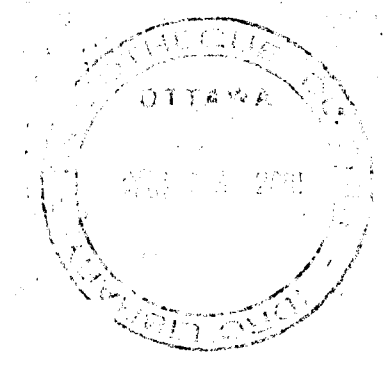


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Asia Telecommunity Study Tour



A consultancy report for the
International Development Research Centre
ASRO, Singapore

October 1994

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INTRODUCTION

In February 1994, the International Development Research Centre, Asia Regional office, Singapore, commissioned Pegasus Networks and Interdoc - Asia Pacific to undertake research into the possibilities and constraints of electronic networking in Asia. A team of four consultants was assembled with funding support put in place.

Project Manager: Maria Lee Hoon, IDRC

Consultants: Andrew Garton, Pegasus Networks
Jagdish Parikh, Interdoc - Asia Pacific
Suchit Nanda, IndiaLink
Leo Fernandez, Interdoc - Asia Pacific

Funding Support: IDRC

The study involved an eight week period of field activity, involving workshops in various cities, extensive interviews and consultations with key ministries, academic institutions, network service providers, network users and non-government organisations. In all over 448 people from 16 cities in 10 countries enthusiastically provided the consultants with relevant and often detailed information. In the course of finalising the study further research was required to both validate and update some of the material gathered.

This report is adopted from this research along with considerable local input encouraged throughout the study. It summarises the telecommunications conditions in each of the countries, along with network development trends, in particular Internet connectivity and local requirements. The report provides a series of recommendations towards network and on-line content provision, and identifies project partners where applicable. It should be noted that the views expressed in this report are those of the consultants and do not necessarily reflect those of IDRC, Pegasus Networks and Interdoc - Asia Pacific.

A more leisurely timetable would have enlarged the presentation of detailed recommendations, and done more justice to the wealth of material and insights collected during this study. The time allocated for on-site visits was often too short to accommodate the full requirements of the terms of reference of the research programme. However, the information presented here, though changing rapidly, does reflect the challenges associated with electronic communications development in Asia.

TERMS OF REFERENCE

The IDRC Asia Telecommunity study into data communications in Asia was guided by the following Terms of Reference:

- (I) to undertake a study mission (with one other consultant) to Thailand, Cambodia, Laos, Vietnam, Indonesia, Philippines, China and Prague from April- June 1994;
- (II) to survey, assess and specify needs for communication and accessing information resources via computer networking among institutions in the following sectors:
 - NGO community in the region
 - IDRC clientele in the region and the IDRC offices in Singapore and New Delhi;
- (I) to sensitise these institutions to networking issues (both human and electronic processes);
- (II) to identify promising/potential user and host institutions and key individuals therein (champions) as well as potential national or regional resource persons and to recommend potential candidates for the planned Regional Workshop (provide criteria applied and short descriptions to justify the selections/recommendations) ;
- (III) to perform demonstrations (at every meeting possible) and provide technical information to assist those institutions which may wish to get started on electronic networking;
- (IV) to assess existing and planned electronic networking technical options;
- (V) to assess the cost, technical reliability and administrative appropriateness of polling procedures (outgoing and incoming) with GreenNet and Pegasus or others as appropriate;
- (VI) to define and elaborate potential administrative, technical, financial institutional scenarios for the eventual project, and recommend the strategies for the long-term sustainability of the project in terms of cost recovery ;
- (VII) to assess what human, technical and financial resources are necessary to speed up the infrastructure building process;
- (VIII) using the results, to plan the agenda and structure of the Regional Workshop, which is to aim at defining a project for donor support;
- (IX) to begin the written report in Singapore from May 26-30, 1994 and to continue for another two days in Australia;

- (X) to present preliminary findings of the study tours at the INET Conference in Prague, Czechoslovakia in June 1994 as well as to present a verbal report to IDRC officials attending INET 94;
- (XI) to submit a joint detailed and satisfactory report of the work accomplished to the Regional Director, Regional Office for South East and East Asia, IDRC by July 30, 1994, or earlier; and
- (XII) to attend the Regional Workshop to be held in Singapore from September 12-15, 1994, as a resource person.

