I. Executive Summary

The Institute for Global Communications (IGC) was formed in 1986 to build an infrastructure for global cooperation using computer communications networks. Since its introduction two years ago, the *PeaceNet* computer network, a service of the Institute, has grown to 2,000 users in thirty countries working to reduce the risk of nuclear war.

In the past year, the interest from outside the United States in the methods and technologies employed by IGC has increased tremendously. With a grant from the MacArthur Foundation, IGC has begun to study the possibilities for using inexpensive microcomputer technology combined with sophisticated radio and satellites communication systems to establish computer networks throughout the world. These networks would serve the independent sector — non-profits and individuals — working for a safe and environmentally sustainable future.

In the past six months, IGC has identified promising technologies and a host of international partners to create an international distributed computer network. This network will make low-cost yet sophisticated communications technology widely accessible.

This proposal outlines a three year plan for establishing interconnected computer networks in three major regions of the world: Africa, Latin America and Asia/Pacific. Our budget for this project averages $350,000 per year for three years. The plan has three essential elements: 1) complete evaluation of appropriate technologies for computer communications around the world; 2) develop a structure for coordinating the implementation of the networks with our partners in various countries; and 3) build a set of reliable links between the networks to allow for global communication.

II. Statement of the Problem

The most serious problems facing the world today — whether the proliferation of nuclear weapons, the buildup of CO_2, or Third World development — all require global cooperation and communication. The world is too complex and interdependent to resolve problems at a national level. Yet the technologies for global cooperation are embryonic. The organizations working to solve global problems still rely on expensive and unwieldy means for cooperation and communication. The cost and time required for international face-to-face meetings preclude their use for sustained interaction. TELEX, while useful for time-urgent messages, is expensive and rigid, and is not interactive. Telephones demand the synchronous presence of both parties, are not suitable for group interaction on an international level, and leave no record of decisions.

New communications technologies can solve many of these problems. Multinational corporations already use electronic mail, conferences, and databases to coordinate huge, diverse businesses. With these tools, managers can send messages around the world instantly, at low cost. Computer conferences allow users to react to one another without the demands of synchronicity or the delays of mail. And databases can speed research and understanding. All these tools can help avoid duplication of effort.

Electronic mail, computer conferences, and databases are proving to be essential in communications and collaboration. The telecommunications field has grown dramatically in the last decade, driven largely by the needs of large corporations. In this period, several academic computer networks have sprung up, which have helped build communications links between professors and students around the U.S. and in other countries. More recently, systems have been built specifically to aid non-profit corporations, so organizations working on arms control and environmental issues have been able to take advantage of these powerful tools.

III. Forging a Solution

In 1986, with support from the MacArthur and a dozen other foundations, the *PeaceNet* computer system, run by the Institute for Global Communications (IGC) was opened. *PeaceNet* is built specifically to help organizations and individuals working on arms control and international security. In its 24 months of public operation, *PeaceNet* has attracted almost 2,000 users, supports over 100 issue-based computer conferences, and has become the principal tool for communications for dozens of organizations. Designed for the environmental community, *EcoNet* was opened by IGC in late 1987 and now serves some 400 organizations and individuals.

In 1987, IGC helped set up a new, independently operated computer network in England, called *GreenNet*. With some hardware, our software, and assistance from technical staff, *GreenNet* was established as the first overseas node. Users in England and Western Europe connect to *GreenNet* — messages destined for other European users stay in the *GreenNet* system, while messages for users in Asia or the Americas are forwarded every twenty minutes to the IGC computer. Sending messages in bulk at high speed dramatically reduces transatlantic communication costs. IGC and *GreenNet* conferences are 'networked:' they exist simultaneously on both systems, and update each other automatically. *GreenNet* now serves some 600 users in Western Europe. This architecture of national networks interconnected internationally serves as the model for our international expansion.

In recent months, IGC has received a growing number of inquiries from potential users in other nations. There is a tremendous demand for international telecommunications which is not met by existing services. IGC now offers access in about 70 countries, but international users must pay steep communications charges to local telecommunications authorities.

