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936 5811 PP 11

~~Attachment A~~

AGENCY FOR INTERNATIONAL DEVELOPMENT

PROJECT PAPER FACESHEET

1. TRANSACTION CODE: [ ] A = ADD, C = CHANGE, D = DELETE

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2. DOCUMENT CODE: 3

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7. PROJECT TITLE (Maximum 40 characters): [AID] Rural Satellite Program - Dev. Communications

8. ESTIMATED FY OF PROJECT COMPLETION: FY 85

9. ESTIMATED DATE OF OBLIGATION: A. INITIAL FY 79; B. QUARTER 4 (Enter 1, 2, 3, or 4); C. FINAL FY 84

10. ESTIMATED COSTS ($000 OR EQUIVALENT $1 = 1)

A. FUNDING SOURCE	FIRST FY B. FX	C. L/C	D. TOTAL	LIFE OF PROJECT E. FX	F. L/C	G. TOTAL
AID APPROPRIATED TOTAL	1,200		1,200	22,000		22,000
(GRANT)	(1,200)	( )	(1,200)	(22,000)	( )	(22,000)
(LOAN)	(0)	( )	(0)	(0)	( )	(0)
OTHER U.S. 1.						
OTHER U.S. 2.						
HOST COUNTRY						
OTHER DONOR(S)						
TOTALS						

11. PROPOSED BUDGET APPROPRIATED FUNDS ($000)

A. APPROPRIATION	B. PRIMARY PURPOSE CODE	PRIMARY TECH. CODE C. GRANT	D. LOAN	E. 1ST FY 79 F. GRANT	G. LOAN	H. 2ND FY 80 I. GRANT	J. LOAN	K. 3RD FY 81 L. GRANT	M. LOAN
(1)				1,200		4,000		5,420	
(2)									
(3)									
(4)									
TOTALS									

A. APPROPRIATION	N. 4TH FY 82 O. GRANT	P. LOAN	Q. 5TH FY 83 R. GRANT	S. LOAN	LIFE OF PROJECT T. GRANT	U. LOAN
(1)	4,220		4,370		22,000	
(2)						
(3)						
(4)						
TOTALS						

12. IN-DEPTH EVALUATION SCHEDULE: MM 10, YY 81

13. DATA CHANGE INDICATOR. WERE CHANGES MADE IN THE PID FACESHEET DATA, BLOCKS 12, 13, 14, OR 15 OR IN PRP FACESHEET DATA, BLOCK 12? IF YES, ATTACH CHANGED PID FACESHEET.

[ ] 1 = NO, 2 = YES

14. ORIGINATING OFFICE CLEARANCE

SIGNATURE: Robert Schmeding

TITLE: Director, DS/ED

DATE SIGNED: MM 05, DD 15, YY 79

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B. Summary Project Description

1. Introduction

This project paper provides the framework for implementing the Agency's new program to test the cost-effectiveness of satellite communications in rural development. The program was approved by the Administrator in October, 1978 (see Action Memorandum, Annex A) at a level of $24 million over 6 years. It was subsequently announced at the UNESCO General Conference in November, 1978. (Annex B.)

The basic premise of the program is that new satellite technologies will make possible the establishment of reliable communications systems in many rural areas of the developing world. Once established, reliable communications in rural areas potentially represent a new development tool of importance. This project is designed to guide the use of that tool toward serving a number of fundamental development objectives, and to test its utility when so used.

2. The Problem

Development programs are often severely hampered by communication constraints in their efforts to provide basic health, agricultural and educational services to rural poor populations. Hostile terrain, the great distances that sometimes separate population centers, the widely-dispersed settlement patterns of small farmers and unreliable ground transportation are factors which limit the extent to which new services effectively reach large numbers of rural people. In many countries the most inaccessible communities are among the most impoverished and, ironically, the least affected by development programs.

- Modern communication technology offers an opportunity to improve the delivery of development services to the rural people. One of the most promising of these technologies is the communication satellite, which can leap many of the most formidable barriers to communication. Other promising technologies, which can be either alternatives or adjuncts to satellite systems, include low-cost two-way radiotelephones, audiocassettes, and low-powered community radio broadcast facilities. By reducing communication constraints, these technologies may be able to improve dramatically the penetration and impact of development programs. Unfortunately, AID, other assistance agencies, and host country ministries have limited direct experience from which to judge the potential and the costs associated with use of satellite and related communication systems in support of rural development activities.

3. Project Objectives

The broad objectives of the project are ambitious, and it is recognized that factors other than this program also will influence their achievement. These goals involve bringing into being each of the basic elements required for operational use of satellite systems appropriate for use in rural LDCs: (1) tested models for using these communications systems in development programs; (2) appropriate satellite services; (3) the availability of low cost stations on the ground for reception and transmission; and (4) sources of financing for such systems.

Objective 1. To develop and test new and potentially cost-effective models by which communications satellite links and related technology can help provide information to rural communities and improve the

availability of rural services.

The main effort of the project will be in developing workable models of communications utilization and carefully evaluating their effectiveness. To meet this goal, a minimum of seven to eight pilot projects will be funded, typically lasting one-to-two years, together with a few shorter-term demonstrations. The choice and design of later projects will be informed by careful analysis of earlier project experience. Planning assistance will also be provided to Missions and LDCs in designing long-term operational projects using these communications technologies.

Objective 2. To demonstrate to the providers of satellite services, most notably INTELSAT*, that it is worthwhile to design their satellite capacity to provide services optimally for rural areas.

In order for such systems to become operationally viable, there will, in most cases, have to be in place satellites providing high enough power levels to permit broadcasting to small, low-cost, rural reception stations. At present, such capacity exists only on a very limited basis, covering few LDCs. Our goal is to provide evidence to INTELSAT and to the developers of regional systems, such as ARABSAT and a possible Andean Pact satellite, that there is a market for such high-powered satellite services. Close cooperation with these entities, particularly with INTELSAT, will be required (and already is developing well).

Objective 3. To lower the cost of ground station equipment appropriate for use in rural LDC environments.

*INTELSAT, the Int'l. Telecommunications Satellite Organization owns and operates the global satellite system. While initially designed to provide communications links between nations, it is also increasingly used for domestic communications. 101 nations are members and owners of INTELSAT.

Manufacturers of ground stations also must be shown that there is such a market, in order for them to design and aggressively promote appropriate ground stations. This project will include very modest hardware R&D to help facilitate the design of such stations, but more importantly will begin purchasing and using ground stations against specifications developed for these rural applications. It will also include an effort to coordinate the purchase of appropriate ground stations by various LDCs.

Objective 4. To provide the evidence needed by investment sources, such as the World Bank, that communications investments in rural areas, because of the lower cost of satellite systems, can be cost-effective in achieving equitable rural development. Financing of large-scale rural communications systems will, if it is to occur, fall largely on the World Bank, regional development banks, and national planning and telecommunications entities. Their participation in the planning of this program and in the evaluation of its results will, it is hoped, provide the information needed for resource flows to increase.

Objective 5. To support the development of national capacities for integrating communication investment planning with sectoral development planning. AID will through this program help to develop procedures for integrating sectoral planning and communications planning at the national level. In addition, substantial efforts will go into establishing a world-wide information network so that developing countries can gain support, and share their experience, as satellite applications continue to grow. Into this information network will flow experience from other countries, including the U.S. which are using these systems for rural development purposes.

4. Background

When properly used, communications technologies* have been shown to provide cost-effective means for providing education and training.

It is also apparent that effective communications can be a critical tool for improving the operations of rural development agencies and for ascertaining and articulating needs of the rural poor. This project will have as its distinctive feature the use of relatively low-cost satellite ground stations to utilize the capacity of the international INTELSAT satellite system, and other existing domestic and regional systems, to provide communications for rural communities, both for two-way communications and for instructional broadcasting. Due to the world-wide coverage of the INTELSAT system, all regions of the developing world potentially can participate in the project.

Communication satellites have proven their reliability and utility in commercial and military service for nearly twenty years. Over 60% of international telephone traffic and most overseas television service is transmitted by satellite. Unlike other kinds of telecommunications transmission, satellite-relayed signals are virtually unaffected by distance, terrain and atmospheric conditions.

*By communications technologies are meant telephones, conventional radio and television, relatively new techniques for transmitting hard copy and pictures over telephone channels including telecopying and slow-scan tele-vion, and the transmission systems, including satellites, for such services. See Glossary for further explanation of these technologies, p. 14.

Until recently, satellite communications systems were costly and cumbersome. The launch, the satellite itself and the necessary ground stations were all very expensive, restricting use of the system to very large-volume users. Furthermore, the large size and cost of ground stations meant that only major urban centers could be served by the satellite system.

Rapid technological development has produced dramatic improvements in performance, with corresponding reductions in cost. Progress in the direction of more flexible capabilities and low costs is expected to continue. It is now possible, therefore, to begin to use this technology for extending a number of new communication services to rural areas where older terrestrial communication technologies could not be implemented in a cost-effective manner.

The staff of INTELSAT, the International Telecommunications Satellite Organization, has submitted to AID suggestions for a program of demonstrations of rural low-cost telecommunications to be accomplished over the next several years. INTELSAT offers technical cooperation and free use of their satellite capacity for up to three months of technical demonstration. After extensive review of this and other possibilities, the Agency decided, in October, 1978, to embark on a program of collaborative studies and demonstrations with INTELSAT, as well as to cooperate in the use of other appropriate capacities, such as Indonesia's PALAPA system, whenever feasible.

The program was approved at a level of $24 million over 6 years. (This includes $22 million in this project and $2 million in a closely associated

L. A. Bureau project.) Since this project is simply to be a stimulus to broader Agency use, that level represents core funding, with additional funds from other budgets anticipated as the core program proceeds. In FY 79 and years after FY 81, funds will come from Section 204. In FY 80, they will come from Section 205, Selected Development Programs.

5. Basic Activities

The core activities of this project will be field demonstration and pilot projects conducted in a limited number of countries which choose to participate and which meet certain criteria. Seven to eight pilot projects, each lasting one to two years, will be undertaken, together with three shorter term demonstrations of less than six months duration. These field activities will make use of the technology for two major kinds of applications:

a. Rural educational broadcasting - for support of programs extending basic services with health, agricultural development and education, through in-service training and through broader educational programming.

b. Basic rural telecommunications (two-way radio, telephony, telex) - with the aim of effecting improved administration of rural development programs.

Additional applications anticipated in the course of the project are:

a. Linking regional research institutions - for data links, professional consultation, the extension of teaching, and the support of users of research findings.

b. Facilitating disaster relief efforts - through portable satellite-based communications systems.

c. Possibly, development of new communications-based modes of technical assistance from the U. S. to developing countries.

Other activities: In addition to the field demonstrations and the pilot projects, the project will conduct other activities essential to achieving an increase in the utility of satellite communications for rural use.

- support the training of LDC personnel in subjects related to planning, implementation, and evaluation of rural communications programs;
- create an extensive information network;
- support limited R&D on key software and hardware problems;
- engage in an evaluation program;
- support Missions and LDCs in their planning for operational systems.

6. Project Inputs

The project will require commitments totaling $22 million over six years, with annual obligations as follows:

FY 79	FY 80	FY 81	FY 82	FY 83	FY 84
$1.20M	$4.00	$5.42	$4.49	$4.37	$2.52

The Bureau for Latin America and the Caribbean will manage a closely related project, with obligations of $0.5M in FY 79 and $1.5M in FY 80.

7. Project Management

Overall management of the satellite program will reside in DS/ED, in close collaboration with the Regional Bureaus. The mechanism for this collaborative management will be through a cooperative arrangement involving

three Regional Bureau Development Communcations specialists who will be assigned to this project. Additional slots were authorized for these positions in the Action Memorandum. The RB specialists will work primarily on region-specific elements of the program but also will share responsibility for certain of the central activities. The Missions' role is, of course, very significant to the success of the individual projects, and major responsibility for relating to and involving the Missions will fall to the RB specialists. DSB will have two full-time staff members assigned to the activity. An inter-bureau group will be established to aid in the cooperative management process. Intensive reviews of the project will be scheduled at the end of the second and fourth years to guide future directions.