METHODOLOGY

The Asia Telecommunity study was conducted in four stages:

1. Preparation
2. Pre-project Evaluation Workshop
3. On-site Interviews
4. Further Research
5. Report Writing

1. Preparation

Prior to the commencement of the Study Tour the consultants gathered relevant background information to assist in the interviews. Various on-line sources were consulted as well as materials prepared by the consultants during the course of their work in the region.

2. Pre-project Evaluation Workshop

Sections 3 and 5 of the Terms of Reference were executed through Pre-project Evaluation Workshops held in each of the cities (see Appendix A, Workshop Participant Invitees). Note that in some cases, due to local conditions, a workshop was not feasible.

The primary objectives of these Workshops were to gather information on:

- Perceived networking needs;
- Current networking initiatives in each country;
- Explore possibilities for inter-organisational collaboration in networking; and
- Recommendations towards networking IDRC.

To meet the above objectives the consultants attempted to identify potential partners in each of the countries visited. Recommendations are listed in this report. It must be noted that due to the tight schedule there were few opportunities for in-depth analysis of organisations/institutions/ministries interviewed.

An agenda was drawn up for these Workshops (see Appendix B), but in many cases it was difficult to adhere to. Numbers of participants varied from city to city and the degrees of exposure to networking required constant reassessment of the agenda. In many of the Workshops the majority of the morning sessions were taken up with networking tutorials and questions regarding the medium.

Where possible questionnaires were distributed (see Appendix C). Many of the requirements listed in the report were drawn from this process.

The project partners were to be invited the proposed Asia Telecommunity Project Design Workshop, September 1994 (see Terms of Reference, Section 14). This Workshop has been postponed.

3. On-site Interviews

Where possible interviews were conducted with IDRC partners, academic institutions,

research and documentation centres, government ministries, telecommunications authorities, network service providers and non-government organisations.

Both the Workshops and interviews cultivated a great deal of enthusiasm amongst the participants. Although, many had been through similar processes with other international agencies they felt assured that the approach taken by IDRC and the consultants would produce results of benefit to the majority of them. Those with specific needs and requirements for networking presented the consultants with both proposals and recommendations (see Appendix D).

4. Further Research

To keep abreast of the rapid changes occurring within the region the consultants maintained contact with some of the organisations and individuals met during the Study Tour. This ensured that new developments, such as IndoNet in Indonesia, would be documented.

The network was used extensively during this process.

4. Report Writing

The four consultants collaborated on the compilation of the report. The network was used daily to maintain consistency of the material written. Drafts of each of the country reports were prepared by the two teams and edited by Andrew Garton.

SUMMARY OF RECOMMENDATIONS

The Study Tour of South East Asia, Indochina and South Asia identified a range of networking requirements running the gamut of capacity building programmes being initiated in the various countries under review. The organisations and institutions that presented their case for networking serving capacity building infrastructure enabled the IDRC consultants to draw a series of recommendations that recognise both the value of content provision and sustained service provision within the region.

This executive summary highlights those recommendations that identify common needs across the region. Specific recommendations are detailed further in this report.

Networking Options

Due to the inconsistent quality of phone lines and general telecommunications infrastructure in many of the countries visited, it is recommended that the following options to networking be seriously considered:

- I. **Low-cost Network Platforms:** Where applicable low-cost technologies, such as PC based facilities (i.e. Fido, UUCP) should be employed. Throughout the report there are references to Fido and UUCP, but these merely draw attention to the transport mechanism and not a specific recommendation. Fido in particular has proved itself time and time again in developing countries the world over. It is particularly useful over high cost, low quality IDD connections. However, improvements to UUCP ensure it as equally efficient. UUCP has become a standard amongst Internet service providers and re-sellers where polling arrangements are required with host networks in regions where full Internet connectivity is not readily available.
- II. **Alternative Connectivity Options:** Where phone lines are of a particularly poor quality, where sustaining a connection via a modem is near on impossible, it is advised that various alternatives be investigated. In many places the use of a combination of radio phones, mobile phone networks, packet radio and low orbit satellites may be appropriate. It is therefore recommended that comprehensive research be undertaken to explore these technologies, to document their present use, investigate in-country regulations regarding their use, and identify persons with expertise in these fields. These communications technologies would only be used as a short term measure till such time as telecommunications infrastructures are improved, or even extended into the more geographically isolated regions (i.e. Indonesia's islands, Nepal, Cambodia).
- III. **Hub and Spoke Topology:** Low cost networking options, such as those suggested above, have been used extensively in a variety of ways in countries such as Africa and throughout the Pacific Islands, South East and South Asia. All these networks employ similar models. The one most popular and successful is the distributed hub and spoke model (see Fig. 2, India Hub and Spoke model). It is recommended that where applicable this model be utilised along with expertise from the existing networks for network design, implementation and training. Users would access a local hub, which in turn polls, or receives a reverse poll from either a regional or international host.

Reverse Polling

Well over 50% of communications costs can be saved by using international service providers that would poll the in-country host. As international telecommunications rates are often cheaper in countries such as Australia, the United States and Europe it is recommended that service providers in these countries be utilised as gateways for the transfer of data internationally. This service provider would schedule polls to the host network in a specific country using a suitable data transfer protocol (e.g. UUCP). The poll would transfer data (i.e. e-mail) utilising a low cost IDD connection. This method of transfer is known as Reverse Polling. Call costs would be covered by the host network on arrangement with the international service provider.

Information Technology Resource Centres

As identified in several countries the establishment of Information Technology Resource Centres, or Telecottages, is seen as serving a wide range of needs. A Telecottage would enable minimal resources to be maximised in a single centre available to a broad cross-section of a community. It would act, for example, as a network hub, an information centre, and facility for training and support. The Telecottage model is most suited to regions where telecommunications infrastructure is poor, where resources to maintain a variety of computer services is unavailable, where the need for access to localised information resources is high but methods for access are less opportune. It is also noted that because electronic networking activities would comprise only a part of telecottage activities, co-operation with other projects and activities would be involved.

Internet

It is advised that any network development maintain connectivity to the Internet as a medium to long term goal. This would ensure the survival of a network in environments where the Internet is gaining increasing value to the developing countries of the Pan Asia region. But for many, full access is still a utopian ideal. To achieve full access requires large sums of money, and considerable technical resources and expertise. Though not impossible to achieve, such developments need to be made along with organisational infrastructures that can sustain them in terms of both financial and human capacities.

Database standards

Numerous organisations identified a need to share their information locally, regionally and internationally, but most are constrained from doing so by having collated their data on a variety of different database platforms. To place this material onto an on-line service common software solutions and networking protocols are required to facilitate this process. It is recommended that research and development be undertaken to create a common standard for the storage and networking of information from common database platforms.

Local Language Support

Much has been done to integrate a variety of languages into communications software packages. Much, if not all of this work has been done locally (e.g. in Vietnam, Indonesia), but there is a paucity of general information about networking available in local languages. Materials that describe networking, its benefits, its uses, access

points, glossaries, etc., are all required to raise awareness to the medium in general. It is therefore recommended that any networking programme for the region ensures that background information, training and support materials be prepared in both English and the local language.

Training

Access to trainers and training workshops on network use, on-line service provision and management is largely unavailable in the Pan Asia region. Though many networks do manage to employ people with a high level of expertise, they are often over-committed or under-utilised. It is therefore recommended that identified project partners be trained at the IDRC Workshops scheduled in Singapore during INET 95. This will be an opportunity to skill a range a potential content and on-line service providers, explore and find solutions to common problems, as well as to share experiences. It would be as much an opportunity for training as it would be for raising awareness to the realities of networking.

Workshops

Exposure to on-line services is meagre in many countries of the region resulting in false expectations of what the medium can deliver. It is recommended that a series of workshops be conducted in countries where awareness to the realities of networking is poor.

Carrier / Content Dichotomy

During the course of the Study Tour it was observed that several long-time documentation centres needing to disseminate information more broadly were researching options for networking from within their own institutions. At the same time it was observed that some network providers were developing their facilities without consideration of content/application. As a result there is the potential for duplication of resources, duplication of service provision where there should not be.

