

Feasibility Study for Broadband Network in Los Alamos County

Los Alamos On-Line, Inc., a non-profit corporation, in conjunction with Advanced Communications and Networks, proposes a detailed feasibility study of methods for implementing a broadband communications network, capable of video, voice and data transaction, in Los Alamos County. The object is to find the combination of technologies with which a cost effective, non-subsidized implementation may be realized in a reasonably short time frame. Further, as these networks are shared by many communities around the world, the Los Alamos project should serve as a model for implementation on both a larger and smaller scale of complexity.

The end result of this effort will be specifications which define an implementable architecture that provides a communications system in the county which will meet future needs and allow the county to be competitive in attracting new industry and retaining existing industry. While the study will identify technologies and tools which allow for a cost effective implementation, a full range of options will be detailed. Communications technology may be thought of as a layer cake, with the ability to add new layers and expand or contract existing layers as need demands. The threshold costs of these layers will be provided, indicating the initial cost of investment and further incremental costs for additional capacity.

While the study will address providing services to all community members, a needs assessment will identify specific requirements of each sector such as business, municipality, government and private. Tradeoffs, costs and future expansion in each sector will be discussed.

The telecommunications industry is seeing unprecedented growth, as the world gears up for the knowledge-based economy and the rapid growth of electronic service industries. The emergence of the World Wide Web as a means of information sharing has placed demands on all aspects of the industry and the associated technologies needed to meet this large scale higher-bandwidth demand. Real time voice and video imaging via a network is a reality in a restricted Internet environment, called an 'Intranet'. This study will focus on identifying those technologies which, when integrated, offer sufficient bandwidth to allow inter-organization voice and video communication within the county.

It has been a widely held assumption that fiber optic cable links or advancements in CATV technology and infrastructure are the only means of achieving the speeds and bandwidth necessary at the residential site for full utilization of the capabilities of the Internet. ISDN, though expensive and slow to be implemented in this country, is starting to offer higher throughput (as compared to traditional telephone line service). There are, however; several emerging technology developments which offer an alternative to expensive infrastructure enhancements. Notably, a product called EtherPhone claims to offer voice and data transmission at Local Area Network (LAN) speeds over standard phone lines. Analog modem technology now offers an alternative to the expense of ISDN, with close to the same speed. In addition, ADSL (asymmetric digital subscriber line) and

HDSL (High bit-rate digital subscriber line) which are about to enter the marketplace, will offer LAN-like speeds. This study will identify the strengths and weaknesses of these and other systems and technologies when integrated into an Intranet community environment. Differences in cost and capability between the use of existing infrastructure and the addition of capacity at various levels will be defined.

In order to be successful at establishing Los Alamos county as a model for communications enhancement, cooperative agreements with the vendors of telecommunications hardware and software will be necessary to ensure a solution which is comprehensive and cohesive. Potential partners and vendors will be identified and invited to participate. This partner/vendor relationships will play an integral part of strategy development.

Several communities around the world are engaged in similar expansion plans. A forum for the discussion of experiences and plans could save Los Alamos county from spending time on strategies which have been tried and given marginal results. If Los Alamos were to sponsor such a forum, the county would be able to gain wisdom from the efforts of others while establishing itself as a leader in the development. It will be necessary to identify those communities around the world which have embarked on such activities and report on the state of their efforts. Further, the steps necessary to convene a periodic conference to share information will be defined.

Any effort of this magnitude which effects the established communications service providers raises issues of who will implement, own and manage the resultant system. With the rapid deregulation of telecommunications new alternatives which could potentially bring new sources of revenue to municipalities are emerging. This study will identify alternatives for the implementation and management of the Los Alamos Intranetwork from a regulatory, overhead, and tariff basis.

The wants and needs of the community will be identified by inviting participation at planning meetings ("focus groups") held in Los Alamos. The proposed implementation strategies will take into account these wants and needs. The final system should be scalable to dynamically serve the needs of the community as well as being adopted by other communities of various size in search of a solution for their own needs.

Scope

This project will target the needs of Los Alamos county for a cost competitive and effective broadband communications network to serve the needs of all members of the community.

No specific technology or capability will be used as a baseline. The objective is to provide a comprehensive overview of tradeoffs in cost and capacity utilizing various implementation strategies. While it is often possible to mix and match components, the strategies will focus on technologies and products which will result in a cohesive and synergistic system.

