most significant presence on the internet. And the wealth of community-specialized services we make available is a point of community pride.*

President of the Los Angeles Free-Net

The LAFN project is clearly a success in that has managed to expand network access to a degree far beyond what the project planners anticipated. Project planners originally intended that the equipment purchased through the grant be used to extend toll-free coverage to the City of Los Angeles. As it turned out, the project was able to extend toll-free access to more than 90 percent of the residents of Los Angeles County. And as the user base has expanded, the range of community services offered on the network has also grown and improved. As of October 1998, toll-free access to the Los Angeles Free-Net is available throughout Orange County as well.

**Technology-Related Accomplishments**

The number of people using the resources available through LAFN has increased dramatically as a result of the TIIAP-funded expansion. LAFN had approximately 4,000 subscribers prior to the 1994 TIIAP grant; by December 1996, there were over 15,000 subscribers. It is impossible to determine how much of this increase is due to the frame-relay system and how much is simply due to the longevity of the LAFN and the quality of its service. However, it is possible to determine the percentage of users who log on to the expansion nodes that were implemented as part of the TIIAP project. By looking at the total quarter-hour login samples per site per day during the 1-week period starting on November 30, 1997, and ending on December 6, 1997, which can be considered a typical week, approximately 58 percent of the users logged onto one of the four TIIAP-funded expansion sites rather than the original Tarzana site (see Table 1).

**Table 1. Quarter-hour login samples per site per day during the 1-week period starting on November 30, 1997**

Logins	Site					Total
	Tarzana	Norris	El Camino	Cal Lutheran	AQMD, Diamond Bar	
PPP	22,049	14,577	11,980	4,272	1,636	54,514
Text	4,214	1,599	1,533	286	50	7,682
Both	26,283	16,176	13,513	4,558	1,686	62,196

Note: This report does not include non-dial-in telnet sessions to LAFN’s text-based service.

LAFN management has a general sense of the user base through demographic information that is collected from subscribers during registration. Mandatory information that is collected includes address and telephone number. Optional fields include education level, income level, ethnicity, age, and gender. The demographic characteristics of the LAFN user base on December 11, 1997, are shown in Tables 2 through 6. Unfortunately, no comparative data for the target population have been compiled by project staff.

**Table 2. Age distribution of LAFN registrants**

<b>Age range</b>	<b>Number</b>	<b>Percentage</b>
1-10.....	40	2
11-20.....	2,300	13
21-30.....	3,458	19
31-40.....	3,195	18
41-50.....	2,946	16
51-60.....	1,477	8
61-70.....	360	2
71-80.....	360	2
81-90.....	67	0.4
Total.....	14,706	81
No response.....	3,461	19

**Table 3. Gender distribution of LAFN registrants**

<b>Gender</b>	<b>Number</b>	<b>Percentage</b>
Male.....	12,172	67
Female.....	3,862	21
Total.....	16,034	88
No response.....	2,133	12

**Table 4. Racial distribution of LAFN registrants**

<b>Race</b>	<b>Number</b>	<b>Percentage</b>
Asian .....	2,639	15
Black .....	730	4
Caucasian .....	9,433	52
Hispanic .....	1,411	8
Other .....	1,588	9
Total.....	15,801	87
No response .....	2,366	13

**Table 5. Education level of LAFN registrants**

<b>Highest education level attained</b>	<b>Number</b>	<b>Percentage</b>
Elementary school.....	706	4
High School .....	3,477	19
College .....	6,975	38
Post Graduate Degree.....	4,895	27
Total.....	16,053	88
No response .....	2,114	12

**Table 6. Income level of LAFN registrants**

<b>Annual income (x 1,000)</b>	<b>Number</b>	<b>Percentage</b>
Less than \$10.....	1,941	11
\$10 to \$50 .....	6,305	35
\$50 to \$100 .....	4,162	23
Greater than \$100 .....	2,334	13
Total.....	14,742	81
No response .....	3,425	19

**Impact of the Project on Direct End Users**

The range and quality of services for end users of the LAFN network are continually improving, although it is not possible to determine the extent to which the expanded user base resulting from the TIIAP award has contributed to the improved services. Clearly, the incentive for a community group to establish a link on the LAFN website is much higher now that LAFN has more subscribers and a wider service area.

The LAFN site incorporates numerous feedback mechanisms whereby users can provide comments and suggestions for improvement. The bulk of the user comments are positive in nature. A review of these communications show that users appear to be particularly pleased with the technical assistance provided, the fast connection, system reliability, low prices, and the opportunity to share knowledge with other subscribers via the telephone mentor program. Some of the areas in which users have expressed dissatisfaction include the lack of a PPP IRC, the limited number Usenet newsgroups available, the restriction of web pages to nonprofit organizations, and slow modem speeds.