IGC would like to work with other international groups to build the infrastructure for better international cooperation. This infrastructure will build on the successful technologies and organization of *PeaceNet* and *EcoNet*, which now serve over 2,500 users. Our intent is to build technologies for global cooperation, and to design these technologies so they are most useful for the independent sector — individuals and non-profit organizations working to resolve global problems. To meet these goals, we must build an inexpensive and reliable system that has several key features: it relies on the talents and resources in each region supporting a node; it meets the unique information demands of the independent sector; and it takes advantage of economies of scale in technological development and international communication. Toward these ends, after considerable study and development, we have designed a program for developing a widely accessible international system of networks.

Working in collaboration with local groups, we will create networks analogous to *PeaceNet*, *EcoNet* and *GreenNet* in other countries. These networks (or 'nodes') will be locally managed, but will use the same technologies as *PeaceNet* and *EcoNet*. They will be interconnected to allow for international communication. With this distributed architecture, we will be able to respond directly to local concerns, develop specialized information resources, and provide low-cost communications within regions and throughout the world.

IV. Implementation Plan

This expansion plan has three components: 1) complete our evaluation of appropriate technologies for computer communications around the world; 2) develop a structure for coordinating the implementation of the networks with our partners in various countries; and 3) build a set of reliable links between the networks to allow for global communication. Throughout the project period, we will be expanding our research of networking possibilities to additional regions of the world. We have made significant progress on all three fronts, and we have been successfully linked with our 'sister' network in Europe, *GreenNet*, for nearly one year.

Within the next six months, we will have completed the technical design work, and have forged agreements with several organizations in other countries to open new networks. The proposal details these steps and lays out the plans for further expansion. The proposal seeks funds to finish the technical development, work with local groups in several other countries to establish new nodes and an entire framework to manage a distributed system, and continue research in other regions of the world.

A. Organizational Steps

The international expansion will rely on a group of independently operated but highly integrated nodes in different regions of the world. Our first step is to identify groups, like *GreenNet* in England, with the technical, financial, and organizational capacity to operate a computer network. These groups will be chosen on the basis of their abilities, their reputation and their location.

In early 1988, Geoff Sears, IGC Director, embarked on a six month study of the organizational, technical, and financial aspects of international expansion. His research is summarized in a report entitled *International Computer Networking: Options for the Independent Sector*. IGC and *GreenNet* staff travelled to Brazil, Costa Rica, Guatemala, Mexico, Nicaragua, the Soviet Union, Sweden, and Ireland. They met with organizational representatives from Kenya, Zimbabwe, the Ivory Coast, Australia, Canada, the Philippines, Japan, Malaysia and Germany.

The results indicate that the architecture we have proposed is very attractive to organizations in other countries and that financial support will be available locally. We have selected the first candidates for establishing nodes, and are completing agreements with them.

Nodes will be operating in Sweden and Brazil in a matter of months; in the first year of this project we expect to have similar nodes in Central America, Australia and the Philippines before moving on to Kenya in the second year.

The exact order and speed of expansion will depend on the financial and technical conditions in each region.

To manage the technical development of this distributed system and promote efficient sharing of resources, we will establish a coordinating body with representatives from each network. The international coordination will allow us to develop one set of technologies common to all the nodes, and to provide international communications at the lowest possible cost.

B. Country-Specific Plans

Latin America

Brazil

The Institute for Global Communications is working with a group of independent non-profit organizations in Brazil to develop the *Alternex* network as a service to groups involved in environmental and human rights work in Latin America. The Instituto Brasilero de Analises Sociais e Economicas (IBASE) has played a leading role in creating this project. The network will be guided by a council composed of seven major Brazilian NGOs; daily operations will be at the IBASE offices in Rio de Janeiro. The network will serve other NGOs working in environmental and social service activities all over Brazil.

IBASE has been a pioneer in the application of computer technology to socio-economic work. They have been active in work with trade unions, peasant groups, indigenous peoples and AIDS victims. IBASE has collaborated an independent organization working on the AIDS problem in Brazil to form an AIDS database available on the Brazilian Public Data Network.