The network will be specified as an Intranet configuration. An Intranet is a network which is private to a set of users with a link or links to the outside world. To the user the network appears to be part of the Internet. To the administrator and manager it is a finite system with bounded capabilities and bandwidth.

Existing and new infrastructure will be included in the cost analysis. Strategies for use of existing capacity will be compared with new structures such as fiber optic cable and wireless communications.

Methods

The study will be conducted in four phases. The first three can proceed in parallel. The last phase will see the integration of all information from the first three.

Phase 1: Explores each communication media and the options available within that medium. All physical layers will be considered (such as fiber-optic cable, copper phone lines, wireless, and coaxial cable). The advantages/disadvantages and limitations of the services (such as ISDN or ATM) available on each of the physical media will be documented with special emphasis being placed on new and scaleable technologies. Additional topics will include network topologies and protocols.

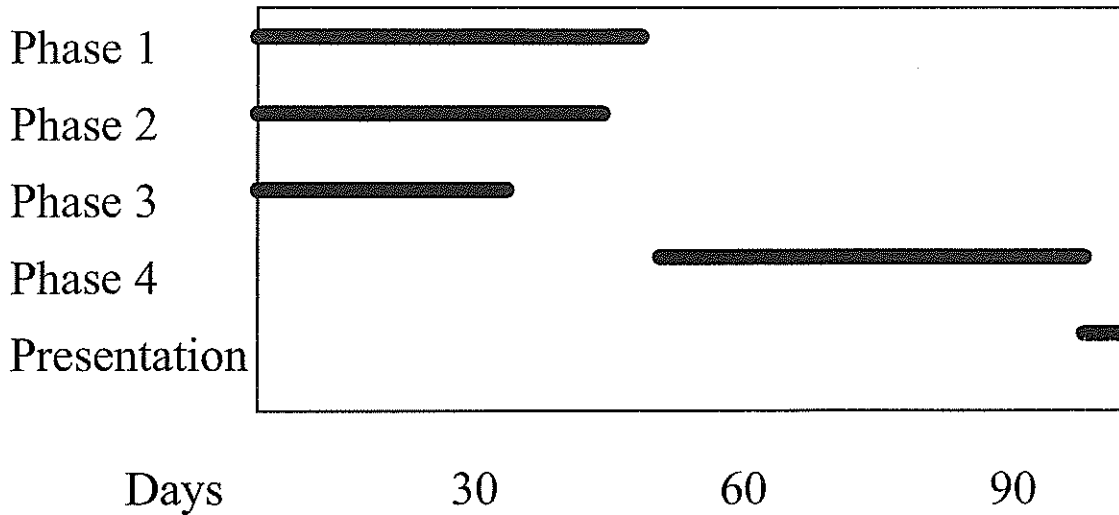
Meetings with selected vendors will be held to identify the status of current technology offerings and potential development partnerships.

Existing telecommunications providers will be contacted to establish receptivity to planned expansion and willingness to be involved. Specifically, meetings will be held with US West to identify the means of providing enhanced capacity to residential users.

- Phase 2: Documents the existing infrastructure within Los Alamos County. This effort will determine the location of all available physical media such as fiber optic cable. This phase will also include valuable information such as the location of available conduit and easements along with the corresponding owners and/or points of contact. Every effort will be made to include local personnel in this process.
- Phase3: Identifies existing community efforts to enhance communications infrastructure, the state of these efforts, and potential areas of collaboration and information sharing. The concept of a forum for the exchange of information will be pursued. A web page will be initiated to identify Los Alamos' interests and efforts to invite participation. Local personnel will be used wherever possible. The feasibility and desirability of an international conference (at Los Alamos) on design and applications of, and experiences with, community networks will be explored.
- Phase 4: Presents specific options for integrating advanced communications technologies into a Los Alamos County broadband intranet using existing and/or new physical media. All previously gathered information will be assimilated into a form necessary for detailed consideration and discussion with potential suppliers and partners of the Los Alamos broadband Intranet and will include a baseline architecture and some options..

Schedule

Work will start with the signing of a contract between Los Alamos On-Line, Inc. and Los Alamos County, and Industry Network Corporation for the work proposed. Phases 1 through 3 will start immediately. The following timeline displays approximate schedules and the table in the Budget section presents approximate hours per phase.



Deliverables

The primary deliverable will be a comprehensive report detailing the findings of the research along with recommendations. Included will be design, simulation and analysis of a broadband network. The findings will be presented both orally and in writing.

Budget

We propose that the cost for this design effort be shared by INC (which has agreed to support 30% of the cost) and Los Alamos County.

