CHAPTER I

SUMMARY

This staff study was undertaken by the Office of Technology Assessment in response to a request from Senator Talmadge of the U.S. Senate Committee on Agriculture and Forestry. Senator Talmadge expressed his concern for "equity for rural people" and asked that OTA consider undertaking a technology assessment to determine the feasibility and value of using broadband communications to provide public services for rural areas. Senator Talmadge further indicated his interest in the contribution broadband communications might make to the broad objectives of "rural community development".

In the course of this staff review, the following tasks were undertaken:

- identify rural needs and make a preliminary evaluation of actual and potential applications of broadband communications to meet those needs;
- determine the present status of rural growth so that the role broadband communications might play could be defined; and,
- identify constraints to, and an approach for, bringing broadband communications to rural areas,

Each of these topics is dealt with in Chapters II, III, and IV, respectively. Chapter IV also identifies policy alternatives and describes an approach for further OTA assessment activities if such are considered desirable by the OTA Board or by the Senate Committee on Agriculture and Forestry *or* by other committees of the Congress.

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This Chapter begins by defining the scope of the study in terms of the types of communications technologies included. The meanings of the terms "rural" and "urban" are also described. Major findings concerning each of the tasks identified above are then summarized.

Definitions And Scope

"Broadband" communications refers to transmission of many television, voice and/or data signals through a single system. The transmission may be through the atmosphere or through wires or glass fibers. There is-no clear point of separation between broad and narrowband. For the purposes of this study, the term "broadband" indicates a communications system employing one or more of the following technologies: coaxial cable, translators, ground or satellite-based microwave relays, and fiber optics. Technologies outside the scope of this study include conventional two-way telephone, radio and TV broadcasting stations and mobile radio. In general, the term broadband as used in this report implies two-way interaction with video, as well as voice and/or data in at least one direction.

There are a number of definitions of "rural" and "urban" (see Chapter III, page 3). Because available data on population trends are organized by counties which are classified as "nonmetropolitan" and "metropolitan", these terms are used rather than rural and urban when discussing population trends. When the discussion is more general, the term rural rather than nonmetropolitan is frequently used. A metropolitan county is defined as one in which there is an urban nucleus of at least 50,000 people. Adjacent counties are included if 30% or more of the population commute to the urban core. If less than

30% but more than 15% of the workers commute, the adjacent county is still considered metro if it meets two out of three subsidiary criteria considered characteristic of metro areas. These criteria refer to density, degree of urbanization and rate of growth. Other areas are classified as nonmetropolitan.

Previous Applications Of Broadband Communications

Applications of broadband communications to rural areas can be divided into two categories: 1) public services (including health, education, law enforcement, and governmental/administrative services) ; and, 2) commercial uses (including security systems, information transmission, data transmission and pay-TV). For each application, the following were reviewed: 1) rural needs; 2) experiments conducted in providing the service; and 3) potential rural uses, including their feasibility and value. The analysis suggested the following major findings.

Public Service Applications

In both health and education, rural needs derive from shortages and inadequacies of facilities and personnel as well as from many factors that make access difficult, such as distances to be travelled. Financial resources, that is, lower incomes than in urban areas, the fact that fewer residents are insured for health care, and the generally smaller tax base available to support facilities also contribute to the reduced opportunity for health care and education in rural areas.

In health, a vigorous experimental program conducted over the last twelve years has demonstrated the feasibility of using broadband communications to meet rural needs in five basic areas of health care; namely, consultation, supervision, direct patient care, administration and management, and education and training. Patient acceptance is high and it has been demonstrated that telemedicine can increase the adequacy of health care by providing access to services which were not available before or which were only minimally available. Health services personnel cite some problems, especially concern with privacy and confidentiality, but generally, their attitudes towards telemedicine are favorable. Unknowns requiring further research include the costs and benefits of video compared to non-video systems and methods to combine manpower and technology into total health care delivery systems that can be self-sustaining financially.

Fewer experiments using two-way communications have been conducted in the field of education, especially in rural areas. Nonetheless, the technical feasibility of meeting many of the educational needs of rural areas has been demonstrated. There is, however, a lack of information concerning which kinds of hardware and software best support educational uses, as well as concerning the relative effectiveness of education using broadband communications as compared to the traditional classroom. Educational programs adapted to, broadband use and/or guidelines for their development are also needed. Generally, very little hard data are available on the cost-effectiveness of using broadband communications for education.