Representatives of the UNDP, the LARC academic computer network, IBASE and IGC initiated negotiations with Embratel (the Brazilian government agency in charge of telecommunications) to permit a concessionary rate for international data transfer between the *Alternex* network and the IGC networks. Embratel has expressed their willingness to cooperate, and is studying a proposal. It is likely that a favorable arrangement could also benefit the LARC project which will link the existing computer centers of the major Brazilian universities and research institutions. Discussions have begun with Embratel and the International Telecommunications Union (ITU – a part of the United Nations) on the use of the BrasilSat I and II satellites. Use of these satellites could provide low cost connections with remote parts of Brazil, and with neighboring nations of Latin America.

The *Alternex* project has the support of several Brazilian government agencies who may choose to use the system as well. Agencies supporting *Alternex* include: 1) the Instituto Brasileiro de Informacao em Ciencia e Tecnologia (IBICT) which is part of the Minisiterio da Ciencia e Tecnologia and part of the Conselho Nacional de Desenvolvimento Cientifico e Tecnologia; 2) the Coordenadoria de Cooperacao Internacional (CAPES) from the Ministerio da Educacao (Ministry of Education); and 3) the Itamaraty (the Brazilian State Department).

The Institute for Global Communications will provide technical assistance in the installation of the system and in training of technical staff at *Alternex*. IGC and *GreenNet* will also interconnect their host computers with the Alternex system. These connections will give the *Alternex* system direct connections with the 3,000 users on the *PeaceNet, EcoNet* and *GreenNet* systems as well as links to most of the other commercial and non-commercial networks in the United States, Europe and Japan. The UNDP and CEVIS, an Italian NGO are funding the *Alternex* project. Additional funds may be provided by the Ford Foundation to support networking among groups involved in environmental protection.

Central America

Since January of 1988, IGC, through its sub-network CARNet (the Central American Resource Network), has been working on a dynamic regional Central American telecommunications project led by CRIES, the Coordinadora Regional de Investigaciones Economicas y Sociales (Regional Coordinator for Economic and Social Research), based in Managua, Nicaragua.

This CRIES project, financed by the Norwegian Development Aid Agency, is linking research and documentation centers throughout Central America and the Spanish-speaking Caribbean using computer-mediated telecommunications. The main objective of the project is to facilitate joint research projects and minimize such problems as duplication of efforts and lack of access to up-to-date global information, caused by the region's chronically underdeveloped telecommunication resources.

IGC staff attended the organizational meeting of this project, and conducted Spanish-language training seminars in computer telecommunications use. Fourteen institutions are participating in the project, and every Central American nation, plus Mexico, Cuba and the Dominican Republic are represented. CRIES plans to expand the project to include twenty institutions in 1989.

The possibilities for NGO use of new telecommunications technologies have been greatly advanced by the development of RACSAPAC, a public data network in Costa Rica, which has installed nodes in Guatemala, El Salvador, and Honduras. RACSAPAC enables relatively low-cost data transmission within Central America, and international connections to a number of other nations' data networks. The government of Nicaragua is planning its own public data network, and CRIES is participating in the planning process.

IGC technical staff have been working closely with CRIES in the preliminary planning for a local computer network to serve the independent sector in Nicaragua.

Mexico

A number of organizations in Mexico have identified a need for a low-cost networking system like the one developed by IGC to serve the local NGO community. IGC is in the preliminary stages of exploring the technical, organizational and legal requirements for establishing a host computer system in Mexico. First steps include interviews with key potential users and operators of such a system, and support for the convening of "interest group" meetings in Mexico to discuss and disseminate plans for development.

Institutions interested in the project at this very early stage include various research centers at the UNAM (University of Mexico), the Centro de Ecodesarrollo (Center for Eco-Development).

North America and Scandinavia

Sweden

For the past several months, *GreenNet* and the Institute for Global Communications have been collaborating with the Swedish Peace and Arbitration Society (SPAS) to establish *PeaceNet Sweden* as a local network serving groups working for nuclear security in Scandinavia. In late August, 1988, *PeaceNet Sweden* began operating as a public dial-in service with electronic mail and bulletin board services using an IBM AT-compatible microcomputer (80386 class). The computer is housed at the offices of the Swedish Peace Council. They will begin using the software developed by IGC and *GreenNet* before the end of 1988. *PeaceNet Sweden* is a joint project of the Swedish Peace & Arbitration Society (SPAS) and the Swedish Fellowship of Reconciliation. The project has been supported by a grant from the Swedish Foreign Office.