8. Implementation

Phase I. In FY 78, support will be provided to two pilot projects which have already been planned: Peru, where funds of this project will supplement those of the Latin American Bureau through a PROAG, and Yemen where a two-month demonstration is planned to be implemented, also through a PROAG. In addition, FY 79 funding will be provided for the following arrangements:

a. A RSSA with the National Telecommunications Information Administration (NTIA), for the initiation of a hardware R&D program,

b. Two technical support contracts as a transition to the permanent mechanisms which will come into place in FY 80.

Phase II. In FY 80, long-term contracts will be let with the following:

a. An Applications Management contractor, who will have principal responsibility (with sub-contractors) for planning and carrying out field projects, as well as for implementing substantial training and information programs.

b. A Hardware Manager, either NTIA or NASA (through a RSSA) or through a contract with a non-governmental organization,

c. An evaluation contractor

d. Software R & D contracts

C. Issues

1. Will a sufficient number of LDCs have the institutional capacity needed to utilize these communications systems?

A question has been raised as to the capacity of LDCs to manage and to develop the "software" that may be required to implement these programs. The key to the response is that AID will work primarily with existing LDC institutions which have experience in delivery of health, education, and agriculture information. Typically, the communication capacity will be integrated into their ongoing activities. In some cases, the only new component will be a satellite link extending present services, while in others training in specific educational communications media will be added.

In other cases the project will make use of services where the demand for "software" or professional communications expertise is minimal, such as facsimile, teleconferencing, slow-scan TV, two-way audio, telex, and teletext. In all cases AID will provide training as necessary.

An essential element of the project, of course, is to aid LDC institutions in learning how to adjust their operations to take advantage most practically of the potentials of communications. The required adjustment will be greater in some places than others, and the first steps will have to be adjusted to the existing constraints.

2. Will the technology be sufficiently reliable for LDC rural use?

The satellite technology itself will be of high reliability, since the program primarily will use operational satellites, including the INTELSAT system, Indonesia's PALAPA, and conceivably ARABSAT (Arab countries) and INSAT (India), should they come into being. All are designed for the high reliability required of commercial service. To the extent that NASA's

aging experimental satellites also continue to be used, their declining reliability will have to be taken into careful account in the kinds of services provided on them.

AID will use relatively small ground stations similar to those now being produced for the domestic commercial (cable) market. Equipment design will emphasize ease of repair and the capability to withstand rigorous LDC environments. Previous experimental uses of satellite ground station equipment have proved successful in extremely rugged environments, e.g., the Arctic and sub-Arctic Alaska, the South Pacific, and rural India. Maintenance systems will be integral to all projects.

3. Will there be an ongoing demand for these services?

Telecommunications is already seen as being an essential and sometimes unique means by which remote areas of LDCs can be more fully integrated into the nation. Their value is usually recognized first as a means of delivering information via radio and T.V. and of coordinating regional government activities by telephone. Investment in domestic satellite service by Sudan, Algeria, Nigeria, and India and interest in such service by Yemen and Peru stem from this perception.

The AID projects will include a focus on a second level of use for telecommunications: extending social services and upgrading the capabilities of field personnel through instructional programs, in-service training and consultative support in emergencies. Experience in such places as Alaska, the South Pacific, and Nicaragua indicates such activities are highly valued by users and are likely to draw continuing support.

4. Will AID create an increased dependence on foreign equipment and skills?

Equipment design for on-the-ground hardware will emphasize simplified modular components, which will make possible local component production and assembly where practical. Realistic assessments of ongoing requirements for foreign technical and financial assistance will be included as a significant part of the planning and evaluation process. Training components in each project will be designed to minimize future dependency on foreign technicians.

5. Is it really likely that increasingly cost-effective technology will be developed?

Communications technology is steadily becoming cheaper as micro-processors and large-scale production combine to drive down costs. Calculators, home computers, and electronic watches are conspicuous consumer examples.

Satellite technology shares this trend. INTELSAT A earth stations (30 meter antennas with correspondingly large electronic installations) have been joined by lower cost Standard B (11 meter antennas and small electronics). Still smaller Standards C & D stations are being developed.

Increases in satellite power will further reduce future costs. AID's program is designed to help demonstrate to INTELSAT that there is a large LDC market (in addition to the growing U. S. market) and so encourage this trend.

Comparative analyses of terrestrial vs. satellite linkages will be undertaken in order to satisfy the basic cost-effectiveness questions. In addition, technical development activities will be funded by the project to increase their appropriateness for rural applications.

6. Is AID entering into large-scale support of telecommunications infrastructure?

No, AID does not at this time have the resources or the commitment to enter into such high-cost, long-range investment projects, except in selected circumstances such as in the Supporting Assistance Program. The evidence collected in this program will, of course, influence future AID decisions as to the utility of rural communications investments as a development and equity tool. There are, however, other sources of financing. It may also lead lending agencies, such as the World Bank, to the conclusion that investments in communications are justified both in economic growth and equity basis. In addition, there already are firm plans in a number of LDCs in investing resources available to them in the development of their communication systems (India, Indonesia, Nigeria, Colombia and the Arab nations are obvious examples). The project proposes to demonstrate how such systems can be effectively employed for specific rural development purposes.

GLOSSARY OF TECHNICAL TERMS

SLOW-SCAN TELEVISION. Method of transmitting individual frames of television images via telephone lines. The images are updated at predetermined intervals. Does not allow transmission of motion.

FACSIMILE. Method of transmitting images of printed matter over telephone lines; producing hard copy, more speedy transmission for telecopying.

TELECOPYING. Method of transmitting images or printed matter over telephone lines; producing hard copy: less speedy than facsimile.

TELETEXT. Method of transmitting printed text using the lines in the picture portion of television signals. Displayed on television monitors. (Example P.B.S.-TV captions for the deaf in news programs.)

TELECONFERENCING. Method of conducting meetings among geographically dispersed individuals or groups by linking them into a communications network. Teleconferencing systems can have varying numbers of participants and participating locations. They range from a network of interconnected telephones to full two-way television systems.

DAMA/DEMAND ASSIGNMENT MULTIPLE ACCESS. Method of assigning a channel to a user only when it is needed, so that channels may be shared by many users or sites.

GROUND SEGMENT. The satellite facilities on the ground; earth stations.

SPACE SEGMENT. The satellite itself.

SATELLITE BEAM. Comparable to a beam of light but relates to the signal field which a section of a satellite can cover. A satellite can have several beams.

SATELLITE CAPACITY. Number of channels, audio and television, which a satellite can relay or transmit.

II. Project Background and Detailed Description

A. Background

1. Problem and Project Rationale

a. Problem

The broader context of the problem to be addressed in this project is the systematic discrimination against rural areas in terms of resource investment and social service delivery. Rural areas have been short-changed in the allocation of private and public investment and in the provision of social services.

LDC national budgets cannot accommodate the expansion of traditional systems of social service delivery into all areas of the country because total costs are so great, even though unit costs may be comparatively low. They have often turned to solutions like using less thoroughly trained personnel to expand coverage, but this introduces problems of quality control and overall capability.

Rural areas are hindered from developing because of their lack of infrastructure and economic activity, which in turn make it difficult to attract development investment and to influence allocation decisions about social services.

The results of this discrimination are seen in significant under-utilization of resources, especially human resources, patterns of migration to urban areas and, of course the human consequences of deprivation.

It must be recognized that this pattern results from constraints which are inherent in the situation. Some obvious constraints are geographical remoteness, hostile terrain, widely dispersed settlement patterns and unreliable ground transportation. Additional constraints are the difficulty of administering rural programs, the difficulties rural people have in participating in or affecting government decision-making, and the poor quality of many rural development programs arising from the inadequate size of the trained manpower pool and the difficulty of getting trained people to move out to the rural area.

b. Communication Satellite Technology: Its Rationale as a Rural Tool

Communication satellites are a very young technology that has been going through rapid changes in technical capability and cost. The potential afforded by the technology has been recognized from the start, and many LDC and developed country planners have been very interested in the use of that potential to attack development problems. Many studies and a few projects have been carried out to explore the possible uses: the conception of what might be the most desirable applications has been evolving over time and is now much more sophisticated and realistic than the original proposals. Part of this evolution can be attributed to the experience and perspective gained from these studies and experiments, and part to the changes in the technology over the last two decades. The earliest ideas for satellite use concentrated primarily on providing direct broadcast educational programs on a massive scale -- simultaneous broadcasts to schoolrooms throughout Latin America or India, for example. This orientation was virtually forced by the satellite

economics and technology of the time. Now the potential applications of interest are much more diverse and frequently small-scale; there is a proportional reduction in interest in broadcast activity and a balancing interest in using the two-way capabilities that can now be provided on small, relatively inexpensive terminals, in order to implement and administer programs in rural areas and to provide general telephone services.

The advantages of the current level of satellite capability for rural use are the following: (1) such systems do not depend on the slow growth of infrastructure out from urban centers to the rural areas. This reduces a structural, inherent bias of conventional terrestrial telecommunications hardware against service in rural areas; (2) the hardware itself is generally located at the point of use, i.e., in the village or town. This makes access for maintenance and repair much different and much easier than what one faces for terrestrial microwave or landline equipment, which usually crosses long distances in hard-to-reach areas; (3) the costs of communication by satellite are relatively insensitive to distances, i.e., the cost of sending the signal up to the satellite and back down again is about the same for locations that are close together as for locations that are far apart. Thus, cost of communications for very remote areas should become little more expensive than services in urban areas.

The project can be expected to demonstrate on a small but visible scale that the following effects are possible:

1. Administration can be improved by the timeliness and speed of response of two-way communication.

2. Quality of service programs can be improved without a corresponding growth in costs.

3. Involvement of rural areas in the economic mainstream through communications can affect patterns of development.

4. Rural people can be more involved in the expression of their own needs concerning rural development activities.

This is not to say that these solutions will be reached without difficulty. There are difficulties in adapting the technology to the uses and solutions proposed, and they should not be ignored. There is the problem of the adoption of new, rapidly changing and unfamiliar technology. There is the challenge of the economics of the technology which relies for its cost-effectiveness on the aggregation of significant number of users for the services provided, either singly or collectively, thus posing institutional and administrative problems. There are a variety of technical constraints.

On the other hand, it is not exaggeration to say that the technology of satellites and associated communications services provides a distinctive and most promising new set of tools which may give the LDCs not an entirely new way, but a significantly enhanced way, to deal with the human needs of the rural poor.

B. Detailed Description

1. Project Purpose and End of Project Status

In the broadest sense, the purpose of this project is to bring new technological resources in communication to bear on the development problems discussed in Section II.A.1. The specific purposes of the project are as follows:

Purpose 1: To develop and test new and potentially cost-effective models by which satellite communication links and related technologies can help provide information to rural communities and improve the availability of essential service.

The project will support the development of a variety of models (involving software, program content, training and institutional change) using low-cost flexible communications satellite technology. Both educational services and 2-way communications for rural administration will be emphasized.

Purpose 1a: To help provide educational and training services essential to rural programs

The models envisaged will allow delivery of informational and instructional material both to the rural poor and to outreach workers providing development based in rural areas. Such services will include education, health and agriculture. For example, a communications system can be designed to serve the health sector development program to permit activities such as:

a) broadcast of health-related educational programming

b) in-service training of health agency outreach staff.

Using the same system, in-service teacher training may be provided, or direct instruction to agricultural groups. In many cases, an integrated system serving multiple uses will be appropriate.

The model systems developed will be evaluated both in terms of their effectiveness in accomplishing the specific purposes for which they were intended and in terms of the potential cost-effectiveness of implementing them on an operational basis.

Purpose 1b: To improve administration of and support services to rural development projects

It is anticipated, as indicated in the preceding, that most field activities conducted under the project will support on-going and planned rural development programs. Here, of course, one of the most difficult problems has always been that of providing timely, adequate and efficient support to the worker in the field. Part of this problem is that the field worker cannot effectively communicate his own perception of needs back to the central urban area in order to get the advice, help, support he needs. The project will place a strong emphasis on two-way interactive communication and the participatory processes which this promising aspect of telecommunications can provide.

In the area again of health sector programs, for example, the following kinds of activities can be undertaken:

a) Consultation on medical problems between health outreach staff and medical support staff at more central locations;

b) reporting on local health conditions;

c) coordination of logistical support;

d) general administrative assistance and supervision.

Benefits could accrue immediately through the field use of the communications systems developed under the project and ultimately through the development of permanent operational systems. More effective and efficient coordination, supervision, reporting and other management and support functions are expected to result, as measured by evaluation studies.