Rural needs in law enforcement derive from the long distances involved and the time consumed in travel to and from the central station, thus reducing the time available for assigned duties. Broadband communications could be used to televise roll calls and briefing sessions, transmit fingerprints and related documents and aid in the conduct of pre-trial arraignments.

Governmental and administrative uses are also potential areas of application. For example, where processing of applications requires more than one agency, broadband communications could reduce requirements for travel and time for processing, thereby reducing costs to local governments and serving clients more efficiently.

Hard data on the economic tradeoffs of using broadband communications to meet needs in law enforcement and governmental/administrative activities are not available for any setting, urban or rural. However, at least one experiment is underway in each of these applications which should provide some data on their feasibility and value.

Commercial Applications

Potential security services include detection of fire and of unlawful entry, both of which are sources of major economic loss in rural areas. Broadband systems could be used to reduce these losses by permitting continuous monitoring of isolated buildings from a central

location. Such systems are presently being installed in some new communities, but the economic viability of these systems in rural areas remains to be tested.

In the area of information, services are available which provide stock and commodities prices, round-the-clock news and other information. If the necessary market exists, these could be readily delivered by rural broadband systems.

As for business uses of broadband systems, the potential of high volume data transmission and of automatic meter reading were examined. A working system in New York City uses the excess channels of a local cable television system for transmitting massive amounts of information between a central bank office and many branches. The bank pays a fee to the cable company for its use of the system.

The potential for automatic meter reading arises from the fact that manual reading of meters for water, gas and electricity is especially costly in rural areas because of the distances between houses. A recent study indicates that the cost of manual meter reading will exceed that of automatic meter reading via cable by the end of the decade.

The final commercial application reviewed was pay-TV, for which subscribers pay a fee to obtain special programs and sports events.

The economic viability of these commercial uses in rural areas has yet to be proved. However, they represent potential sources of revenue which could be used to support a rural broadband system.

Discussion

A major purpose of many broadband communications experiments in public services has been to demonstrate technical capability. Economic feasibility and the design of economically viable systems have received less attention. When cost-effectiveness has been considered, it has been limited to the use of technology to provide a single service. As will be discussed later, detailed consideration of a system approach to broadband communications in which costs are shared and revenues are generated by public users, commercial users and subscriber-supported entertainment fees has not been attempted. However, such a system approach may be the key to an economically viable broadband system which could serve an entire rural community.

All of the public service and commercial uses indicated previously and more fully described in Chapter II have potential for inclusion in a rural broadband communications system. Selection of applications for a particular community should be based on a comprehensive needs analysis. The particular public services and commercial uses will vary according to the characteristics of each rural area.

Rural Development And Broadband Communications

In approaching the task of examining the contribution broadband communications can make to rural development, it first was necessary to examine the present nature of change in rural America.

The 1970's has seen a reversal of the historic migration of Americans from rural to urban areas, with a net 1.6 million persons moving from urban to rural areas. This growth is not distributed evenly among all

rural areas, nor was it found to be explainable in terms of simple proximity to metropolitan areas: the largest quantitative increase in net immigration occurred in counties adjacent to metropolitan areas, but the sharpest turnaround in migration developed in the more distant rural counties.

This change, however, has not altered the sizable differences that exist among rural areas. In parallel with the finding that there is no simple way to describe rural America is this study's proposition that broadband communications systems will succeed or fail to the degree that their characteristics match the varying needs and economic conditions of each rural area in which they are located.

In trying to make sense of the great diversity of needs and conditions in rural America, this study first identified the major forces underlying present change and then projected the future course of development and needs that are likely to emerge as a result of these forces.

The three principle forces identified in this study were:

- decentralization of manufacturing;
- decentralization of the service sector of the economy; and
- residential preference.

These forces and proximity to metropolitan areas can be related to the two major categories of growing rural counties. These are (see Chapter III):

- "Turnaround Acceleration" -- counties in which growth began in the 1950's and "accelerated" in the 1960's; generally adjacent to metropolitan areas and characterized by growth in service industries,

- "Turnaround Reversal" -- counties which have only recently "reversed" their decline and generally began to grow in the 1960's; generally not adjacent to metropolitan areas and characterized by growth in manufacturing industries.

The third force, residential preference, has contributed to growth in both categories of counties.

