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SATELLITE LINKAGE FOR  
EDUCATIONAL AND RURAL DEVELOPMENT

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AID RURAL SATELLITE PROGRAM

## I. Introduction:

The past three decades have seen a revolution in telecommunications - from the first television transmissions via satellite in the early 1960's to the video-and computer-conferencing activities of the 1980's. Today, telecommunications serve as the 'nervous system' of modern societies; they are multi-purpose in use and pervasive in effect. Telecommunications provide significant social and economic benefits critical to maintaining and improving national economies and - by extension - the quality of life.

In the relatively short time that satellite technology has been with us, communication satellites have displayed an amazing range and versatility of applications. The technology has demonstrated its value to telephone and telex communications, radio and television broadcasting, business communications, and the delivery of public services to isolated communities.

As the technological innovations have progressed and as increasing number of developing nations have access to satellite communication facilities, many have become intrigued with the vision of harnessing these new technologies to break through the barriers to development in the Third World.

## II. Satellite Communications and the Developing World

Satellite communications have a particular significance for the Third World. Characterized by predominately rural and isolated areas, rugged and inhospitable terrain, and minimally developed infrastructures, developing countries have long suffered from inadequate and unreliable communication services - which, in turn, have adversely affected the economic and administrative efficiency of these countries, as well as undermined the prospects of improving business productivity and curtailed access to

health, education, and agricultural services. With the advent of satellite communications, the bias of traditional terrestrial systems toward heavily populated urban communities can be overcome. The advantages of satellite communications in meeting the needs of the vast rural areas of LDC's are many:

- o satellite systems are not effected by rough terrain.
- o satellite systems are not 'hierarchical'; whereas terrestrial-based systems must be built in stages, satellite-based systems require independent earth stations which can be located and installed where the service is needed.
- o satellite systems are less vulnerable to overall failure as the earth stations operate independently, unlike terrestrial systems which are based on a succession of relays.
- o satellite systems are more cost-effective, as distance is not a factor in the cost of providing service.

By combining reliable communication services with end equipment designed to reach large audiences, telecommunications can maximize the scarce human and material resources available in LDC's by extending valuable expertise and social service programs to rural areas. This capability is particularly important in its relevance to the education, health and agriculture sectors, primary fields of importance to rural populations.

### III. Applications of Telecommunications Technologies

During the past decade, experimental projects and actual operations have demonstrated the capability of satellite communications to offer significant assistance to the development process by:

- o providing access to information needed by rural communities - - such as

- information on prices, fertilizer application and cultivation practices;
- o increasing opportunities for education and training in a variety of areas -  
- such as language, health or agriculture; and
- o providing access to markets and business opportunities, sources of credit,  
etc.

Both the U.S. Agency for International Development (AID) and NASA have worked with developing nations to jointly explore the potential of telecommunications - television, radio and telephony - as a 'tool' for development. Based on these experiences, it is possible to put forward some suggestions that merit consideration for adaptation and application in Latin America.

#### A. Past Experience

Television broadcast to rural areas is facilitated by satellite communications. Television has long been acknowledged as an educational tool in the United States. Disadvantaged and isolated communities in the United States are reached by the Learn Alaska and Appalachian Community Service Network which provide educational and instructional programming to a wide variety of audiences. The National Technological University, a consortium of the nation's finest engineering universities, provides via satellite television engineering courses to its nationally-based student body.

In the developing world, the most extensive educational television project to date is the Satellite Instructional Television Experiment (SITE) initiated India in 1975. Facilitated by NASA, the SITE Project provided in-school and adult education to 2,400 villages across India using locally-manufactured TVRO's. Educational enrichment programs for children concentrated on strengthening language and mathematical skills at the primary and pre-primary levels. Evening programs provided non-formal education,

mainly in agriculture and health, to village communities.

In the Middle East, AID is currently assisting in the development of a television-based basic literacy program, using techniques developed for the very successful Sesame Street program in the United States.

Less sophisticated (and expensive) than television, radio has proven effective in the developing world for the dissemination of information and providing educational access to rural populations far from urban centers. The transistor 'revolution' transformed radio into a pervasive medium, its low cost ensuring its wide distribution in rural areas; the use of satellite for transmissions extended the reach of radio broadcasts.