Purpose 2: To demonstrate to INTELSAT and other communication carriers that there is a potential market for providing satellite capacities specifically designed for rural LDC services.

At present, INTELSAT satellites are designed primarily for international services, from capital to capital. They are optimized for large, multi-million dollar ground stations. Some of these satellites also have a very limited high power capacity, which will permit our experimentation with small ground stations, costing $50,000 to $100,000. However, a major objective of our program is to influence INTELSAT to provide such a capacity on an operational basis beginning in the early 1980's. It is also hoped that the designers of planned regional systems, such as ARABSAT, will take into account the results of our experimentation with ground stations designed for rural purposes.

Purpose 3: To lower the cost of ground station equipment appropriate for use in LDC environments

The procurements that will go on during this project, as well as the broader network of discussions and analytic activities, will be aimed at achieving lower cost ground station designs. In addition, a small amount of hardware R&D will be directed toward this end. Once again, the most powerful stimulus will be in the definition of a probable market.

Purpose 4. To provide the evidence needed by investment sources, such as the World Bank, to justify communications investments in rural areas.

Financing of large-scale rural communications systems will, if it is to occur, fall largely on the World Bank, regional development banks, and national planning and telecommunications entities. Their participation in the planning of this program and in the evaluation of its results will, it is hoped, provide the information needed for resource flows to increase. The key to the

argument is that the new satellite technologies make possible systems of rural communications which are cost-effective, stimulatory of rural economic development, and equitable.

Purpose 5: To support the development of national capacities for integrating communication investment planning with sectoral development planning.

AID will, through this program, help to develop procedures for integrating sectoral planning and communications planning at the national level. In addition, substantial efforts will go into establishing a world-wide information network so that developing countries can gain support, and share their experience, as satellite applications continue to grow. Into this information network will flow experience from other countries, including the U.S., using these systems for rural development purposes.

For the reasons cited above, it is important to develop procedures and models for integrating sectoral and communications planning. The present pattern tends to be that communication agencies disregard sectoral development plans in planning their programs while sectoral agencies take communications as a given in their own planning, much as they have in the case of transportation. However, as was the case in developing and demonstrating the benefits accruing from farm-to market roads -- programs which represented a breakthrough in the integration of transportation and agricultural planning, -- AID through this project will show a wide and influential audience how communications and sectoral planning can complement each other to further rural development objectives.

We are involved, in this program, in helping to stimulate a world-wide reassessment of the use of communications. In order to be successful, substantial efforts will have to be made to engage, and then support, key decision-makers throughout

the world. Thus, a significant information program will be initiated and other activities undertaken to support broad involvement. Such forums as a newly developing UNESCO International Consultative Group on Communications Aid will be utilized for this purpose. Specific approaches will include the following:

(a) Involving host countries in collaborative information gathering projects (e.g., a cooperative project with the Government of India in obtaining measures of benefits of rural telecommunication investments in India).

(b) Transferring as much control and responsibility for pilot projects as possible to host government and local counterparts, possibly including equipment procurement.

(c) Establishing a series of information-gathering, analysis, and dissemination programs, with heavy emphasis on bringing together users of this technology, to share experiences and plans among themselves.

2. Project Outputs

Outputs of the project stem from two sources: first, outputs as a direct result of Project expenditures, e.g., the results of the pilot projects and demonstrations; second, outputs of the Project which will influence in the long run the development and establishment of appropriate satellite communications systems and policies for rural development.

a. Demonstrations and Pilot Projects

"Demonstration Projects" are field activities lasting from two to six months which show the capability, utility and feasibility for rural development of satellite communications systems, sometimes in tandem with terrestrial and two-way or broadcast radio systems. The purpose of these demonstration projects is to influence LDC planning in the area of telecommunications as well as public service delivery by demonstrating that practical applications of rural communications systems are feasible in specific LDC contexts. Demonstration projects may develop into pilot projects. A total of three demonstration projects is envisaged.

"Pilot Projects" will often provide the final evidence as to the feasibility and cost-effectiveness of operational services to rural areas. They will be carefully planned and evaluated to address all issues which will affect the decision-making process regarding operational rural communications services, e.g., requirements of organizational cooperation, capital and operational costs, tariffs, availability or production capabilities of software utilization support systems, and overall benefits to rural socio-economic development. They will be part of a systematic exploration and development of rural communications systems in the host country as well as of a systematic approach to the assessment and implementation of satellite based public service delivery systems.

Seven to eight pilot projects will be conducted, in addition to the support provided to the Latin American Bureau funded pilot project in Peru. It is expected that many of the experiences gained and approaches tested in the pilot projects will be directly transferable to other countries with similar rural communications requirements.

The Project will not undertake, unless unusual circumstances require, brief demonstrations of a few days.

Each demonstration and pilot project will be preceded by in-country technical trials of one to two months duration. These trials will provide hands-on training to host country technicians and engineers in the assembly, installation, testing and operation of satellite communications systems.

b. Trained LDC Personnel

Training is intended to meet specific needs of pilot projects and to help develop the capacity of LDC participants to plan and conduct regular operational programs. The kinds of application envisioned require new kinds of cross-disciplinary thinking and planning that are lacking in the experience of many LDCs.

A variety of different modes of training will be used in the project, spanning many disciplines. Modes will include the following: (a) one to three month observational training visits to on-going projects in other developing countries, the U.S., and Canada; (b) internships in on-going projects in the U.S. and elsewhere; (c) attendance at professional meetings; (d) specially-organized short courses by U.S. institutions and equipment suppliers, both in the U.S. and in-country; (e) limited long-term M.A./M.S. and Ph.D.-level training. The fields in which training will be provided include (1) communications research; (2) communications planning; (3) instructional systems design; (4) evaluation; (5) telecommunications system engineering;

(6) systems operation and maintenance; (7) video and audio instructional program production; (8) telecommunications systems planning for public services; (9) telecommunications planning, economics and policy development.

Since the requirements for training will vary greatly from one country to another it is not possible at this stage to provide a detailed training plan. It is estimated that approximately 30 person-years of long-term training and 175 person months of short-term training will be provided under the project.

c. Network of LDC, US, and International Institutions Concerned with Developmental Applications of Communications Technology.

The information network which will be created by this Project plays a key role in achieving the global objectives of the Project, which are to affect the future development of rural communications systems in LDCs Early dissemination of information about the Project and its objectives as well as early active involvement of key planners and decision makers of LDCs in international planning and financing organizations is of prime importance to shape a program relevant to their needs. The information network is designed to bring about this knowledge and involvement by designing a communications strategy which would include the conduct of services, the development and printing of specifically targeted studies, the publication of newsletters and monographs as well as the production of audio-visual materials, including plans and videotapes.

Specific activities of the Project, such as demonstrations, pilot projects, studies and evaluations are tools to achieve the overall project objectives. The information network in the early phases of the Project will assist in the documentation and dissemination of existing experiences and lessons, which will benefit these activities. As the Project progresses, the information

network will ensure that these activities are known, understood, and supported by the key technical and policy decision makers. It is estimated that the network will involve a direct information flow to 3,000 to 4,000 individuals. A more important output will be the ability of this network to influence and assist people who make decisions at the policy, fiscal, and operational levels.

d. Project Evaluations and Studies on Communications Policy and Planning

Project evaluations and studies will provide the planning tools for the transition of pilot projects to operational services. They will address the following areas: national rural communications needs, planning requirements for operational applications of communications technology for rural development, the formulation of national rural communications plans and policies as well as the establishment of comparative costs of satellite systems and other technologies for operational communications systems. Participation and monitoring of these studies by other countries as well as by lending institutions will be encouraged to broaden the impact.

The evaluations of the pilot projects and the demonstrations will differ from each other in that the demonstrations will be evaluated largely in a formative way, establishing an improved basis for future field projects. The evaluation of the pilot projects will be designed to provide solid summative data upon which, in tandem with the studies, decisions regarding operational services can be made.

The evaluation activities will be guided by two major objectives, first, the cost-effectiveness of the particular field projects; second, the socio-economic impact of improved broadcast and two-way communications on rural development. To achieve these objectives the evaluations will attempt to determine the threshold at which benefits and costs of rural communications systems can become affordable and attractive to LDC planners and lending institutions.

More specifically, the evaluations will address the following:

- costs of software development, testing and utilization support,
- resource requirements of user ministries to plan, implement, manage, operate and evaluate communications based service delivery systems compared with traditional means of reaching the target group,
- costs for thin route ground stations, space segment and associated communications systems including procurement and installation as well as operational costs for management, technical staff, power sources and maintenance,
- comparative assessment of costs and benefits of communications-transportation trade-offs,
- utility, benefits and effectiveness of rural communications systems in providing educational services, health care delivery, rural administration, agricultural and other development services, compared with traditional means of reaching the target groups,
- the impact of expanded outreach of new services of rural development programs facilitated by communications services,
- the effect of the intervention or the pilot projects on indicators of socio economic development in rural areas,
- the political and regulatory constraints, national and international, of rural satellite communications systems,
- quality, performance and operations and maintenance requirements of the technical system,
- training requirements in all facets of the projects: technical, managerial, planning, software production and evaluation,
- satisfaction by beneficiaries with system performance configuration and services,
- requirements for multisector co-operation in rural communications planning between telecommunications, broadcasting, health care, education and other sectors.

Internal AID evaluation will also include the following subjects:

- achievement of specific Project targets in terms of the various activities of the Project, i.e. impact on specific sectoral objectives, development and testing of low-cost rural communications technology; development and testing of appropriate software; training of staff in technical and applications areas; institutional capabilities in LDCs and US to carry out rural communications programs; diffusion of rural communications planning concepts or models within participating countries as well as to other countries and agencies,
- appropriateness and quality of implementation of the Project
- appropriateness of host country participation in all aspects of the demonstrations, pilot projects, evaluations and studies,
- implications of the program for funding policies of donor agencies and lending institutions,
- effects of the project on the future of thin route rural satellite communications systems in terms of future spacecraft design, power levels, availability, lease charges and standards of ground station specifications.

e. Equipment

AID will have available 22 satellite terminals of the following types:

- Transmit-Receive Audio
- Receive-Only Audio

At present the use of full motion television systems is not planned in the Project because of the costs involved. Should technological opportunities or operational requirements indicate the desirability of full motion television reception, the project will accommodate those needs.

User interface equipment will be available such as mixers, microphones, loudspeakers, facsimile transceivers etc. This equipment will be managed by a contractor for deployment to locations to the developing world, according to project requirements. The contractor and host government will assess the requirements of each project to compare local purchase costs of this equipment with transportation costs. Also they will establish host government resources to provide this equipment. In countries where suitable conditions exist, the demonstrations or pilot projects in rural communications will be designed such that the equipment installed for such projects can be left in place for continued operational use by the host government. The contribution of the host country in terms of technical, planning and financial resources to such pilot projects will be designed accordingly.

This project will initiate the development of new types of earth stations particularly designed for rural telecommunications - this means, thin-route, limited channel capacity, low power requirements, as well as

easy installation, transportation, maintenance and operations. These earth station designs will meet the demands of many LDCs for low capacity communications links for rural telecommunications systems or for resource exploitation enterprises in remote areas.

The project will assess and develop sources of power supply which are particularly suited for rural LDC conditions. This power technology will also be beneficial for other applications in rural LDC settings and therefore be of wider benefit. Reliable and inexpensive photovoltaic solar energy will be explored, independent of as well as in conjunction with good battery systems.

The project will assist in the development of appropriate systems of interface technology, such as local exchanges, radio telephone interfacing and demand access switching equipment ('DAMA'), all of which will make rural telecommunications systems more cost effective.

The project will assist industrial development in LDCs to the extent that it will provide production assistance to LDCs which want to start local production of earth stations, of earth stations subsystems, or of interface equipment.

f. Satellite Capacity

The satellite space segments which are conventionally available today to LDCs are not optimized for thin route rural communications. To the extent feasible, we will be using the most appropriate capacity that exists on INTELSAT and other satellites, capacity which is not typically used

commercially at present. A demonstration and assessment of the potential market for thin route systems will help the providers of satellite capacity (e.g. INTELSAT) to analyse the capability of existing or planned systems to satisfy this market. The project will give impetus to technological development and application particularly regarding the issue of satellite power levels, frequency bands and beam configurations.