Figure 1 illustrates the dichotomy between information and network providers. It demonstrates how such services could pool their resources to enable a far richer on-line facility.

Carrier Services (A) provides networking and programming expertise. Content Provider (B) provides information documentation expertise. User (C) needs to communicate with their colleagues as well as requiring access to information. But C cannot afford to allocate resources to link up with A and B independently.

B needs to provide access to its resources to local and remote users. In most cases B will attempt to provide (remote) dial-up access duplicating facilities developed by A. A requires content to attract users. In some instances it will focus on e-mail as a feature service neglecting content available from B.

Thus A and B "go it alone", perhaps unaware of each others initiatives.

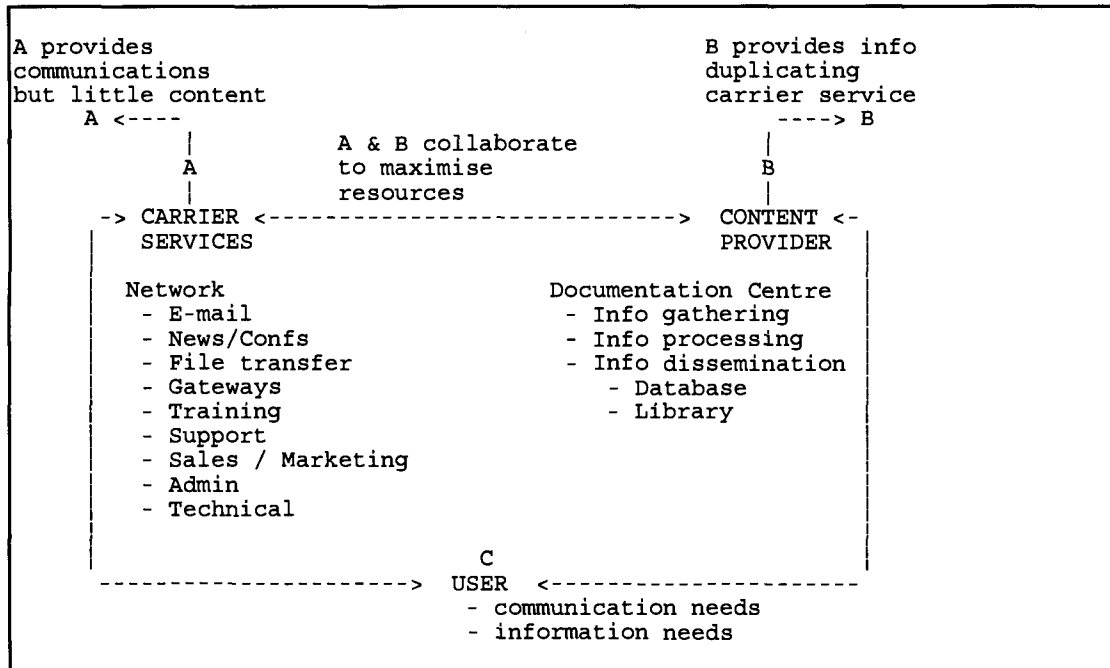


Fig. 1 Content and Network provider dichotomy

The IDRC Workshops provided avenues for local initiatives to meet and to get to know each other. In many cases the workshops acted as a catalyst for bringing these projects together where no other forum had been able to before. It is therefore recommended that further workshops, training and dissemination of a public version of this report content providers and network services would be encouraged to maximise use of available resources ensuring the sustainability of both these facilities.

Such an initiative would ultimately benefit the user. The user would gain access to both information and communications tools via a single conduit. Thus, as illustrated above, A, B and C's needs are met without duplication of resources.

Research

Networking technology, the reach of the Internet and people's awareness to it is changing everyday, and rapidly too. To keep abreast of the present trends, as well as to fill in areas unable to be fully researched during the Study Tour it is recommended that further research be funded. This research would form the backbone of much needed background information to networking in the region which could in turn be published and distributed for public consumption.