## **Impact of the Project on Other Beneficiaries and/or the Overall Community**

According to the operations director for the TIIAP project, the most important outcome of the grant was that it enabled LAFN to become L.A.'s most significant presence on the Internet. It is difficult to assess the accuracy of this statement, however, there is no question that the work done under the TIIAP grant has made it possible for thousands of Los Angeles residents, schools, and libraries to have access to a computer network offering a wealth of community-specialized services as well as to the Internet. The number of paid accounts has nearly tripled in the 3 years since the five frame-relay nodes were implemented and the numbers of free accounts to schools, libraries, and individuals without computers who use the library accounts have demonstrated comparable growth.

Sending and receiving e-mail is a major activity on the network. On a daily basis LAFN receives about 4,800 e-mail messages and sends out 14,300 messages. LAFN also provides free home pages to nonprofit organizations that have accounts on LAFN. Among these are:

- Emergency Network Los Angeles
- The Sanford Meisner Arts & Entertainment Center
- The LA Free-Net's financial page
- Local community college programs
- The Los Angeles County High School for the Arts
- East Los Angeles College
- Brownie Troop #852
- Gardena Valley Democratic Club
- The Jewish Journal of Greater Los Angeles
- The Overset Society Chronicles
- Recording for the Blind & Dyslexic
- Southern California Women's Coalition to Implement the Beijing Commitments
- Southwestern University School of Law student home page
- The Urban League Business Development & Information Technology Center
- The LA Free-Net Users' Home Page Registry
- Weather and travel information
- Web browsers' town meeting

- Government resources
- San Fernando Valley Chambers of Commerce

There are several noteworthy examples of how LAFN is benefiting the educational community:

- The network has made it possible for math classes in 74 area schools to participate in the International Math Olympics, which is an annual competition with bimonthly practice competitions that aims to help students learn their addition and multiplication facts with both accuracy and speed.
- LAFN provides the Internet connection for Youth Net, one of the first telecommunications programs for kids, offering youth (of all ages) around the world the opportunity to safely meet each other and participate in discussions, interactive learning projects, and other educational activities. The Youth Net School Registry contains links to 15 home pages of schools and programs in the Los Angeles area and three other school home page lists. Youth Net also helps teachers have a global impact with their locally developed ideas by maintaining an online collection of approximately 500 lesson plans written by teachers. The Daily Report Card feature of the network is a three-issue per week report on political and social developments in the areas of education and educational reform. Youth Net also offers two online classes for credit, a body conditioning class from Los Angeles Trade-Technical College, and an introductory English class at from Los Angeles Mission College.
- The Panel of Leaders is a collaborative project being conducted amongst K-12 networks in collaboration with the Discovery Networks' Learning Communities. The project helps African American students develop their own leadership qualities through the provision of curriculum materials and activities for teaching leadership skills and concepts and through Internet-based discussions between students, educators, and leaders. Members of the Panel of Leaders include Congressman Kweisi Mfume, Chairman of the Congressional Black Caucus; Dr. Gerry Mendez, President of the National Trust for the Development of African-American Men; and John Fleming, Director of the National Afro-American Museum and Cultural Center, among others.
- Academy One is a curriculum-centered program with interactive projects and information resources for students in grades kindergarten through 12. It has over 500 registered schools from 14 different countries and 33 states of the United States, including several from the Los Angeles area (through LAFN). Some well known Academy One projects include the NESPUT space simulations, the TeleOlympics, La Classe Globale Francophone, Sonnet-Writing Contest, and Letters to Santa.
- Night Without Violence is an annual event in which a Russian school, a Finnish school, and an American school (through LAFN) participate in an Internet chat to discuss violence and ways to reduce violence in our communities.

LAFN has also facilitated a great deal of networking and communication among the local medical community:

- LAFN regularly hosts realtime online chats with experts in the health field. In the 3 years since the program began, 11 Nobel laureates have participated.
- The head of oncology at the University of California, Los Angeles laid the groundwork for a major medical study on the drug Herceptin over the network. This study will be highlighted at the annual meeting of the American Society of Oncology being held in Los Angeles in May 1998.
- An LAFN workstation is housed in the Women's Resource Center in the Women's Pavilion at the Encino-Tarzana Regional Medical Center, giving patients in the medical center and the general public free access to LAFN's numerous health resources. A second workstation is planned on the oncology unit in the hospital and, thanks to a generous grant from the medical staff of the hospital, both work station sites will be hardwired to the system (via fiber optic cables) providing a very rapid, uninterrupted connection to the system for patients, family members, nurses and physicians at those sites.