Further, at the international level the project will stimulate the development and assessment of institutional co-operation and regulations required to provide operational satellite systems for rural communications. It is not expected that many LDCs will need or be able to afford their own domestic space segment in the next few years. Rather, a gradual development can be expected which will emphasize in the next few years or decades the shared use of international satellite systems. This project will help bring about an analysis of the various options. By providing LDC governments with concrete experience in rural telecommunications systems, the seeds are also planted for action upon the preferred options. For example, very small or poor nations in the South Pacific, the West Indies or elsewhere are presently sharing educational and other resources, e.g.. regional Universities. Under present INTELSAT regulations these regional systems do not qualify for the lower domestic satellite rates since they constitute international traffic. With more concrete information on the potential benefits of shared communications systems which this Project will provide, the countries in question will be in a better position to pursue their interests in the international forum.

Also, at present the lease conditions for INTELSAT capacity for domestic systems are long-term and stringent. Both these measures are designed on the basis that international traffic is the organizations prime responsibility and that domestic traffic must adapt to the requirements of the international system. This perspective is historically correct. However, domestic satellite communications systems in LDCs are increasing significantly each year. This project will open a largely unexplored but very promising area of domestic satellite applications by highlighting the demand for domestic satellite capacity appropriate for countries with predominantly rural populations. The Project will assist LDCs and international satellite institutions in assessing and formulating such terms and conditions for satellite access particularly suitable for domestic systems.

3. Project Inputs

The distribution of the $22M in project funding is described in the detailed budget in a later section.

The nine field demonstrations and pilot projects will be supported by the provision of a total of 22 satellite ground terminals and communications systems equipment. Funds will also be provided for the procurement of services for operational support of the field applications, software and hardware R & D, and collection and analysis of field evaluation data. The total cost of these demonstrations is projected at $12,125 million. There will roughly be a 45 - 55 percent division between hardware and applications support for each project.

Support for other activities will total $9,875 million.

They will include:

(a)	Developmental Planning in FY79-80	(250)
(b)	Overall management of the field projects, including substantial training and information activities	(3600)
(c)	Field technical support	(2800)
(d)	Small R and D projects on hardware design	(825)
(e)	R and D on software.	(1000)

(f) Evaluation ($1.4M) including:

(1) The development of a common evaluation approach and methodology,

(2) Methodological assistance to field projects,

(3) Policy-oriented evaluation reports

(4) Documentation of field projects

(5) Dissemination of evaluational conclusions.

Detailed Description
Inputs

BUDGET (in thousands of dollars)

	79	80	81	82	83	84	Total
1. Developmental Planning	250						250
2. Application Management							
Planning, Information Network, Hardware, Advisory Service, Training	—	625	745	745	745	740	3600
Pilot Projects							
# 1 Peru	125						
# 2 Indonesia		300	100				
# 3		400	300				
# 4			400	500			
# 5			400	500			
# 6				500	200		
# 7					500	300	
# 8					500	200	
							5225
Demonstrations							
# 1 Yemen	50						
# 2		100					
# 3			100				
							250
3. Hardware							
R & D	325	100	100	100	100	100	825
Field Technical Support							
Logistics, Communications Systems Design, Interface requirements, Training		425	525	625	625	600	2800
Pilot Projects							
# 1 Peru	250						
# 2 Indonesia		300					
# 3		1300					
# 4			1300				
# 5			1000				
# 6				700			
# 7					700		
# 8					500	200	
							6250
Demonstrations							
# 1 Yemen	200						
# 2		100					
# 3			100				
							400
4. Evaluation		150	150	250	300	550	1400
5. Software R & D		200	200	300	200	100	1000
TOTAL	1200	4000	5420	4220	4370	2790	22000

4. Evaluation Arrangements

AID's periodic evaluation of the program's efficiency will be designed to assess the accomplishments against the stated program objectives. These objectives are designed to affect not only AID's programs serving rural populations in LDCs but also programs of other agencies such as INTELSAT, the World Bank and naturally the LDCs themselves. The evaluation structure and procedures must support these varied interests.

Evaluation Structure

In order to monitor and fine-tune the program and to maintain close liaison with other programs of the Agency as well as with other key agencies, such as the World Bank, the Interamerican Development Bank and INTELSAT, an Evaluation Advisory Committee will be instituted. This Committee will be composed of representatives of these various sectors under the general responsibility of DS/ED. The committee will meet at the early stages of the Project as well as at pre-determined intervals during the project. The purpose of this committee is to define global evaluation questions and information requirements which need to be addressed to provide a substantive basis for decisions regarding the development and funding of operational systems for rural communications.

The evaluation of the individual demonstrations and pilot projects will be guided by evaluation objectives established by the Advisory Committee. An Evaluation Contractor will design an overall project evaluation plan reflecting these objectives. The Contractor will be responsible for implementing the evaluation plan. Evaluation objectives of the individual projects will be jointly determined by AID and host governments to insure that the objectives are met. Each project will have

an evaluation team to develop, design and implement an evaluation plan. In detailed discussions on methodologies, etc. AID will be represented by the Evaluation Contractor who will assist host country personnel in designing and carrying out the evaluation. The coordination of individual project evaluation plans, methods, and activities, will be crucial to the overall Project evaluation, since the Project will take place in different countries and for different uses. The Evaluation Contractor will be responsible for this coordination. All contractors will be asked to cooperate in efforts, during and subsequent to the project, that AID will make in disseminating results to LDC's, AID Missions and Regional Bureaus.

Data Collection

Each pilot project and demonstration will generate its own set of data. Collection of these data will be designed to satisfy the evaluation requirements of the individual projects as well as to address the more global evaluation questions defined by the Evaluation Advisory Committee. It will be necessary to supplement data collection of the individual projects with the additional data to explore the global evaluative questions. This will be undertaken by the Evaluation Contractor.

Evaluation Training

The Evaluation Contractor and the host country evaluators will be working closely together. Whenever necessary, the Evaluation Contractor will assist the host country evaluators in carrying out the necessary tasks. It is an aim of this cooperation to build a reservoir of people in the host countries who can undertake evaluation in succeeding phases of the projects or in related activities.

Part III. Implementation Arrangements

A. Project Organization

The organizational arrangements for the project are designed to meet the following criteria:

1. To place the minimum direct management responsibility on a limited AID staff, consistent with adequate supervision and control.

2. To provide a management structure simple enough so that lines of responsibility remain clear, but flexible enough to meet the demands of differing requirements created by the world-wide nature of the project.

3. To maintain AID policy liaison with other concerned Federal and international agencies.

4. To provide for a constant information flow and reporting system for continued review by DSB and the Regional Bureaus.

I. Overall AID Management

Overall management responsibility for the project will be lodged in DS/ED, working in a team relationship with Regional Bureau staff. DSB staff will act for AID in dealing at the policy level with INTELSAT and other Federal agencies, such as the National Telecommunications and Information Administration (NTIA) and NASA. DSB will also provide for necessary procurements for both software and hardware, and will provide professional guidance and coordination of the program.

DSB will provide technical direction and coordination to a team of Regional Bureau Development Communications Specialists assigned full time to this activity. Three Regional Specialists were authorized in October 1978 by the Administrator to make possible the implementation of the project. This group will share responsibility for management of project activities.

The Regional Bureaus will promote awareness of the program in the several concerned substantive sectors (as will PPC), will work in the field (with DSB) with the Missions and with concerned institutions in planning field activities, and will have management responsibility for field operations in their regions.

DS/ED will utilize the expertise in telecommunications engineering of DS/ENGR, in space applications of DS/OST, in alternative energy sources of DS/EY, and in rural development of DS/RAD.

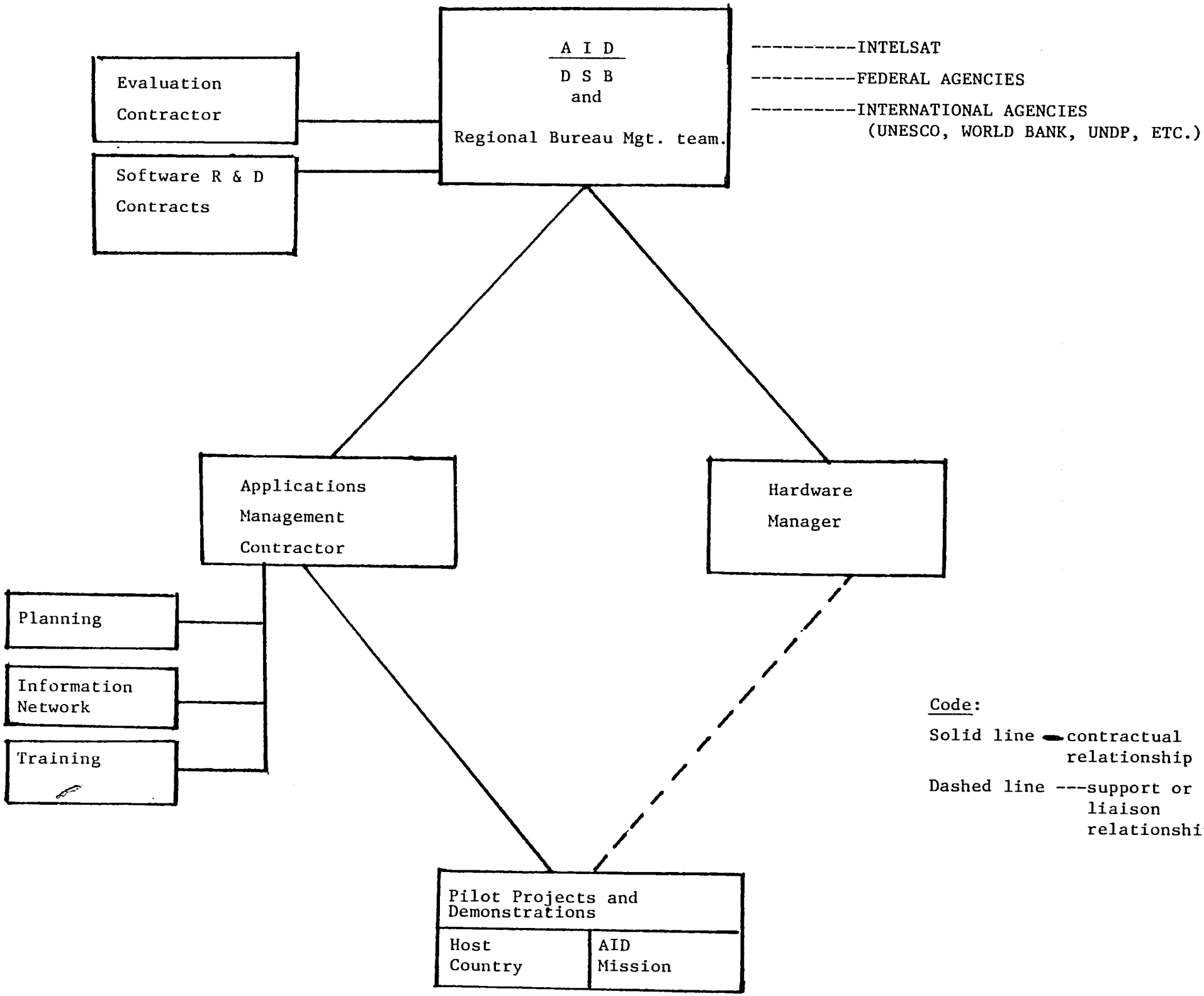
DSB will receive guidance from an Advisory Committee, consisting of senior representatives from the Regional Bureaus, PPC, SER, DSB offices and appropriate outside agencies.

2. Overall Project Structure

The project structure that has been developed is heavily influenced by a desire to keep AID management requirements at a practical minimum.

It will therefore involve two main contract agents, one in charge of overall applications, and the other dealing with the specialized problems of hardware management. A more complex structure with a number of separate contractors was examined and rejected in favor of this simpler approach. Evaluation and software R &D remain as independent functions.

During FY 80, this structure will come fully into place. In the interim, FY 79 funds will be utilized for several initiatory activities, including support to projects in Peru and Yemen. These initial steps are described in detail at the end of this section on Implementation Arrangements. The permanent structure will function throughout any periods of additional activity that may be later determined.