The following summary observations outline the implications of the varying course of rural development for the feasibility and role of rural broadband systems. Also highlighted is the contribution that broadband might make in resolving future needs in the two categories of growing counties plus, for completeness, a third category of rural counties that are declining. ("County" is used as the unit of analysis because most statistics are gathered on this basis. In practice, broadband systems could encompass several counties of varying character.)

- In any rural county, an area-coverage broadband system will require the fullest development of every possible service (entertainment, public, as well as commercial) as sources of revenue if such systems are to be feasible. Leaving aside entertainment as a common denominator in all systems, the principal additional source of revenue will vary according to the type of rural area:

  1) in the fastest growing rural counties (those dominated by growth in the service sector of the economy), business and commercial services are likely to offer the greatest potential sources of revenue.

2) in growing rural counties characterized by growth in manufacturing employment, public services are likely to constitute the best additional source for revenue.

- Broadband systems in growing rural counties could:

  1) enable greater dispersal of service-type industries than is presently the case in some of the fastest growing counties. This could permit more equal sharing in the fruits of growth by all sections of a county and make more likely the continued viability of smaller rural communities.

  2) help forestall continuing erosion of business functions in those small towns located in areas of manufacturing growth, and provide the communications network necessary for later growth in the service sector, should economic conditions permit.

- Broadband systems in declining rural counties could:

  1) contribute to the cost-effective functioning of federal and state programs designed to upgrade medical, educational and other community services.

  2) help to attract new industries by serving as a vehicle for delivery of upgraded community services.

- Implications for government policy are:

  1) in growing rural counties, broadband systems have the potential for becoming self-supporting; assistance required in their

development is likely to be in the areas of technical aid and securing of financing.

2) in declining rural counties the economic base is likely to be inadequate to support broadband systems. However, to the extent that government subsidies might be made available to upgrade schools and community facilities, some functions might be performed through the use of broadband and appropriate reimbursement made to the system. The latter revenues, in turn, might be sufficient to make the system financially self-supporting. The value of broadband in providing public services is likely to depend upon the extent to which these services mesh with and contribute to government assistance programs, as well as upon the degree to which rural development policy emphasizes area-wide, coordinated delivery of community services.

- Despite the evident promise of broadband communications systems, there can be no assurance that they will evolve in the manner suggested above. Before entrepreneurs, local 'business leaders, or governmental officials can seriously entertain organizing and deploying such systems, much more has to be known about the practical aspects of their financing and operation. This will be examined next.

Constraints To Rural Applications Of Broadband Communications

Given the high potential of broadband to meet rural needs, it is noteworthy that there have been so few applications providing services other than conventional television. Three categories of potential constraints were examined: technology, FCC regulations and cost. Technology is not

limiting. FCC regulations do provide some constraint. For example, relaxation of restrictions on translators, so that they could rebroadcast signals received from ground or satellite-based microwave relays, would encourage wider use of this technology.

While FCC regulations do not directly inhibit use of cable for public services, the regulation that public service channels should be provided free of charge in some rural areas adjacent to metro areas could have the effect of eliminating a vital and necessary source of revenue for rural systems. The free channel regulation may also have inhibited using public services as a source of revenue even in those rural areas where the regulation does not apply. Therefore, although the FCC has sought to encourage development of nonentertainment uses with free channels, the regulations may have had the opposite effect and made it impossible for rural areas to afford either broadband systems or new services.

While regulatory constraints can be removed simply by changing the regulations in question, the third constraint, cost, is a more fundamental barrier. However, it is unclear whether this constraint is actual or perceived. For example, while the low density of rural populations makes use of broadband to provide conventional television economically less attractive than in urban areas, the same low density could well favor it for public service and institutional use. If these nonentertainment uses have value, appropriate fees could be charged which would increase the economic base of the broadband system. However, this approach has not been explored.

A System Approach To Developing And

Assessing Rural Broadband Communications

By a rural broadband "system" is meant an area-wide communications network accessible to all residents and institutions. The system may be used to meet health, education and other social service needs, facilitate government and administrative transactions, and serve commercial enterprises as well as provide network TV and entertainment. Thus a package of services would be provided and it is suggested that the combination as a whole may be economically viable, where an individual service by itself may not be.