There are more than twenty five organizations using the system as of the end of August, 1988, including two of the largest Norwegian peace organizations, the Swedish Peace Council in Uppsala, the Swedish International Peace Research Institute and the Swedish UN league. SPAS runs a nuclear-testing alert and statistical service on the system. They are working on providing service to a range of groups in eastern Europe, and are planning an on-line, country-by-country directory of peace groups around the world.

Canada

The *Web* is the largest and most sophisticated of the Canadian computer networks serving environmental and peace work. Based in Toronto, the *Web* connects to the Canadian Public Data Network for public dial-in service for its 400 users spread across all the provinces. Recently, the Web has begun coordinating its work with the Native Computer Communications Network, which links more than forty groups of indigenous Canadians. The *Web* also intends to build linkages with the Ottawa-based *AlterNet*.

The *Web* plans to begin using the software system developed by the Institute for Global Communications so that their networks may be fully integrated with *PeaceNet*, *EcoNet* and *GreenNet*. They have taken delivery of a new and more powerful computer, and will be coordinating software implementation with IGC.

Asia/Pacific

Philippines and Southeast Asia

IGC is collaborating with the Philippines-based People's Access non-profit computer network to plan a southeast Asian computer network. People's Access is a relatively new NGO working to link organizations involved in rural development work with computer networks. People's Access has conducted many training seminars in computer-based communications and information management for NGOs all over southeast Asia and the Pacific.

People's Access currently uses simple bulletin board software on an IBM-compatible microcomputer. A pilot project linking compatible computers in Indonesia and Thailand with People's Access was highly successful, but because of the limitations of their software (it does not support the international standard for computer communications), People's Access intends to use the UNIX-based system developed by the Institute for Global Communications.

The comprehensive plan for a Southeast Asian network calls for the installation of host computers in Indonesia, Malaysia, the Philippines and Thailand. Each computer will provide a national network with services in the national language and specialized information resources as required. Since each host will have identical hardware and software, full integration of electronic and database services will be relatively simple. The umbrella organization for the entire regional project is the Southeast Asian Forum for Development Alternatives (SEAFDA), which is a regional NGO network involved in research, publication, and action-oriented work. A SEAFDA member organization in each of four countries will operate the national network. In Indonesia, the network operator will be INSAN (a human rights documentation center); in Malaysia, Consumers' Association of Penang (CAP); in Thailand, the Thai Institute for Rural Development (THIRD); and in the Philippines, People's Access.

IGC staff will provide technical support, including selection of equipment, configuration of software and training of key local staff. IGC is currently investigating the technical feasibility of using the PeaceSat project, which provide free satellite time for non-profit communications applications.

Australia - Pacific

In Australia, IGC is collaborating with the Rainforest Information Center in Lismore, Australia, to form a network to serve organizations in Australia, New Zealand and throughout the Pacific. This network will make use of the PeaceSat satellites and will use the software of the Institute for Global Communications to ensure that the system is fully compatible with the the IGC networks and with the Southeast Asian network.

IGC is now working closely with the Rainforest Information Center to develop the implementation plan and procure computer and communications equipment.

Institutions that have expressed interest in supporting both the Australian and Southeast Asian networks include the Environmental Policy Institute, the United Nations Environmental Program (UNEP), the United Nations Non-Government Liaison Service (NGLS) and the Threshold Foundation.

Africa

In June of 1988, Dr. Thomas Odhiambo, the President of the African Academy of Science, asked IGC to study the possibilities of computer networking in Africa. To date, IGC has identified a number of possible collaborants in such a network. Current contacts are concentrated in Kenya, though other

possibilities exist for networking with organizations in both west and southern Africa.

The problems facing African nations demand pan-African solutions. The continent-wide scale of environmental devastation cannot even be monitored, much less ameliorated without new communications tools. Yet basic infrastructure development in Africa lags far behind Asia and Latin America. Although building effective communications systems in Africa will be one of our biggest challenges, we feel this is an essential component of the work.