Project Organization

2.a. Applications Management Contractor

This contractor will have the major responsibility for planning and carrying out (through sub-contracts) the field demonstrations and pilot projects, and will also conduct a substantial information network activity. In addition, it will provide hardware advisory services to guide the hardware activities, will develop appropriate training mechanisms, and will assist AID in defining software R & D priorities, based on its experience in the design and conduct of the field projects.

Each of these functions is described below:

Planning and Management of Field Activities. Working with AID staff, the contractor will participate in the selection of possible project sites, and then will, with each potential host country, develop a project proposal. Upon approval of the proposal by AID the contractor will provide the technical assistance to prepare a detailed project plan which can form the basis for Project Agreements to be signed between AID and the host country.

Pilot projects will require varying degrees of external technical assistance, depending on the level of host country technical, management and evaluation capability. Where substantial external assistance is needed, the Applications Management Contractor will select a Field Project Subcontractor, subject to AID approval.

Hardware Advice and Liaison. The contractor will define for each field activity the performance characteristics of communications equipment that will be needed and will transmit that, through AID, to the Hardware Manager. In addition, the hardware advisory

function will include provision of continuing advice to AID on longer range issues that transcend any particular LDC activity, such as the nature of institutional arrangements among INTELSAT, LDC telecommunications agencies, and AID.

Training. The project entails substantial training requirements, both in relation to specific pilot projects and for participants from additional countries where significant applications of telecommunications to development programs are underway or being contemplated. The Management Applications Contractor will design and manage both short and long-term training programs. The fields in which training will be required were discussed in Part II-B-1 (Outputs). DS/ED will be assisted in its review of this activity by the Office of International Training.

Information Network. This project will achieve its overall objectives only if it is successful in influencing decision-making about communication in many settings. To do so, a significant information activity will be designed to document and disseminate results.

The contractor will perform the following tasks, possibly through a sub-contract:

(1) Development of special multi-lingual materials to communicate the project's objectives and encourage participation.

(2) Identification of key managers and policy-makers who should be informed regarding the project.

(3) Publication of a quarterly newsletter on project activities and general developments in the field of communication satellite applications to development problems.

(4) Provision of a publications abstract service and of a reference service for AID and other planners.

(5) Organization and conduct of seminars and meetings to seek advice and feedback from a variety of sources, including LDC representatives.

(6) Preparation of documentary materials in print, tape, and film format on pilot projects and other significant activities of interest to the network.

(7) Preparation on ad hoc basis and as need arises, special summaries, status reports, and project descriptions for use by AID.

(8) Organization and management of special periodic seminars to inform AID, the world community, LDCs and other interested parties of the current status and accomplishments of the overall project, and of specific field projects.

2.b. Communications Hardware Management

Discussions are underway that may lead to responsibility for technical management being lodged in a Federal agency--either the National Telecommunications and Information Administration ("NTIA") or NASA--through an interagency RSSA. Should this course not prove feasible, because of bureaucratic

complications, a hardware systems contractor will be selected, either independently or as a part of the overall Applications Management Contract. This determination will be made in the Summer of 1979 after further discussions with the Federal agencies.

The Hardware Manager will be responsible for contracting for the design, procurement, installation, and operation of the hardware system installed in each of the several participating LDCs. A very close relationship with host country technical entities will be established as an integral element of the work of the Hardware Manager.

The Hardware Manager will also bear responsibility for making the necessary arragements with the various satellite operators and telecommunications entities such as INTELSAT, ARABSAT, and PERUMTEL (Indonesia). Policy relations with INTELSAT will remain a direct responsibility of AID/DSB.

There will of course have to be constant interaction between programmatic and hardware aspects of the field activities to ensure that the hardware systems are appropriate to the intended application and that technical possibilities and constraints are fully understood and taken into account in designing applications.

NTIA will manage hardware R & D activities which are considered to represent significant contributions to low-cost rural communications.

2.c. Evaluation Contractor

Given the expected variety of applications and settings of the project, there will be a need to ensure that a common perspective, and methodology to the extent possible, informs the collection, processing and analysis of pilot project data. It is also anticipated that there will be a need for some specialized studies and analyses to be performed, beyond the

scope of individual pilot projects and including field activities carried out under auspices other than AID.

AID will select an overall evaluation contractor whose specific tasks will be:

(1) Development of a general evaluation scheme for pilot projects which can be applied by the applications contractor.

(2) Provision of technical assistance in evaluation management, methodology data collection, etc., to host country.

(3) Conduct of special field evaluation studies.

(4) Synthesis of evaluation results for policy-level audiences.

2.d. Software Research and Development Contracts

For the applications involving educational and training uses of broadcasting, the development of effective broadcast programming is of course critical to success. In individual pilot projects, aid in developing local programming and utilization mechanisms, will be provided. In addition, however, funds are being set aside for R & D in specialized "software" areas useful to a number of field projects. The determination of specific R & D areas will be made as the overall project develops, depending on needs that emerge from field projects.

3. FY79 Funded Implementation Activities

FY79 funds will be used for the following:

a. To conduct a 2-month demonstration and technical trial in Yemen ($250,000 obligated through a PROAG.)

b. To join LAC in funding a two-year project in Peru. ($375,000 of DSB funds plus $400,000 in LAC funds, obligated through a PROAG.)

c. To initiate hardware research and development through a RSSA with NTIA's Institute for Telecommunications Sciences.

d. To provide technical support, preparatory to the longer-term contract apparatus coming into place (i.e., until approximately Feb. 1, 1980).

That support will be provided through (1) additional funding of a current contract with the Academy for Educational Development which provides communications planning services to AID ($95,000) and (2) a contract with a Section 8(a) small business, Human Resources Management.

Details of each of these are as follows:

a. Peru

In Peru, a demonstration of rural telecommunication services will take place in a pilot area, in the eastern jungle region of the country. The Instituto Geofisico del Peru, in collaboration with the Peruvian Ministry of Education, Ministry of Health and ENTEL-Peru (the national telecommunication company), has proposed a field study of the use of small low-cost satellite ground stations to extend government communication services to the vast areas of the country where low population density does not justify investment in traditional communication hardware.

For the pilot study, satellite ground stations will be installed in three market communities which presently have no public telecommunication services.

These communities will then be connected to surrounding villages by means of inexpensive non-satellite linkages. It is expected that each community thus serviced will have the equivalent of two phone lines available for one to four hours per day. One line will be used for public telephone service. The other will be dedicated to providing support services for various development activities which are already under way. The Ministries of Health, Agriculture, and Education have identified a number of communication support services which could significantly improve the performance of existing development projects in rural areas. These services include the following:

Education: administrative support, teacher training, nonformal education;

Health: administrative support, remote consultation, in-service training, public health education;

Agriculture: administrative support, information services, instruction.

The demonstration is tentatively planned as a three year activity. The Latin America Bureau has allocated $400 thousand and this project is planned to authorize $300 thousand. The DSB portions will make possible three rather than two sites and will provide evaluation and software training assistance. An effort also will be made to provide Peru with an opportunity to undertake some of the hardware research and development activity.

b. Yemen

A demonstration of small station satellite service is planned for Yemen including basic telephone and telephone based services such as audio teleconferencing and facsimile transmission of documents. In addition, the range of the satellite links would be extended through use of two-way radios to link nearby villages.

The demonstration plan results from two years of AID consultation responsive to a Yemen request for assistance in determining how they could use satellite communication for development. This work has included a study of how Yemen could use the proposed Arab satellite system (ARABSAT) and an AID-sponsored seminar in December, 1978, exploring Yemen's need for rural communication in support of social services.

The objectives of the demonstration will be:

- to provide the Ministry of Communications with first hand experience with small satellite ground stations;
- to demonstrate and test satellite equipment in the rural Yemen environment;
- to demonstrate reliable two-way communication between rural locations and Sana;
- to give other ministries with field operations an opportunity to try two-way communication links
- to show planners in neighboring Arab countries what may be possible with this technology.

Two small (6 meter or less in diameter) earth stations will be used. One would remain in the capital of Sana, and the other would be transported to two or three sites, ranging from a large town to a village. The anticipated cost of the demonstration is $250K.

This demonstration will take place in the Fall of 1979 and will serve the additional purpose of providing an early test of the kind of equipment to be used in later stages of the project. It should be an important guide to design modifications and administrative procedures for the subsequent elements of the program.

c. Hardware Research and Development

The technical annex to this paper describes several high priority R & D projects which can increase the usefulness of the communications systems used in the project. They include work on local "switching" mechanisms and solar power adaptations for use with ground stations. These expenditures are a modest part of this program, budgeted at less than $1 million for the life of the project, but possibly critical to the objectives of reducing costs for ground equipment. While labelled "R & D", from a technical standpoint they are more nearly adaptations of existing technologies.

To the furthest possible extent, a place will be made for participation of host country technical institutions in the R & D process.

Review of the R & D priorities will be made by a technical committee which will meet periodically and which will include AID staff, NASA technicians, and outside consultants.

d. Developmental Planning

(1) $95,000 will be added to a present contract (Academy for Educational Development) for a continuation of planning assistance that has been provided in the satellite applications area.

(2) Human Resources Management will be awarded an (8A) contract to provide an array of additional support services needed until the full-scale initiation of the project mechanisms. ($155,000). Those services will include: technical analyses supportive of the development of FY80 RFP's; assistance in discussions with INTELSAT, COMSAT, etc. as to the terms of leasing arrangements, availability of specific satellites, etc; development of a project management protocol which will be usable in the various field demonstrations; technical advice; and

assistance in required AID preparations for the September, 1979 planning meeting for the International Consultative Group on Communications Aid, in which discussion of this project, and satellite communications, will play a significant role.

B. Development and Implementing of Pilot Projects and Demonstrations

The following discussion is intended to explain the principal steps that will have to occur during each of the four major phases of pilot projects: Identification and Exploration, Detailed Planning, Operations, and Follow-up.

Phase I: Identification and Exploration

An early task will be to develop a list of likely candidate projects and sites for participation in the project. Following initial communication about the project and reactions from Missions, a series of exploratory visits by DSB and Applications Management Contractor personnel will provide opportunities for discussion with Mission and host country officials of how the project's resources relate to their interests and plans and to identify existing problems and resources including physical infrastructure, technical capacity, financial resources, administrative structures and policies. In cases where there is definite field interest in organizing a demonstration or pilot project, DSB and Advisory Contractor personnel will work with the Mission staff and host country officials to develop a preliminary proposal and design which will relate proposed applications to national development programs and plans and to Mission priorities, as well as to the overall purposes of the project. In addition to information generally included in a PID, preliminary information will be included pertaining to the Project Selection Criteria included below. Very central to this process will be a review of the probable feasibility of extending the pilot project to an operational phase. This proposal will be submitted to AID/W with the concurrence of the local AID Mission for review by DSB and the Advisory Committee

with assistance from Advisory Contractor staff. Approval of the preliminary proposal will trigger the next phase.

Phase 2: Detailed Planning

Detailed project planning will lead to a final design for a pilot project. It will be designed to address the considerations normally taken into account in writing Project Papers, plus the specific criteria included below.

During this phase, two distinct but highly inter-related sets of considerations will be addressed (a) those related to software and utilization of the communications system and (b) those related to hardware and technical aspects of the system.

Software and utilization planning will proceed from the identification of key development problems to which the system may be responsive, to a detailed plan specifying how the system will be used, what recorded or live programming will have to be developed or otherwise obtained, agendas for tele-conferences, training requirements, administrative measures, etc. A plan for evaluating the results of the demonstration or pilot project will also be prepared, and base-line data will be collected as required.

Technical planning will be based on the technical requirements of the applications plan, and the outcome of this process will be a detailed integrated communications system design based on users' needs for audio, visual

and hard copy services, plus plans for specific sites, logistical arrangement operation of the equipment, training and evaluation of technical performance. A formal proposal to the appropriate satellite operating organization (usually INTELSAT) for satellite system time will be made at this stage.

Applications and technical planning contractor staff will work closely together during this phase. Should conflicts arise they will be resolved by DS/ED.

The culmination of the planning phase will normally be the signing of a Project Agreement or its equivalent, to which the AID Mission, DS/ED and the participating host country agencies will be parties.

At this phase of project development it is anticipated that a formal in-country project committee will be constituted, consisting typically of representatives of the Mission, pertinent host-country sectoral ministries, the national domestic and international telecommunication agency (ies) and, depending on the government organization, the Ministry of Information. This committee will be of an appropriate level to take policy-level decisions, and will normally have an operational "secretariat" to assist in routine matters.