A project being initiated in Trempealeau County illustrates the system approach. A county-wide cable and microwave system available to all residents has been planned. An institution. the schools, will also use the system with the objectives of improving the quality of education, reducing teacher costs and saving funds now spent to transport pupils among schools. While an early feasibility study showed that a conventional individual subscriber supported cable system would not be economically feasible, the addition of revenues from the school users ($9000/year from each of eight schools) sufficiently improved the financial outlook so as to make the system possible.

At the present time, a massive government program to support rural broadband systems might be premature. While planning is well underway for such a system in Trempealeau County, Wisconsin, no full-service area-coverage system presently exists anywhere in the United States. It thus does not appear that enough is known about the detailed nature, feasibility, and value of such systems to encourage their present wide-spread deployment by means of routine and standard operating programs.

Instead of a large-scale government program, the logical next step would seem to be a series of system demonstrations in which broadband services are tailored to meet the specific and different needs of individual rural localities. Different services will have different cost-effectiveness ratios depending on the demographic, socioeconomic and institutional characteristics of the community. System demonstrations can provide data on what works, where, and under what conditions.

Assuming that a decision might be made to provide federal assistance for these demonstrations, the following basic steps would need to be taken:

- designation of a Federal agency (or agencies) to administer the program, collect data and evaluate results;
- provision of a funding mechanism(s); and
- identification of potential demonstration sites.

Responsible Agencies

In considering agencies that might be assigned responsibilities for system demonstrations, the need for an effective planning organization at the local level should not be overlooked. In some areas, such as Trempealeau County, cooperatives may be so pervasive that they can unite most of the population and the local government in the organizational effort necessary to plan for and implement a broadband system. In others, something akin to the multi-county planning districts being established in several states might provide technical assistance and direction.

At the Federal level, it is clear that a great deal of attention will have to be given to devising an effective means of direction and coordination. Listing only a few of the possible institutional mechanisms, an inter-agency task force could be appointed to oversee Federal participation in demonstrations. Or, a policy board comprised of representatives from executive agencies and rural and industry interest groups could be designated to design and supervise demonstrations in accordance with broad legislative guidelines.

It is beyond the purview of this study to examine fully these and other alternatives. The approach taken here is to outline one simplified alternative in which oversight is provided by existing Congressional committees (possibly with the assistance of OTA, as described in Chapter IV),

Many agencies have been involved in telecommunications research, including NASA and HEW. However, there are three, for the reasons described below, that might be initially considered for major roles in the demonstration phase. These are: 1) the National Science Foundation (NSF); 2) the Department of Commerce; and, 3) the Department of Agriculture.

The National Science Foundation has taken the lead in "systematic experimentation" with its Phase I design and Phase 11 implementation studies of public services via broadband communications and might be considered for the lead role in conducting system demonstrations as a natural follow-on to these efforts. NSF could also be primarily responsible for collection of data on one of the three major areas to be included in every system demonstration. These three areas are: 1) public service; 2) business and commercial use; and 3) impact on rural life. While as lead agency NSF might coordinate the administration, data collection and evaluation

of the overall program, it could also be primarily responsible for the first of the areas enumerated; that is, the public service sector of the demonstrations.

Potential business and commercial use of a broadband system seems to fall within the province of the Department of Commerce. The Economic Development Administration of that Department recently funded a study to help "in determining national policy regarding the future course of telecommunications research and development as related to rural ecomomic development". Thus, the Department of Commerce appears to have the interest, as well as the mandate, to contribute to business and commercial uses in system demonstrations.

The Department of Agriculture is presently a source of loans and loan guarantees (under the Rural Development Act of 1972) for broadband projects and is an authoritative source of detailed knowledge on rural development in general and potential demonstration sites in particular. A significant part of system demonstrations must be evaluation of the impact of expanded telecommunications services on rural growth and on the distinctive characteristics of life (both positive and negative) in rural areas. The Economic Research Service, which was a major source of information for Chapter III, could contribute to development of rural impact data.

In addition, the Department of Agriculture, through its Extension Service, might play a significant role in making known the system demonstration concept to potential rural sites.

Funding Mechanisms

There are two aspects of funding which should be considered: 1) capital resources for construction of systems; and, 2) funds which can be used for identifying demonstration sites; developing software and materials for public service, commercial and other system demonstration uses; operating and maintaining the system; and conducting evaluations.