Several examples can also be given of how disadvantaged community segments indirectly benefit from the network although no specific information is available about the impact of these services:

- LAFN is the Internet hub of From the Wholesaler to the Hungry, a program that delivers hundreds of thousands of tons of fresh produce to needy people around the world.
- The LAFN Career Center includes several sites with job listings and job search information.
- LAFN's Voter's Guide offers a comprehensive guide to issues, campaigns, candidates, parties, financing, media reports, and other information of interest.
- LAFN hosts the Urban League's first site in the nation.
- The Congressional Caucus for Women's Issues held an event in November 1995 through LAFN to encourage girls to develop computer skills. Members of the Caucus held a question-and-answer session with girls in grades 4-12 after school to discuss how technology has changed and will continue to change the way we learn, work, and live. Thirty-seven schools throughout the nation were involved, including 7 Los Angeles area schools through LAFN.

At the time of the site visit (December 1997), LAFN management had no way to tell which network resources were most useful to subscribers. However, a program had been recently developed by a volunteer communications engineer that will help determine the numbers of people accessing the site's web pages. LAFN management is extremely sensitive about privacy issues and will not attempt to track usage within individual accounts. LAFN management are, however, considering providing an online system for doctors to access patient medical records using an encryption program (Pretty Good Privacy) to ensure security.

## **Impact of the Project on Grant Recipient and Project Partners**

**Benefits Received as a Result of Project Participation.** The Encino-Tarzana Regional Medical Center, which houses the main computer center for LAFN, enjoys many benefits from its association with LAFN. The hospital has received two workstations around the hospital that are directly linked to LAFN. These stations were provided for the use of patients, families, nurses, and physicians to help them readily access health care resources and information. One of these workstations is housed in the Women's Resource Center. The nurse who runs the center reports that LAFN is an "incredible resource for patient education" providing a wealth of current and reputable medical information on a broad range of topics. LAFN's biggest weakness is its lack of a support directory for a few particular diseases. LAFN plans to connect additional workstations throughout the medical center, at least one located at the nurse station on each floor or wing.

The project has also impacted the operations of the LAFN in that the main computer center had to be upgraded substantially to handle the increased usage. With the added communications infrastructure, there has been greater need for problem solving and system maintenance. Whereas, LAFN used to have one paid staff member prior to the TIIAP-funded expansion, the network has added three part-time assistants to help with systems operations. These positions are funded entirely through user fees and not through the TIIAP grant.

Benefits for the four project partners who provide space to house project equipment are for the most part limited to an acknowledgement of the site owners' generosity in a notice seen by each person signing to LAFN through that site. The sites also receive free LAFN accounts and thereby benefit from the full range of network resources and networking opportunities available.

**Changes in How Services are Provided.** The LAFN is a volunteer-run organization and much of the success of LAFN is directly attributable to the dedication and enthusiasm of its volunteers. These volunteers report that they are motivated to work with the network primarily by the intrinsic rewards their assistance offers. They feel that they are providing a worthwhile community service and they recognize that the assistance they provide is critical to the network's success. Many volunteers further report that the intrinsic rewards of their efforts have increased as the network expanded its service area and became a more significant and widely regarded community resource.

## **Project Goals Not Met**

The TIIAP initiative established a low-cost communications infrastructure that allows toll-free access to LAFN and the Internet from over 90 percent of Los Angeles County and therefore fully realized its intended objective.

## **Impact of TIIAP Support on the Initiative**

LAFN management doubts that they would have been able to expand local call access throughout Los Angeles County without the TIIAP grant. They speculate that perhaps one of the four expansion nodes may have been able to be funded with user fees; however, there were no alternative funding sources that would have supported the implementation of all four expansion nodes. TIIAP funding not only was critical for implementing the network, but it validated the network in the eyes of the community. Universities and

community organizations were found to be more willing to work with a network that has received a seal of approval from the Department of Commerce.

## **EVALUATION AND DISSEMINATION**

### **Evaluation**

Because the LAFN is a volunteer-run organization and the volunteers are overloaded simply trying to keep the network operating at an optimal level, evaluation has not been a high-priority activity. Sensitivity to the privacy concerns of subscribers have also hampered efforts to collect detailed information about the user base and how the network is being used. However, LAFN staff appear to be doing an adequate job of discerning (and responding to) the needs of subscribers. Evaluation activities relating to the TIIAP project have been limited to the following activities, each of which has been discussed previously in Section E:

- Collecting basic demographic information from subscribers during registration;
- Collecting, reviewing, and responding to user comments obtained via online feedback mechanisms built into the system; and
- Monitoring system usage.

### **Dissemination**

**Publications.** An article was published in the April 1996 *Bulletin of the Medical Library Association* entitled “Lost Angeles Free-Net: An experiment in interactive telecommunication between lay members of the Los Angeles community and health care experts.” The article described LAFN’s attempts to provide members of the lay community with “timely, specific, understandable, and responsive” answers to individually relevant medical questions. Although LAFN has dropped this service due to a lack of participation on the part of physicians, the article presents observations to help guide the development of similar systems around the nation.