Phase 3: Operations

This phase includes preparatory operations and actual implementation of the demonstration or pilot. AID-provided assistance to operations will be under the overall direction of the Applications Contractor field representative. A host-country official from the telecommunications agency or the lead sectoral ministry will generally be designated Project Director.

Preparatory operations include the following: obtaining of necessary formal clearances and approvals, development of software, making final arrangements for physical facilities that were identified in Phase 2, transportation of equipment to the country, installation and testing, training of host-country user and technical personnel, fieldwork in local communities to prepare project utilization and ensure local participation, etc.

Implementation will involve: on-going technical operation and maintenance of the system, coordination between applications and technical managers on matters of schedule, network control, promotion of testing of system for new applications and by different user groups, operation of feedback systems for both technical and programmatic aspects, to permit formative evaluation (mid-course corrections), periodic or continuing measurement of results, anticipated and unanticipated, etc.

During this phase the Information Network contractor will be involved in documenting field operations and the Evaluation Contractor will be advising on the implementation of the evaluation plan.

Phase 4: Follow-up

Follow-up steps will include many matters that will have been anticipated during earlier phases, such as reporting, dissemination of results, analysis of cost, technical institutional and administrative implications of the project for development and telecommunications planning in the country, etc. In addition, there may be unplanned follow-up steps required including responding to requests to purchase the equipment outright and to requests for additional technical assistance dealing with expressions of interest or concern

from neighboring countries, etc. As experience is gained, the number of unexpected outcomes will probably decline.

PROJECT SELECTION CRITERIA

Project Goals and Purposes

--must be consistent with AID satellite initiative goals and purposes.

Target Audience

--must concentrate on rural populations,

--must show how project affects rural poor.

Institutional Criteria

--must involve appropriate communications entities (e.g. P&T, Ministry of Information),

--must involve appropriate development sector entities (e.g. ministries of health, education, and agriculture,

--must be integrated with existing sector program,

--must build on existing institutional base (ministry, university, training center, etc.),

--resources of implementing agencies must be sufficient to meet approximately 25 per cent of total project costs (15% in the poorest countries).

--must have interest and support of the Mission.

Software Considerations

--must show what types of local staff will be involved in applications: e.g. teachers, trainers, health workers, media production staff, curriculum production staff, extension workers, etc.,

--must show what software/applications training will be required,

--must show what existing materials could be used or modified,

--must include requirements, and likely sources of external technical assistance.

Media Criteria

--should use medium appropriate for task and audience,

--should use narrowband (i.e. audio channels), slow-scan, TV, fascimile,

--should show how project technology can be integrated with existing technology: radio stations, telephone network, etc.,

Project Duration

--should be sufficient to accomplish project goals,

--generally should not be less than three months for demonstrations, two years for pilot projects.

Evaluation

--must identify hypotheses to be tested or questions to be answered by the project,

--must include an evaluation plan,

--must specify how the evaluation is to be carried out and by what organization,

--must show plans for feedback and formative evaluation,

--must include analysis of costs and benefits of project services.

Technology Transfer

--must show what local technical staff will be involved in the project,

--must identify technical training required in installations, operation, maintenance, etc.,

--must show how equipment will be operated and maintained during project,

--must show how facilities would continue to be operated if desired after project termination,

--must show requirements and likely sources for external technical assistance.

Follow-On

--must show how the services delivered by the project could be continued if positively evaluated.

Fallback

--must identify contingency plans in case of equipment failure, major delays in project timetables, etc.

C. Implementation Schedule

A schedule for the first two years of the project is appended to this section. The detailed budget section contains, in its structure, a target schedule for subsequent years. Revisions will be made as circumstances and evaluative conclusions warrants.

The projects in Peru and North Yemen will be initiated as soon as possible. By the sixth month of the project, it is expected that detailed planning for the third field project, probably in Indonesia, will be well underway. Work on a fourth will begin by the tenth month. Field operations of the Yemen and Peru activities will begin before the end of year 1, barring unforeseen delays.

The selection and processing of candidates for training will begin almost immediately after project approval, concentrating initially on countries or regions where interest in rural satellite communications already exists, such as Yemen or Peru. The overall training activity, however, will be funded with FY80 funds.

Also, during the first year the information network of interested persons and institutions will be constituted.

Year 2

By the second year the project will be fully operational with field activities implemented (detailed planning, implementation evaluation or follow-up) in four sites, two sites funded from FY80 funds. Field liaison, networking, training, and program evaluation activities will continue.

At the end of the second year a program review will be held to determine any modifications in the direction of this project.

Project Year 1 Key Implementation Steps and Responsibilities

	Action	When Complete
1. General Project Initiation Steps		
. Formally establish Inter-bureau Implementation Advisory Committee	DSB	June, 1979
. Recruit and hire additional AID/w staff	DSB,RB's,OPT	Summer 1979
. Arrange hardware R&D RSSA with NTIA	DSB,SER/CM	July, 1979
. Sign contract arrangement with AED (through Dec., 1979.)	DSB,SER/CM	June, 1979
. Sign contract with HRM (through Dec., 1979)	DSB,SER/CM	June, 1979
. Develop RFP for FY80 applications	DSB	August, 1979
. Review applications management proposal	DSB	Nov., 1979
. Initiate Applications Mgt. Contract		Jan.,1980
. Sign RSSA for Hardware Management, or complete RFP		Sept., 1979
2. Initiate Special Pilot Projects		
A. Peru		
. Signing PROAG	LAC,w DSB	July, 1979
B. Yemen		
. Signing of PROAG	DSB	July, 1979
. Mission Contract, for tech. assistance to carry out project		August 1979
. Conduct of Demonstration		Fall, 1979

	Action	When Complete
3. Other Pilot Projects or Demonstrations		
A. Identification and Exploration		
. Communication to Field	DSB,RB, Contractor	July, 1979
. Field Visits	RB,DSB, Contractors	Fall/Winter 1979
. Preparation of Preliminary Proposals	RB,HC, Mission Contractors	Ongoing
. AID/W Review and Approval of Preliminary Proposals	RB,DSB, Advisory Committee	Ongoing
B. Detailed Planning	RB,DSB, Contractors and Mission	Ongoing
C. Consultation wtih Indonesia on *Palapa* Demonstration	DSB, Asia	Summer 1979
4. Identification, Selection, Processing of Candidates for General Training		
. Communicate objectives, criteria to field	DSB	Fall, 1979
. Propose candidates	Missions, HC,RB	Fall, 1979
. Select and process trainees	RB's, DSB,IT	Winter, 1979
. Offer first training program	Training institutions	Spring 1980

	Action	When Complete
5. Planning and initiation of Information Network		
. Identify and qualify participants	DSB,RB's, Contractor	Spring 1980
. Design newsletter	Contractor	Spring 1980
. Plan special materials and documentaries	Contractor	Spring 1980
. Publish first newsletters and materials	Contractor	Spring 1980
. Plan and hold initial seminars and meetings	Contractor	Spring 1980
6. Planning for Evaluation of Pilot Projects		
. Prepare general evaluation guidelines	Contractor	Spring, 1980
. Assist Evaluation of Peru Pilot	Contractor	
. Assist planning evaluation of third pilot	Contractor	Fall, 1979

Project Year 2 Implementation Steps

1. Initial Special Pilot Projects/Demonstrations	
A. Peru	
. Continuing technical assistance in programming	Continuing
. Technical assistance in evaluation	
. Continuing short-term training	
2. Other Pilot Projects	
A. Initiation of Indonesia Pilot Project	Summer 1980
B. Identification and Exploration of other Sites	
. Continuing communication to field	Continuing
. Field visits	Spring 1980
. Preparation of new prelimirary proposals (Field Projects 4 and 5)	Summer 1980
C. Detailed Planning	
. Complete Detailed Planning Field Projects 4 and 5	Fall 1980
. Sign Project Agreement Field Projects 4 and 5	Fall 1980
D. Operations (Field Projects 4 and 5)	
1. Preparatory	
. Procure applications management subcontractors Field Projects 4 and 5	Fall 1980
. Mobilize equipment	
. Obtain clearances, approvals	
2. Implementation	Spring 1981

Part IV. Project Analyses

A. Economic Analysis

The expenditures of $22 million over five years on testing the role of satellite communications for rural areas appear justified in view of the economic benefits that can be anticipated for rural development in LDCs. The ultimate benefits of this project are not limited to the LDC's actively participating in the satellite projects, but will affect developments world-wide. A significantly new body of knowledge and developments is expected as a result of this Project which will affect the cost of rural telecommunications systems as well as establish the role of communications in rural economic development.

Prima facie evidence exists that thin-route satellite communications systems can be cost-effective ways of providing rural communications services, since their systems costs are distance insensitive. Canada and Alaska have chosen satellite systems to provide this service. The exploration of the economic viability of these services in LDC circumstances is an objective of this project.

Theoretical evidence also exists that communications systems contribute significantly to the socio-economic development of rural areas in LDCs. This Project has set as its objectives to identify and test ways in which this contribution to socio-economic development will take place as well as to measure the socio-economic development stimulated by rural communications systems.

Economic analyses of the type proposed here has not previously been undertaken on a comprehensive scale. Isolated components were analysed in the past without an overall systems view.

The economic analysis of this project will explore the following issues:

1. Effectiveness and efficiency of public service delivery supported by communications systems. Included in this analysis are issues of administrative and logistics efficiency of development projects and associated savings in time delays or transportation. Also included will be analyses of improved effectiveness of ongoing projects by being able to use existing resources but providing better services to more people than previously possible.

2. Changes in economic activities by the private sector in rural areas of LDCs. Included here are indicators of more effective marketing systems, stimulated local markets and increased investments from outside the area.

3. Another economic analysis will relate to transportation--communications trade-offs. This trade-off analysis will be made for the private sectors as well as for the public service sector.

4. The Project will provide economic data on the costs of satellite communications equipment, interface equipment and associated expenditures for capital outlay as well as for systems installation, operations and maintenance. These cost data will be valuable components for overall economic analyses and planning for rural communications systems in LDCs.

5. The Project will also develop new technologies which are of great long-term economic benefit to LDCs for initial investments as well as for operations, e.g. solar energy sources, DAMA equipment.

6. The Project will assist in the assessment and development of LDC capabilities in software as well as hardware management and production. Economically, this capability will decrease LDC reliance on foreign resources and capital investment, since in-country resources will be available.

Of particular economic interest in the long term will be the encouragement of LDC to produce and manufacture components and sub-systems of the communications system.

7. Another important area for economic analysis will be that of domestic rate structures and tariffs. Economic models will be assessed which will allow the potential economic benefits of distance incensitive satellite communications systems to be passed on to the end users while maintaining an economic environment in which system expansion can be continued.

8. The economic analysis will also include the assessment and testing of domestic price structures suitable for public service delivery applications. It will analyse the extent to which satellite systems costs can be kept at an affordable level by sharing system costs among a variety of users, including the commercial sectors.

9. The economic analysis of rural satellite communications systems for LDCs will assess current INTELSAT space segment costs, power levels as well as rules and regulations governing the use of thin-route earth stations. These factors are of great importance to the overall present and future systems costs to LDCs.

10. The economic analysis of the Project will also attempt to identify potential market growth of thin-route communications systems in LDCs This analysis will be a powerful tool for LDCs in developing plans and arrangements for future satellite systems, be they national or regional systems or part of the INTELSAT system.

B. Social Analysis

The project will typically add communications components to established field projects that will enhance the effectiveness of these projects and/or expand services to groups not currently reached by those services. Effective use of the communication media offers a way of partially overcoming the traditional correlation between the ability to benefit from development projects and current socio-economic status, for media such as broadcast radio are in many societies so widely distributed that they can provide a generally available information source. Even in societies where individual radio ownership is still limited group listening is usually common. Further, access is growing. Telephone service, which represents the ultimate in accessibility and immediacy of communication, is more slowly being extended to rural areas.

The specific track from inputs to beneficiary will vary with the specific country project setting. Where the project supports a health program, for example, the ultimate beneficiaries will be the rural population benefiting from improved health care and related services. Intermediate beneficiaries will be rural health care providers whose ability to function in their assigned roles will be improved. In an agricultural project setting, on the other hand, the ultimate beneficiaries will be farmers while intermediate beneficiaries may be rural extension agents.