Kenya

In Kenya, IGC has been working with a number of individuals interested in developing an East African computer network. A founder of the Environmental Liaison Centre in Nairobi has convened several public meetings to assess the need for a local computer network with international connections to other networks. A core group of computer users has prepared a proposal for the Kenyan Ministry of Telecommunications to allow concessionary pricing for non-commercial activities. A representative of the International Union for the Conservation of Nature, which operates a simple computer bulletin board system in Nairobi on environmental affairs in the Sahel, has offered technical assistance in developing a more sophisticated system.

IGC is planning to study the situation in more detail in collaboration with the African Academy of Sciences. A social scientist with extensive experience in micro-computer applications in Africa has been selected to lead a technical, economic and cultural study of the appropriateness of computer networking technology in Kenya.

Southern Africa

In southern Africa, there has been some exploratory work by different groups, but as yet no formal network has been planned. Early in September of 1988, the Ecumenical Documentation and Information Centre on Eastern and Southern Africa (EDICESA) held a workshop on networking and communication. People from Zimbabwe, Botswana, Kenya, Tanzania, Lesotho, Mozambique, South Africa, Italy, Angola and the Netherlands attended the sessions, and preliminary plans were drawn up for building an NGO network in the region.

West Africa

A joint project between the United Nations Non-Government Liaison Service and IBM has developed a series of data centers in several Sahelian countries, including Mali, Senegal and Burkina Faso. While these centers have not yet been linked together, a direct linkage has been established between a data center in Abidjan, Ivory Coast and an European Academic Network (EARN) node in France. IGC will continue to study the possibility for extending this linkage to more data centers and for building a system for increased usage of the data centers by indigenous organizations.

Other Regions

Israel and West Germany

IGC has made preliminary contacts with organizations in Israel and West Germany which are interested in starting peace and environmental networks. Although none of these talks have progressed beyond the exploratory stage, there is tremendous potential for linking people and groups working for environmental protection and peace in these countries.

Japan

In Japan, several computer networks serving the independent community have started in last several months. They are mainly in Tokyo and the Metropolitan Kanto District, though some are in Hiroshima and Shikoku. To date, IGC has had preliminary discussions on building linkages with these networks. Several principal organizers of these networks already use the PeaceNet system extensively to work with colleagues and distribute information to PeaceNet users.

A significant problem to integrating networks with the UNIX-based hosts that IGC uses is the language barrier: most of these Japanese networks use the Kanji or Kana character systems exclusively, and are not well adapted to exchange with the English-based IGC and GreenNet systems.

IGC intends to build linkages for exchange of information with the Japanese peace and environmental networks that use the English language as soon as possible. Networks with which linkages can be relatively easily established are: Denshi-Mura (Electronic Village), Kamome and TWICS BeeLINE.

Conclusion

Helping local organizations build the infrastructure they need to operate a computer network will be a continuing challenge. *GreenNet*, after one year of operation, is now advanced to the stage where it can, in turn, aid further international expansion. We cannot expect networks in other nations, working under more difficult technical conditions and under different cultural contexts, to develop in the same rapid manner as *GreenNet*, but it is reasonable to expect that eventually these networks will develop into robust, vibrant and useful partners.

C. Technical Steps

The architecture we envision — interconnected, distributed nodes each serving a distinct region — offers great promise in meeting local communications needs and holding down costs. To make these nodes affordable and reliable, we have begun extensive technical development, aimed at scaling-down the technology so that it can utilise IBM AT-class 80386 computers. The original *PeaceNet* and *EcoNet* computer networks ran on expensive, cumbersome mini-computers and utilized generic software tools.

When computers based on the Intel 80386 processor chip became available, we decided to transfer the software down to these machines. The new computers are faster, cheaper, smaller, and employ generic technologies, making them easier to repair or modify. This transfer requires about one programmer-year of time; it is about 80% complete. We will prototype the first machine in October, 1988, and hope to have these machines online before the end of 1988.