Manpower budget for this effort is estimated at 2 people for a total of 960 hours. However, our plan to use local volunteers could reduce the Phase 2 and 3 contractor man-hours from 470 to about 100. The travel budget includes mileage between Socorro and Los Alamos for 5 meetings with the planning committee and community and an addition 3 to 4 meetings with local utilities. Two trips are planned to meet with potential partners and vendors such as Microsoft, Netscape, and Cisco Systems. One trip will be to the San Francisco area and the other to the Seattle area. Potential partners and vendors will be invited to Los Alamos which may eliminate the need for this travel.

INC and Advanced Communications and Networks Hours

Phase	Hours	Rate	Total
1	326	\$50	\$16,300
2	310 <small>note 2</small>	\$50	\$15,500 <small>note 2</small>
3	160 <small>note 2</small>	\$50	\$ 8,000 <small>note 2</small>
4	358	\$50	\$17,900
	1154	\$50	\$57,700 <small>note 2</small>

Item	INC In-Kind	INC Cash	LAC Cash	LAC In-Kind	LA On-Line note 1	TOTAL
Manpower	\$5,000	\$13,175 note 2	\$39,525 note 2	\$5,000		\$62,700 note 2
Travel		\$2,050	\$2,050		\$2,500	\$6,600
Supplies		\$600			\$1,000	\$1,600 note 2
TOTAL	\$5,000	\$15,825 note 2	\$41,575 note 2	\$5,000	\$3,500	\$70,900 note 2, note 3

note 1: Los Alamos On-Line proposes an out-of-pocket expense fund (travel and supplies) not to exceed \$3,500. It will charge no fee for its services.

Note 2: If volunteer efforts in Phases 2 and 3 reach the intended levels, the INC/ACN effort can be reduced by about 350 hours. The overall contract cost (direct cash, not in-kind service) would then be reduced by about \$17,500 to approximately \$40,000.

Note 3: Gross Receipts Taxes, if applicable, are not included.

Qualifications

The work will be managed by Los Alamos On-Line, Inc. (Sidney Singer) in conjunction with INC and performed by Advanced Communications and Networks, owned and managed by Van Lanning. Mr. Lanning's qualifications are:

- A solid technical background
- Excellent communication and presentation skills
- Strong personal integrity
- Demonstrated performance in planning and implementation

Experience

Present

Advanced Communications and Networks, Socorro, NM Consultation/Implementation/Integration

Provides unbiased consultation regarding systems, networks, and programming projects. Provides or reviews short and long term plans. Provides or monitors integration and/or implementation of systems and networks.

Current and Previous Clients:

- Industry Network Corporation, Albuquerque, NM
- New Mexico Institute of Mining and Technology, Socorro, NM

- Phenix Healthcare, Phenix City, AL
- State of New Mexico, Commission on Information and Communications Management, Santa Fe, NM. A 2 year effort for the governors NII task force to inventory the communications infrastructure of the State of New Mexico.

1989- 1996

Energetic Materials Research and Testing Center, New Mexico Institute of Mining and Technology, Socorro, NM

Education

Bachelor's of Science degree in Mathematics with emphasis on Computer Science and Engineering; some graduate work completed

References available upon request

Literature References

The following locations on the World Wide Web contain information about telecommunications technology and those who are implementing it. The list is intended to serve as a starting point. The reader is invited to use a search engine such as Lycos, using the keyword 'telecommunications' to find other sites of interest.

Intranet:

Netscape - http://home/netscape.com/comprod/at_work/index.html - an overview of the intranet.

Wireless Communications:

Wireless Lan Group: <http://www.ecs.umas.edu/wireless/> - research into the use of wireless technology

Other Communities:

League of California Cities - City of San Carlos
<http://www.ci.san-carlos.ca.us/telecom/lccmod.html> - comprehensive overview of initiative to upgrade existing telecommunications infrastructure and regulatory policies.

Applied Rural Telecommunications - Yampa Colorado
<http://www.yampa.com/aerie/places/yampa2.htm>

Vendors:

Advanced Network Solutions

<http://www.halcyon.com/routers/welcom.htm> - a comprehensive list of products to extend the theoretic limits of copper wire transport.

Rockwell Semiconductor

<http://www.nb.rockwell.com/nr/modemsys/highspeed.html> - a description of high speed modem and a white paper describing technology and issues of implementation.

Data Telemark

<http://www.datatelemark.com/datatelemark/dtm.html> - list of ISDN applications and overview of ISDN.