Another way of approaching the question of benefits is in terms of the communication systems that will be set-up under this project. These will include simple interactive voice communication (telephony), two-way transmission of written copy and pictures (facsimile and slow-scan video), and one-way transmission of broadcast radio and television signals from a central point to rural receiving stations, from which they can be re-broadcast. The nature of the system that will be installed in each case will set parameters on the kinds of benefits possible and on who the beneficiaries may be.

Educational Broadcasting

The shift in AID priorities to reaching the rural poor has brought about an increased concern with radio for reaching rural audiences,who frequently own or have access to radios. The effectiveness of high quality radio programs for education and information in rural areas has been well established by many studies sponsored by AID, the World Bank and UNESCO, among others. Content areas that have been the objective of successful attempts to use radio programs for development have included nutrition education, mathematics, small farm technology, and health, among others.

The present project will support demonstrations and pilot projects to extend the reach of existing or evolving educational broadcasting projects to populations which otherwise would be without access to such opportunities. Furthermore, it will support the development of software targeted on specific groups in rural areas.

Targeted programs will benefit two types of audiences -- local representatives of national development agencies working in health, agriculture, education and other sectors and inhabitants of rural areas, themselves,such as farm decision-makers, housekeepers, mothers, school age children, etc.

Centrally-produced broadcast programming will be based on a process by which the intended audience participates in needs assessment, pre-testing and feedback to ensure appropriateness of messages to the target group. Survey field research can measure extent of reception and the impact of programming in terms of changed practices, improved school performance or other indicators. Research of this type will be built into all pilot projects.

Broadcast programming will also be developed locally. Local productions have an immediacy and familiarity hard to capture in centrally produced programs, and also bring important psychological benefits, such as increased community pride, reduced sense of dependence on outside sources of information, and sharing of experience among community members.

This project will include significant experimentation with slow-scan television, as well, as a low-cost method of transmitting visual images.

Interactive Systems

Interactive systems can permit communication between two fixed points or between one point and many points, just as telephone systems can provide either private or party lines. The project will involve both types of systems. Thus, in some settings rural communities may be enabled to communicate with more central towns and cities, where important technical and physical resources may be based. For example, by having available an accessible telephone, local health care providers may receive expert consultation from physicians located far away, and communicate needs for supplies and other technical support. Local incidence of diseases can be reported, and control measures communicated from responsible authorities. A supervisor at a more central facility can, through a party line kind of arrangement, hold meetings and provide orientation, assistance, and moral support, to a large number of subordinates, without their having to dislocate to a central location, with all the costs that would entail. Evidence from remote parts of Alaska and Canada, as well as experiences in rural Nicaragua, the South Pacific, and other areas where two-way systems have been used to support development agents in remote sites, suggest that the quality of services rendered to rural groups may significantly improve when such support is present.

The project also acknowledges that there may be unpredictable, but highly valuable benefits that accrue from unstructured, spontaneous use of interactive communications services in rural areas. One type relates to new and more efficient forms of organization for economic tasks. For example, in India the possibility of telephone communication enables a large local dairy cooperative to organize the collection and marketing of fresh milk, whereas, due to the delays and unreliability of communicating by physically transporting messages regarding when and where pickups would be made, the dairy members would otherwise have to produce less profitable and less needed cheese. Such a system can also make available important market information, without which farmers may be ignorant victims of

intermediaries who are privy to current pricing information.

Another type of benefit that is expected to derive from point to point interactive communication is increased flow of information to and from rural communities and centers of research and development on food production technology. The availability of interactive channels of communication will permit easier "pre-feed" into R and D decision-making information related to existing production technology and conditions, as well as feed-back on the results of local trials.

Since AID has less experience with interactive telecommunications and understanding of how it may impact on rural areas, and because methodologies for evaluating such services are not fully developed, the project will give special emphasis to studies that will try out new approaches to generate knowledge of the social benefits of interactive telecommunication services.

C. Technical Analysis

The technical feasibility of undertaking satellite based rural communication projects has already been under review within AID. AID has gained field experience through the sponsorship of a field satellite demonstration with the University of the West Indies which included rural outreach programs. AID has also gained experience through the planning of satellite projects involving outreach programs of the University of the South Pacific, and of demonstrations and pilot projects for rural communications in Peru and North Yemen.

AID has engaged experts to analyze the options and make recommendations concerning the use of satellite communication for rural development. A 1977 study by Operations Research, Inc. concluded that "The current INTELSAT satellites appear technically capable of delivering television, telephone, and broadcast radio services to village sites in developing countries throughout the world." It also provided cost estimates of the various types of earth stations that would be required. (See Annex). A subcontract to EDUTEL Communications and Development was designed to develop a methodology for costing rural communications systems including satellite service and other forms of telecommunications. The methodology has been applied in Yemen and is being tested in Indonesia.

To ensure reliability and continuity, AID will be working primarily with operation (as opposed to experimental) satellite systems, particularly INTELSAT. (Operational regional satellites such as Indonesia's PALAPA system may also be used). These satellites are designed for very high reliability to meet commercial telecommunications requirements. In addition, AID will work closely with the operating entities responsible for providing commercial service: e.g. INTELSAT and the Ministries of Communications or Post and Telecommunications in each host country. For further discussion of the technical soundness of the system see Part II-A-2, "Communication Satellite Technology" above.

The earth station technology to be developed and tested in the program has matured to a degree where technical risks are relatively low. Small, low-capacity satellite earth stations are being tested at present in several countries within the INTELSAT system. For example, Norway and the United States are testing terminals with antennas of 3 meter diameter which provide the equivalent of one telephone channel. Other terminals with 4.5 meter or 6 meter antennas are being tested with INTELSAT satellites in countries such as Nigeria and Saudi Arabia. Maintenance systems have been highly refined in applications such as those in India, which involved 2,400 scattered villages. With appropriate maintenance proceedings, India achieved far greater than 90% reliability. It will be essential for the project to place heavy emphasis on simple but effective maintenance procedures.

Environmental factors, such as heat or cold, humidity, or dust affect the performance and reliability of satellite earth station technology. Experiences in Indonesia, the U.S. and Canadian Arctic and the jungle areas of Peru, and the Algerian Sahara have shown that earth stations can be designed to resist these environmental factors and perform satisfactorily for extended periods. The AID program will draw on these experiences as well.

Thin-route satellite stations for rural areas may potentially be confronted by the lack of adequate rural electrification as a power source. Again, experience has been gained in providing power sources for satellite earth stations in various parts of the world. Power source technologies tested include batteries charged by portable generators; various efforts are underway

at present to tap solar energy for this purpose. This project will analyse all of the past experiences and utilize the technology most appropriate for the circumstances of the country in which the project will take place. It can be expected, however, that solar energy may be the most attractive solution in many of the projects and efforts will be made towards developing and testing this technology.

Another factor affecting the technical feasibility of the thin-route satellite systems in this project is one of logistics. The satellite earth stations will be deployed essentially in remote areas with difficult transport access. The same terminals will also be deployed in different countries and therefore will need to be assembled and disassembled several times. Experience in this area has been gained primarily in the Canadian CTS program with the result that the feasibility of such logistic operations has proven to be practical. Earth stations can be designed in components that can be transported by small aircraft or even canoes. The Canadian CTS program has shown that even frequent dislocation of earth stations does not essentially affect their performance if they are designed appropriately.

D. Environmental Impact

No negative environmental impact will result from the project. The effect of radiated energy on the human body as well as on the ecology is negligible and only a potential factor after long continuous absorption by direct exposure. However, necessary precautionary measures will be taken by fencing the satellite terminal. This is standard international procedure.

The civil works associated with the installation of the earth stations will not cause negative environmental impact.

CONTRACT/GRANT FIELD SUPPORT ($000)

Project	FY 1982 Total Cost	FY 1982 Field Support (Dollars)	FY 1982 Field Support Person-Months	FY 1983 Total Cost	FY 1983 Field Support (Dollars)	FY 1983 Field Support Person-Months	FY 1984 Total Cost	FY 1984 Field Support (Dollars)	FY 1984 Field Support Person-Months
Formal Education									
931-1017 Extension of Rural Primary Schools	900	300	48	700	300	48	900	300	48
931-1233 Imprv. Efficiency of Education Systems	500	100	12	0	200	24	1000	600	60
936-5807 Radio-Assisted Community Basic Education	970	600	48	900	600	48	600	300	48
936-5818 Teaching Science	0	0	0	500	100	12	600	100	12
Nonformal Education (NFE)									
931-1054 Structuring NFE Resources	680	400	72	600	400	72	700	400	72
931-1241 Learning for Employment Opportunities	300	50	12	300	50	12	300	50	12
931-1242 Literacy Oriented Functional Education	75	20	3	0	0	0	0	0	0
Development Communications									
931-1018 Mass Media/Health Practices	525	0	0	400	0	0	300	0	0
931-1109 Communications Technology: Studies & Applications	450	450	36	200	200	36	450	450	36
931-1231 Development Communications Clearinghouse	100	75	45	100	75	45	150	125	45
936-5811 Rural Satellite Program	300	300	12	1200	1000	65	1000	900	85
TOTAL	4800	2295	288	4900	2925	362	6000	3325	430

COUNTRY ACTIVITY REPORT
BY GEOGRAPHIC AREA - FY 82 THRU 84

NEAR EAST

COUNTRY: TUNISIA

PROJECT	TITLE	FY 1982 STATUS	FY 1982 AMT ($000)	FY 1982 STAF	FY 1982 #OF TDYS	FY 1982 #OF PTP	FY 1983 STATUS	FY 1983 AMT ($000)	FY 1983 STAF	FY 1983 #OF TDYS	FY 1983 #OF PTP	FY 1984 STATUS	FY 1984 AMT ($000)	FY 1984 STAF	FY 1984 #OF TDYS	FY 1984 #OF PTP
ST/ED																
LITERACY-ORIENTED FUNCTIONAL ED. 931-1242.		A	25	0	4	0		0	0	0	0		0	0	0	0
COUNTRY TOTAL:			25	0	4	0		0	0	0	0		0	0	0	0
TOTAL FOR REGION:			25	0	4	0		0	0	0	0		0	0	0	0

A - ACTIVE B - PENDING MISSION APPROVAL

COUNTRY ACTIVITY REPORT
BY GEOGRAPHIC AREA - FY 82 THRU 84

EAST ASIA

COUNTRY: PHILIPPINES

PROJECT ST/ED	TITLE	FY 1982 STATUS	FY 1982 AMT ($000)	FY 1982 STAF	FY 1982 #OF TDYS	FY 1982 #OF PTP	FY 1983 STATUS	FY 1983 AMT ($000)	FY 1983 STAF	FY 1983 #OF TDYS	FY 1983 #OF PTP	FY 1984 STATUS	FY 1984 AMT ($000)	FY 1984 STAF	FY 1984 #OF TDYS	FY 1984 #OF PTP
	EDUCATION FOR PRELITERATE ADULTS															
931-1020.			0	0	0	0		0	0	0	0		0	0	0	0
	NONFORMAL EDUCATION NETWORK															
931-1250.		A	5	0	1	0	A	20	0	1	0		0	0	0	0
	RURAL SATELLITE PROGRAM															
936-5811.01		B	50	1	2	3		0	0	0	0		0	0	0	0
COUNTRY TOTAL:			55	1	3	3		20	0	1	0		0	0	0	0

COUNTRY: INDONESIA

PROJECT ST/ED	TITLE	FY 1982 STATUS	FY 1982 AMT ($000)	FY 1982 STAF	FY 1982 #OF TDYS	FY 1982 #OF PTP	FY 1983 STATUS	FY 1983 AMT ($000)	FY 1983 STAF	FY 1983 #OF TDYS	FY 1983 #OF PTP	FY 1984 STATUS	FY 1984 AMT ($000)	FY 1984 STAF	FY 1984 #OF TDYS	FY 1984 #OF PTP
	RURAL SATELLITE PROGRAM															
936-5811.01		A	50	1	3	3	A	250	2	4	3	A	250	2	6	3
COUNTRY TOTAL:			50	1	3	3		250	2	4	3		250	2	6	3
TOTAL FOR REGION:			105	2	6	6		270	2	5	3		250	2	6	3