**Presentations and Demonstrations.** Project management participated in a 2-hour interview on a local public radio station, KPFK, although the primary topic of discussion was the LAFN and its services rather than the TIIAP project or the technology underlying the network’s frame-relay system.

**Electronic Versions of Materials or Reports.** The TIIAP project’s final report to the U.S. Department of Commerce is available online through the LAFN website.

**Contacts Made by People Considering such a Project.** Project staff were contacted by an unidentified individual in San Diego who wanted to know how the frame-relay system worked. This person was referred to the online version of the TIIAP final report.

**Potential for the Project to Serve as a Model.** The techniques and equipment used in implementing this network can theoretically serve as a guide to other community networks serving large geographic areas. However, the likelihood that replication will occur is limited because the network design is highly specific

to the telephone system characteristics in California and may be only applicable to other large, densely populated regions of the state.

## **G. LESSONS LEARNED**

The lessons learned during project implementation primarily concerned technological considerations relating to connecting up a large urban area. A hospital computer center, such as that at the Encino-Tarzana Regional Medical Center that houses the LAFN servers, is considered by project staff to be an ideal setting for housing equipment for a community-based telecommunications network because it is air conditioned, physically secure, and has emergency generators in case of a power failure. LAFN not only receives the space without cost, but the hospital also donated the telephone lines needed, thereby alleviating the expenses associated with leasing sites. To encourage potential site owners to house project equipment, LAFN management recommend helping site owners recognize that their assistance would make a very positive contribution to the surrounding community. They also recommend publicly acknowledging the site owners' generosity.

Although project staff evaluated different combinations of routers and CSU/DSUs at different nodes, each combination of equipment was found to work equally well. Consequently, project administrators suggest that the equipment be chosen on the basis of cost and the length of the warranty. Nevertheless, specific recommendations for developing communications links were spelled out in the project's final report:

- Design the network architecture first, then conduct a cost analysis of various communications options, iterating the design and analysis until closure is reached.
- Consider third-party providers for services. LAFN purchased its frame-relay connections through the local telephone companies. The telephone companies often use the services of third parties, e.g., Metropolitan Fiber Systems, for their frame-relay services, which can be cheaper for the same service.
- Ask for discounted services. Many telephone companies (and third-party providers) now compete more vigorously for customers, particularly long-term data customers. They have unannounced discounts, such as free installation.
- One phone line per 40 registered users at a given node is felt to provide reasonable access without overburdening the system.
- Consider a fractional T1 line if growth is anticipated because although upgrading from a 56K line to a T1 costs about \$1,000, once a fractional T1 line is installed, the installation cost to upgrade it is very small.

A second broad category of lessons learned involved dealing with local telephone companies. The local phone companies that participated in LAFN's original network design convinced LAFN management of the need for dozens of POP sites. After careful analysis of telephone exchanges, LAFN management determined that LAFN could provide toll-free access to almost all of Los Angeles County with just four POPs.

Specific recommendations noted for working with local telephone companies include:

- Have a single point of contact within your organization with all information and prior telephone company interaction history.
- Specify installation instructions to telephone company personnel in detail.
- Hire a consultant, or educate yourself about communications issues. Assume that you know more about their system than they do.
- Identify management personnel within the telephone company by name and phone number, and escalate unsolved telephone communications issues to telephone company management levels early on. Also, involve your telephone company account manager early in resolving unsolved communications issues.
- Maintain detailed logs of all telephone company interactions.
- Report all prolonged outages to the local or state Public Utilities Commission. In many states, outages longer than 24 are a violation of state regulations and may result in refunds or subject the telephone company to administrative penalties. Even suggesting to telephone management that you are considering filing with the Public Utilities Commission seems to have a beneficial effect in getting telephone issues resolved.

## **H. FUTURE PLANS**

*The biggest challenge we face is to continue meeting the demand for services because our user base is continually expanding.*

LAFN President

The LAFN network including all of the nodes funded by the TIIAP grant, was fully operational at the time of the site visit in December 1997 and by all indications will continue to thrive. LAFN management plans to continue expanding the service area receiving local call access. A geographical analysis has identified a node location that would complete the network's local service area coverage of Los Angeles County and also include a large portion of Orange County. It is expected that LAFN will be able to fund the \$7,000-10,000 expansion project entirely with income generated through user fees.

LAFN management are also actively seeking grants to help underserved community segments utilize the network. LAFN staff have identified several homes for the aged in which to set up computers to provide residents with access to the network. A strong interest has already been demonstrated among seniors at one senior center in using the services on the LAFN, particularly e-mail and medical information. LAFN staff are working with community groups to connect disadvantaged families to the Internet. LAFN management further anticipates that new area schools and libraries will continue to take advantage of the free Internet access offered through LAFN.