For capital construction of telecommunications plant, an existing source of funds is Community Facilities loans under Title I of the Rural Development Act of 1972. (Another possible source, as suggested by some, might be the Rural Electrification Administration.) The second category of funds which are primarily to be used for conducting and evaluating the actual system demonstrations could be provided through the lead agency, either as outright grants or loans. Calculations of the potential costs to support four system demonstrations were made. Assuming loans for construction and grants for other costs, per year costs for a five-Year Program were estimated at roughly $1.8 million.

Candidate Sites

Only one criterion might be universally applied to all candidate rural areas which might wish to serve as a system demonstration site. That is, there must be a high degree of community support for the system. Institutional and public service use of broadband is novel and unfamiliar. As shown in Trempealeau County, individuals within the community in question will have to work together to define common needs which can be best met through broadband services. They will also have to be capable of recognizing the economic value of these services and support the system accordingly, (e.g., tax monies used to support schools might be used for broadband

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educational services). Several types of sites for system demonstrations were identified in the course of this study and are discussed in the body of this report.

Investigation Of The Impacts Of Widespread Implementation Of Telecommunications In Rural Areas

Widespread implementation of telecommunications systems with the characteristics described in this report could have major consequences not only for rural areas but also for urban areas. Changes brought to rural areas through broadband might be positive or negative. Thus, definition of impact areas, and development of a plan for evaluation of the potential positive and negative consequences of widespread telecommunications systems, should be an integral part of any system demonstration program. While detailed consideration of this topic is beyond the scope of this staff study, a representative listing of the impact areas that might be pertinent was developed. These fall into the six major categories of population balance, economic impacts, social impacts, institutional impacts, transportation-telecommunications tradeoffs, and longer term impact areas.

A Future Course Of Action If System Demonstrations Prove Successful

If system demonstrations prove the feasibility of community-wide broadband systems to meet a variety of rural needs and if it is judged that the positive and negative impacts of such systems are, on balance, favorable for national growth and development, then funding services for

implementing such systems on a broad scale might be sought. One solution might be to establish a Federal program modeled on the Rural Electrification Administration which brought electricity and telephone to rural areas through low cost loans. However, in the case of rural broadband systems, a more flexible approach involving several different funding mechanisms appropriate to the different economic characteristics of rural America might be considered (and evaluated further during the system demonstration phase).

This funding could be related to the Turnaround Acceleration, Turnaround Reversal and Declining county categories cited earlier as a framework for analysis. (It should be noted again that the "county" is the unit of analysis because most statistics are gathered on a county basis. In practice, broadband systems could encompass several counties of varying characters.) Because of the differing attractiveness of these types of rural counties to private entrepreneurs, the system operator might also be expected to vary. For example, funding mechanisms and owner/operators might vary with the category of rural county as indicated below:

County Type	Federal Financing Mechanism	System Owner/Operator
Turnaround Acceleration	Guaranteed Loan	Private Industry
Turnaround Reversal	Direct Loan	Rural Cooperative
Declining	Government Subsidy	Private Industry/ Local Government

Sources of funds include the Business and Industrial Division of the Department of Agriculture for guaranteed loans, and Community Facilities loans under Title I of the Rural Development Act of 1972 which are direct loans. Both of these sources have already been used to support rural broadband systems. In this connection, however, it is important to note that a letter sent to OTA by the Department of Agriculture stated that "...we do not anticipate this type of loan becoming a significant part of our community facility loan program."

Previous Legislative Initiatives
And Findings From Other Studies

A number of bills and studies were reviewed. These may be divided into" three groups depending on their treatment of the problem of bringing broadband communications to rural areas.

The Whitehead Report exemplifies the class of national cable policy studies. Within this class, rural cable is treated more as a monitoring problem than as a problem requiring action. Thus, it is not surprising that no specific course is outlined nor is a funding mechanism proposed for bringing cable to rural areas.

The second group of bills and studies includes S. 1219, H.R. 5319, H.R. 244, the Interstate and Foreign Commerce Subcommittee report on cable and the Booker T. Washington/Cablecommunications Resource Center report on rural telecommunications. This group of bills and studies suggests that telecommunications should be brought to rural areas now and suggests low-cost, long-term loans as the funding mechanism. The implication is that the major constraint on rural telecommunications is lack of risk capital and that the problem can be solved in a manner paralleling the Rural Electrification Act of 1934 which enabled the spread of electricity and telephone service to rural areas. However, the parallel between these two situations may not be as exact as it appears. For cable, content is all important whereas the consumer supplies the uses for electricity or the content carried by telephones. Whether enough is presently known about program content to ensure success of rural broadband systems is unclear.