A - ACTIVE B - PENDING MISSION APPROVAL

COUNTRY ACTIVITY REPORT
BY GEOGRAPHIC AREA - FY 82 THRU 84

LATIN AMERICA

COUNTRY: COLOMBIA

PROJECT	TITLE	FY 1982 STA TUS	FY 1982 AMT ($000)	FY 1982 STAF	FY 1982 #OF TDYS	FY 1982 #OF PTP	FY 1983 STA TUS	FY 1983 AMT ($000)	FY 1983 STAF	FY 1983 #OF TDYS	FY 1983 #OF PTP	FY 1984 STA TUS	FY 1984 AMT ($000)	FY 1984 STAF	FY 1984 #OF TDYS	FY 1984 #OF PTP
ST/ED																
931_1250.	NONFORMAL EDUCATION NETWORK	A	13	0	1	0	A	15	0	1	0		0	0	0	0
COUNTRY TOTAL:			13	0	1	0		15	0	1	0		0	0	0	0

COUNTRY: COSTA RICA

PROJECT	TITLE	FY 1982 STA TUS	FY 1982 AMT ($000)	FY 1982 STAF	FY 1982 #OF TDYS	FY 1982 #OF PTP	FY 1983 STA TUS	FY 1983 AMT ($000)	FY 1983 STAF	FY 1983 #OF TDYS	FY 1983 #OF PTP	FY 1984 STA TUS	FY 1984 AMT ($000)	FY 1984 STAF	FY 1984 #OF TDYS	FY 1984 #OF PTP
ST/ED																
931-1031.	LDC INSTITUTIONAL INVOLVEMENT	B	10	0	1	0		0	0	0	0		0	0	0	0
COUNTRY TOTAL:			10	0	1	0		0	0	0	0		0	0	0	0

COUNTRY: DOMINICAN REPUBLIC

PROJECT	TITLE	FY 1982 STA TUS	FY 1982 AMT ($000)	FY 1982 STAF	FY 1982 #OF TDYS	FY 1982 #OF PTP	FY 1983 STA TUS	FY 1983 AMT ($000)	FY 1983 STAF	FY 1983 #OF TDYS	FY 1983 #OF PTP	FY 1984 STA TUS	FY 1984 AMT ($000)	FY 1984 STAF	FY 1984 #OF TDYS	FY 1984 #OF PTP
ST/ED																
931-1231.	DEVELOPMENT COMMUNICATIONS CLEARINGHOUSE	B	5	0	2	0		0	0	0	0		0	0	0	0
936_5807.	RADIO ASSISTED COMMUNITY BASIC EDUC.	A	600	4	15	0	A	600	4	20	0	A	550	4	15	0
COUNTRY TOTAL:			605	4	17	0		600	4	20	0		550	4	15	0

COUNTRY: ECUADOR

PROJECT	TITLE	FY 1982 STA TUS	FY 1982 AMT ($000)	FY 1982 STAF	FY 1982 #OF TDYS	FY 1982 #OF PTP	FY 1983 STA TUS	FY 1983 AMT ($000)	FY 1983 STAF	FY 1983 #OF TDYS	FY 1983 #OF PTP	FY 1984 STA TUS	FY 1984 AMT ($000)	FY 1984 STAF	FY 1984 #OF TDYS	FY 1984 #OF PTP

A - ACTIVE B - PENDING MISSION APPROVAL

COUNTRY ACTIVITY REPORT
BY GEOGRAPHIC AREA - FY 82 THRU 84

LATIN AMERICA

ST/ED		FY 1982					FY 1983					FY 1984			
		STA TUS	AMT ($000)	STAF	#OF TDYS	#OF PTP	STA TUS	AMT ($000)	STAF	#OF TDYS	#OF PTP	STA TUS	AMT ($000)	STAF	#OF TDYS	#OF PTP
STRUCTURING NFE RESOURCES 931-1054.		A	250	0	4	6	A	400	0	2	1	A	400	0	4	0
LEARNING FOR EMPLOYMENT OPPORTUNITIES 931-1241.		B	150	0	1	0	A	200	4	3	0		0	0	0	0
LITERACY_ORIENTED FUNCTIONAL ED. 931-1242.		A	25	0	4	0		0	0	0	0		0	0	0	0
COUNTRY TOTAL:			425	0	9	5		600	4	5	1		400	0	4	0

COUNTRY: HONDURAS

PROJECT	TITLE	FY 1982 STA TUS	AMT ($000)	STAF	#OF TDYS	#OF PTP	FY 1983 STA TUS	AMT ($000)	STAF	#OF TDYS	#OF PTP	FY 1984 STA TUS	AMT ($000)	STAF	#OF TDYS	#OF PTP
ST/ED																
MASS MEDIA/HEALTH PRACTICES 931-1018.		A	300	3	7	0	A	200	3	4	0	A	150	0	2	0
COUNTRY TOTAL:			300	3	7	0		200	3	4	0		150	0	2	0

COUNTRY: JAMAICA

PROJECT	TITLE	FY 1982 STA TUS	AMT ($000)	STAF	#OF TDYS	#OF PTP	FY 1983 STA TUS	AMT ($000)	STAF	#OF TDYS	#OF PTP	FY 1984 STA TUS	AMT ($000)	STAF	#OF TDYS	#OF PTP
ST/ED																
COMM. TECH:STUDIES-APPLIC.(STANFORD) 931-1109.01		B	25	0	4	2	B	20	0	2	0		0	0	0	0
RURAL SATELLITE PROGRAM 936_5811.01		A	200	1	3	3	A	250	2	3	3	A	200	2	3	3
COUNTRY TOTAL:			225	1	7	5		270	2	5	3		200	2	3	3
TOTAL FOR REGION:			1578	8	42	11		1685	13	35	4		1300	6	24	3

A - ACTIVE B - PENDING MISSION APPROVAL

COUNTRY ACTIVITY REPORT
BY GEOGRAPHIC AREA - FY 82 THRU 84

AFRICA

COUNTRY: KENYA

PROJECT	TITLE	FY 1982 STATUS	FY 1982 AMT ($000)	FY 1982 STAF	FY 1982 #OF TDYS	FY 1982 #OF PTP	FY 1983 STATUS	FY 1983 AMT ($000)	FY 1983 STAF	FY 1983 #OF TDYS	FY 1983 #OF PTP	FY 1984 STATUS	FY 1984 AMT ($000)	FY 1984 STAF	FY 1984 #OF TDYS	FY 1984 #OF PTP
ST/ED																
931_1017.	EXTENSION OF RURAL PRIMARY SCHOOLS	A	400	4	6	0	A	600	4	5	0	A	700	4	6	0
931_1020.	EDUCATION FOR PRELITERATE ADULTS		0	0	0	0		0	0	0	0		0	0	0	0
COUNTRY TOTAL:			400	4	6	0		600	4	5	0		700	4	6	0

COUNTRY: CAMEROON

PROJECT	TITLE	FY 1982 STATUS	FY 1982 AMT ($000)	FY 1982 STAF	FY 1982 #OF TDYS	FY 1982 #OF PTP	FY 1983 STATUS	FY 1983 AMT ($000)	FY 1983 STAF	FY 1983 #OF TDYS	FY 1983 #OF PTP	FY 1984 STATUS	FY 1984 AMT ($000)	FY 1984 STAF	FY 1984 #OF TDYS	FY 1984 #OF PTP
ST/ED																
931-1054.	STRUCTURING NFE RESOURCES	A	100	0	4	0	A	50	0	4	0	A	20	0	0	0
936_5801.	NFE ASSESSMENT AND ANALYSIS		0	0	0	0		0	0	0	0		0	0	0	0
COUNTRY TOTAL:			100	0	4	0		50	0	4	0		20	0	0	0

COUNTRY: LESOTHO

PROJECT	TITLE	FY 1982 STATUS	FY 1982 AMT ($000)	FY 1982 STAF	FY 1982 #OF TDYS	FY 1982 #OF PTP	FY 1983 STATUS	FY 1983 AMT ($000)	FY 1983 STAF	FY 1983 #OF TDYS	FY 1983 #OF PTP	FY 1984 STATUS	FY 1984 AMT ($000)	FY 1984 STAF	FY 1984 #OF TDYS	FY 1984 #OF PTP
ST/ED																
931-1054.	STRUCTURING NFE RESOURCES	A	250	3	4	5	A	400	2	5	0	A	150	1	2	0
COUNTRY TOTAL:			250	3	4	5		400	2	5	0		150	1	2	0

A - ACTIVE B - PENDING MISSION APPROVAL

COUNTRY ACTIVITY REPORT
BY GEOGRAPHIC AREA - FY 82 THRU 84

AFRICA

COUNTRY: GAMBIA

PROJECT TITLE ST/ED	FY 1982 STA TUS	FY 1982 AMT ($000)	FY 1982 STAF	FY 1982 #OF TDYS	FY 1982 #OF PTP	FY 1983 STA TUS	FY 1983 AMT ($000)	FY 1983 STAF	FY 1983 #OF TDYS	FY 1983 #OF PTP	FY 1984 STA TUS	FY 1984 AMT ($000)	FY 1984 STAF	FY 1984 #OF TDYS	FY 1984 #OF PTP
MASS MEDIA/HEALTH PRACTICES 931-1018.	A	200	2	5	0	A	100	2	4	0	A	150	2	2	0
COUNTRY TOTAL:		200	2	5	0		100	2	4	0		150	2	2	0

COUNTRY: IVORY COAST

PROJECT TITLE ST/ED	FY 1982 STA TUS	FY 1982 AMT ($000)	FY 1982 STAF	FY 1982 #OF TDYS	FY 1982 #OF PTP	FY 1983 STA TUS	FY 1983 AMT ($000)	FY 1983 STAF	FY 1983 #OF TDYS	FY 1983 #OF PTP	FY 1984 STA TUS	FY 1984 AMT ($000)	FY 1984 STAF	FY 1984 #OF TDYS	FY 1984 #OF PTP
NONFORMAL EDUCATION NETWORK 931-1250.	A	10	0	1	0	A	10	0	1	0		0	0	0	0
COUNTRY TOTAL:		10	0	1	0		10	0	1	0		0	0	0	0

COUNTRY: SENEGAL

PROJECT TITLE ST/ED	FY 1982 STA TUS	FY 1982 AMT ($000)	FY 1982 STAF	FY 1982 #OF TDYS	FY 1982 #OF PTP	FY 1983 STA TUS	FY 1983 AMT ($000)	FY 1983 STAF	FY 1983 #OF TDYS	FY 1983 #OF PTP	FY 1984 STA TUS	FY 1984 AMT ($000)	FY 1984 STAF	FY 1984 #OF TDYS	FY 1984 #OF PTP
RURAL SATELLITE PROGRAM 936-5811.01		0	0	0	0	A	200	2	4	3	A	250	2	6	3
COUNTRY TOTAL:		0	0	0	0		200	2	4	3		250	2	6	3
TOTAL FOR REGION:		960	9	20	5		1360	10	23	3		1270	9	16	3

A - ACTIVE B - PENDING MISSION APPROVAL

COUNTRY ACTIVITY REPORT
BY GEOGRAPHIC AREA - FY 82 THRU 84

PROJECT SERVICES AT MISSION OR BUREAU REQUEST

COUNTRY: SERVICES AT MISSION / BUREAU REQUEST

PROJECT	TITLE	FY 1982 STATUS	FY 1982 AMT ($000)	FY 1982 STAF	FY 1982 #OF TDYS	FY 1982 #OF PTP	FY 1983 STATUS	FY 1983 AMT ($000)	FY 1983 STAF	FY 1983 #OF TDYS	FY 1983 #OF PTP	FY 1984 STATUS	FY 1984 AMT ($000)	FY 1984 STAF	FY 1984 #OF TDYS	FY 1984 #OF PTP
ST/ED																
STRUCTURING NRM RESOURCES 931-1054.		A														
COMM TECH: STUDIES + APPLICATIONS 931-1109.																
DEVELOPMENT COMMUNICATIONS CLEARINGHOU 931-1231.		A														
IMPROVING EFFICIENCY OF EDUC SYSTEMS 931-1233.		A														
COUNTRY TOTAL:																
TOTAL FOR REGION:																
OVERALL TOTAL: 2820			2668	19	72	22		3315	25	63	10			17	40	9

A - ACTIVE B - PENDING MISSION APPROVAL