AID has assisted in the development of radio as a teaching medium with a number of projects: in Nicaragua, a prototype system for teaching elementary level mathematics was developed; in Honduras, radio was used as the central medium for a public education campaign for the prevention and treatment of acute infant diarrhea; in Guatemala, radio was used to introduce improved agricultural practices to farmers and increase agricultural production.

Telephony forms the basis of AID's Rural Satellite Program. Projects in Indonesia, the West Indies and the South Pacific are using telephone-based technology for distance education. Distinguished by its 'interactive' (two-way communication) capability, these projects link up to thirteen university sites via a basic teleconferencing system in order to share resources and multiply professional expertise. The audio capability is supplemented with narrow-band graphics equipment, such as facsimile, telewriters, slow scan television and micro-computers.

In Latin America, the Peruvian National Telecommunications Company (ENTEL-Peru) is providing audio-conferencing services to the agriculture, health and education ministries in order to link them with extension and field personnel in the isolated Amazonian jungle. Recently, Peruvian doctors and health workers participated in a medical conference linking several Latin American countries via the conferencing system.

#### B. Potential Uses in Latin America

The accumulated experience of using satellite communications for development is impressive. Precedence for regional cooperation has been set in the West Indies and South Pacific. Much of the applications research and experimentation has taken place in the Latin America region.

Potential for expanding the educational and social service outreach through a variety of telecommunications media is tremendous. A regional space agency role in program development and coordination could be pivotal:

- o Scarce professional and teaching resources could be shared among the Latin American nations via a regional 'Open University', using television or teleconferencing to provide instruction in such critical areas as engineering, computer science, medicine, and agriculture.
- o Mass education applications - such as basic reading and math skills for both children and adults - could be developed and delivered via television and radio.
- o Regional health campaigns - dealing with issues such as child survival, immunization, basic village sanitation - could be mounted using television or radio.

- o Teleconferencing centers could be established to promote resource and information sharing among nations and facilitate regional conferences.

In the area of technical development, a regional space agency could be instrumental in developing basic telecommunications infrastructure.

The provision of basic rural telephone services is vital to international development; a network of small satellite earth stations will unquestionably provide the most cost effective and reliable solution to rural communications. With the increase in the power of satellite signals and developments in alternative power sources for the ground stations themselves (AID and NASA have developed a small solar-powered earth station in Indonesia), the existence of low-cost earth stations for rural telephony nears reality.

A regional space agency could contribute to this goal with research and development aimed at adapting existing satellite and ground technology for use in the Latin American rural environment. The stage for these ventures is set: the experience in Peru could serve as a model for satellite use in other nations and help establish the technical standards for earth stations, power supply and telephone-based peripheral equipment.

Further in the area of technical development, a regional space agency could support training in telecommunications. In the United States, the U.S. Telecommunications Training Institute - supported by leading U.S. telecommunications firms and partially assisted by AID - provides short-term training in telecommunications engineering, planning and management to developing world participants. As so much expertise in satellite communications currently exists in Latin America, USTTI could

serve as a model for a regionally-based training institute. Additionally, such an organization could facilitate regional links with the newly-established ITU Center for Telecommunications Development, whose mandate is to provide technical advice in the design of rural telecommunications.

Finally, another area with potential for regional cooperation is that of data communications, the most recent of the new communications technologies. The applications of micro-computers to human organization is one of the most distinguishing features of the 1980's. Technological breakthroughs in micro-electronics and data packeting have succeeded in lowering the costs; satellite communications extend outreach capabilities. Systems such as CARINET, PACSAT, and MARISAT are either currently operating in the developing world or plans are underway for their implementation. For example, CARINET, a low-cost packet switched network, links numerous institutions in the developing world via computer-conferencing. These developments open up at least three avenues worthy of serious exploration: the organization of specialized data bases within LAC and the sharing of resources among existing data bases; the use of these technologies for disaster monitoring and disaster relief; and the use of electronic mail and computer-conferencing to provide simple, low-cost administrative and informational communications throughout rural Latin America.

In conclusion, the potential of a regional space agency to effect and support the shared development goals of the Latin American nations is tremendous. Both the need for and experience in telecommunications for development exists in Latin America. The suggestions presented above represent only a few ideas based on the United States' experience. The key to all of them is cooperation among the great nations of the region.

## NOTE

Attached are several papers produced under the AID Rural Satellite Program which explore the uses of telecommunications for development and summarize some of the Pilot Project activities.

The U.S. Agency for International Development is interested in worldwide experience in development communications and would welcome the opportunity for dialogue on this topic.

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