The third group of bills includes H.R. 4564, S. 1257 and H.R. 9630. This group specifically addresses the problem of providing new services, such as public service applications, via telecommunications and proposes demonstration programs which would enable evaluation of such services. Unlike the second group, these bills are not directed at rural areas and projects probably would not take place in rural areas. This is because the funds, when specified, are to be used for studying methods for bringing in the service. Existing systems would be used in the demonstrations and those with significant capacity -- as for two-way use -- are located in urban areas.

This report combines and extends the concepts in all these groups of bills and studies in that it proposes a limited demonstration program, specifically for rural areas, aimed at investigating the feasibility and value of combinations of public services, commercial uses and entertainment.

Policy Alternatives For Applications Of Broadband Telecommunications To Rural Areas

Three policy alternatives were developed during the study. These are:

- continue the status quo;
- fund a limited number of system demonstration projects; and
- create a Federal mechanism to facilitate wide dissemination of broadband services to rural areas.

The pros and cons of each of the policy alternatives are described in Chapter IV of this report.

Future OTA Role

As stated in the Preface, the objective of this staff study was to provide a basis upon which the Technology Assessment Board might decide what contribution, if any, OTA could make in assisting the Senate Committee on Agriculture and Forestry to evaluate the feasibility and value of rural broadband communications.

In the course of the study, the subject of rural broadband communications was found to be relatively unexplored. In particular, no analyses were found which considered the utility of broadband in relation to the fundamental factors underlying the sudden reversal of growth trends in rural America depicted in most recent Census statistics. Therefore, in order to gain some clear understanding of what OTA might do in connection with the subject, it first was necessary to originate a means of relating broadband to the forces underlying this change. Subsequently, it was necessary to consider how and whether such systems could actually be deployed and their value assessed.

Because of these somewhat unique circumstances, this study does not constitute a simple reply to Senator Talmadge's query as to how OTA can be of assistance. Instead, what is reflected in this staff study is a possible course of action- which the Senate Agriculture Committee might weigh. OTA's future role and the specific form its assistance might take, therefore, will depend upon the Committee's judgment as to how many of the three tasks spelled out herein, if any, it might wish OTA to pursue.

With these qualifications in mind, the following is a three-task approach to OTA's participation that the Senate Committee might consider:

First as an adjunct to hearings the Committee might wish to conduct, OTA could help the Committee to assemble a panel(s) to examine and verify or refute the findings described in this report. Topics to be covered could include:

- the present and probable future trends in rural growth;
- the impact of broadband communications on probable growth trends;
- constraints to wider application of broadband communications in rural areas;
- the need for system demonstrations and the number and type of system demonstrations which should be conducted, including criteria for site selection;
- consideration of the possible need for, and best form of, Federal involvement in rural broadband applications in the system demonstration phase as well as in subsequent programs; and
- consideration of the possible role of OTA in helping the Committee to assess and monitor the programs suggested above.

Second, OTA might begin a continuing assessment program to help the committee monitor: 1) telecommunications experiments in or applicable to rural areas; and, 2) the progress of the Trempealeau County project and any system demonstrations undertaken. With regard to the second task, a critical feature would be assessing the impact of telecommunications

on the characteristics of life in rural areas affected. (Assessing whether these impacts might be desirable is outside the scope of OTA activities. The purpose of this monitoring effort would be to provide the committee with data from which a judgment could be made.)

Third, on an as-needed basis, small assessments involving either panels or other mechanisms could be conducted to integrate the data of the monitoring efforts with other data, including the preliminary findings of this study.

Because any system demonstration will require several years, what is proposed here is a long-term, relatively low-cost activity. An estimated level of effort and cost is as follows:

• ½ manyear/year of senior staff	= $17,000
• ½ manyear/year of support staff	= 9,000
• 1/3 manyear/year of secretarial support	= 5,000
• average yearly cost of panels, small contracts, etc.	= 30,000
• contingencies including staff travel	= 4,000
	$65,000/year

It is anticipated that OTA's participation in the project would be reviewed by the Technology Assessment Board at least biyearly. At these times, both the progress and the adequacy of OTA's effort would be subjects of evaluation.