The 80386 computers will cost about $25,000 fully configured, considerably less than their predecessors. They will be about five times as fast — an important consideration, as our present systems are reaching their operational limits. When the technology is fully tested, we will offer turn-key networks to our partners in other countries, saving them substantial time and money.

Basic communications within and between many nations still remains a major problem. Many nations in Africa and other parts of the non-industrial world have crude telephone systems, and lack public data networks. Geoff Sears, as part of his study of international expansion, assembled a group of technical experts from around the world to examine low-cost communications technologies. The participants used a computer conference, on PeaceNet, to contribute information and evaluate several dozen technologies. The conclusions from this study are detailed in *International Computer Networking: Options for the Independent Sector.*

Each national network will require a different solution to connect with other networks. In parts of Latin America, we have begun negotiations for reducing the tariffs on existing public data networks. In the Soviet Union, the San Francisco/Moscow Teleport (which handles United States - Soviet data communications) has obtained far-reaching agreements to install satellite lines and develop technical solutions to bypass the insufficient Soviet telephone system. We have also begun an examination of technologies, like packet radio, low-earth orbit satellite, Very Small Aperture Terminal (VSAT), and multiplexing existing data lines to bypass or avoid insufficient or non-existent communications systems. This research will continue throughout our expansion.

V. Budget

Building an international communications system requires a sustained commitment to new technologies and new organizations. We have projected a three-year budget, which we feel is the minimum period we need to build sustainable nodes.

Personnel	*Annual*	*One-time*
Asia Director	33,000	
Latin America Director	33,000	
Africa Director	33,000	
Technical Support team 2@33,000/yr	66,000	
Taxes, Benefits @ 20%	33,000	
Subtotal, Personnel	198,000	
Travel	*Annual*	
International 12 @ $2,000	24,000	
Domestic 10 @ $600	6,000	
Subtotal, Travel	30,000	
Office Expenses	*Annual*	
Rent $1,000/month	12,000	
Printing	4,000	
Postage	1,200	
Supplies	2,400	
Insurance, utilities, misc.	6,000	
Telecommunications cost 2,500/mo.	30,000	
Subtotal, Office Expenses	55,600	
Total Annual Expenses	***285,600***	

Hardware	*Year One*
Computer system for development	25,000
Packet radio equipment	5,000
Satellite equipment	15,000
One computer (Australia)	25,000
One computer (Philippines)	25,000
Communications equipment	42,500
Subtotal, Hardware, Year One	137,500

Hardware	*Year Two*
Two computers @ 25,000 (Africa)	50,000
Communications equipment	30,000
Subtotal, Hardware, Year Two	80,000

Total, Year One	**421,100**
Total, Year Two	**368,600**
Total, Year Three	**285,600**

VI. Personnel

This project will be directed by Geoffrey Sears, the Director of the Institute for Global Communications. Mr. Sears holds an MS in Resources Planning and a BS degree in Mechanical Engineering from Stanford University. Most recently, he has been a program officer for the Association of Foundations, a Philippine Foundation. Among other activities, he established a computer network for non-profit groups in the Philippines and linked several of these groups to international database services. Mr. Sears has managed an energy conservation program for Stanford University, and served as a research and testing engineer for a prominent manufacturer of solar heat-transfer equipment. A fluent speaker of Russian, he has traveled and studied in the Soviet Union and is a student of U.S./Soviet relations.

Several additional staff will be assisting Mr. Sears. Dr. Suzanne Grant Lewis will be directing the research of networking possibilities in Africa. Dr. Lewis has thirteen years experience as a social scientist in Africa. Her doctoral dissertation, awarded in International Development Education at Stanford University, focused on the application of computers in Tanzania.

On the technical end, Mr. David Caulkins and Dr. Scott Weikart will coordinate a team of several experts in computer and telecommunications technology. Mr. Caulkins is the Vice President of Engineering of Information Appliance, a Silicon Valley high technology firm. Dr. Weikart is the technical director of IGC. He received his Ph.D. in computer engineering from the University of Illinois. Dr. Jerome Weisner, President Emeritus of the Massachusetts Institute of Technology, will provide an independent technical group to review findings.