Asia Networking Guide

Information about networking initiatives, possibilities and realities in Asia and Indochina is rare and unavailable in many countries. Often, there is more information available about such activities in Australia, the United States and Europe than there is in the Pan Asia region itself. As the IDRC Study Tour of networking has collated so much information, and access to even more resources is at hand, it is recommended that these materials be published in a suitable format for public consumption in the Pan Asia region. This publication would take the form of a "networking guide", illustrating present trends, available technologies and contacts for both on-line/network services and further information. This publication would be an invaluable resource for potential service providers, content providers and users. It would be published in a variety of languages and updated biannually. It would also be an excellent resource to demonstrate to the international community the extent of network development in the region and how it has in many way pioneered low-cost network access in the developing world.

1.0 COUNTRY REPORT - BANGLADESH

1.1 SCHEDULE

DHAKA	22 May - 24 May
Workshop - International Centre for Diarrhoea Disease Research	23 May
Scheduled Interviews	22 May - 24 May

Organisations Interviewed

Contact

International Centre for Diarrhoea
Disease Research

Shamsul Islam Kahn
Head, Library & Publications

Mr S.M. Iqbal
Computer Information Services

PraDeshta Ltd

Samudra E. Haque
Director

PIACT

Amin Amir Ali

SAARC Agricultural Information Centre

A.K.M. Abdun Nur

Policy Research for Development Alternatives

S.M.Md. Monsurul Hakim
Computer Division

1.2 OVERVIEW

Organisations from Dhaka welcomed the IDRC Workshop as a very timely event. The Workshop attendees were keen to know more and were active participants. In all there were 22 participants, representing 20 organisations. Apart from two organisations, all those represented had access to computers. Libraries and information centres were well represented and these institutions were interested in exploring possibilities of access to remote databases. However, computer communications was still a new concept to them. Many of them had heard of on-line database access, e-mail and other related terminology's, but were not clear on how these tools work or how they could be integrated into their present work practices.

Only 3 organisations had some minimal experience with e-mail and computer communications. At the time of the Workshop, there were only two e-mail service providers in Bangladesh. One was an experimental site established with a view to providing a commercial service for the country. The other was a site run by an NGO in partnership with GreenNet, London. Only a handful of organisations or individuals were using these services.

International Centre For Diarrhoeal Disease Research Bangladesh (ICDDR) is an institution with powerful computing resources. They could emerge as a large bandwidth user of electronic networking if their current efforts to popularise e-mail within and outside the organisation succeeds.

The NGO Policy Research for Development Alternatives (UBINIG), and other NGOs like the Community Development Library (CDL) are promising key players in the medium who could make significant contributions in promoting the use of the networking amongst the NGO sector. They would also play a useful role in maintaining the information content of the network as relevant for NGOs. Operating a host has already provided insight into the logistics that go behind it, but now they need support and guidance to further their skills and they require assistance with equipment to further augment what they have already commenced.

University libraries, documentation centres like Bangladesh National Scientific Documentation Centre (BANSDOC) and national information centres like AIC engage in various forms of non-electronic networking. Most of them are in the process of computerising their information services and they all have plans to use computer communications for information exchange. In the absence of an established network host with bandwidth capacity to service them, these institutions would be potential collaborators in any electronic networking initiative in Bangladesh. With proper co-ordination and planning, network resources could be shared and duplication of efforts avoided in the independent initiatives that emerge from amongst these organisations.

1.3 TELECOMMUNICATIONS CONDITIONS

Bangladesh has a very low telephone density of 0.2 handsets per 100. The penetration of PSTN into rural areas is very minimal. The exchanges that are being used are old and already overburdened with present traffic. There are promising moves to improve

this situation but it will take a lot of time and extensive investment which the government may not be in a position to commit to at this point in time.

Telecommunications has not been on the government's priority list for some time. Available resources are directed at other more basic infrastructure requirements. However, there are signs that those who are in the planning commissions are increasingly motivated to support telecommunications as they view this as a necessity rather than a luxury.

On existing lines, test revealed that modems were functional within a limited distance. Connections as high as 14.4bps were possible for short duration's. Data transfer rates were satisfactory. Whether this can be replicated over longer distances and across different exchanges is yet unknown.

1.3.1 REGULATORY ENVIRONMENT

Minimum telecommunications regulations exist in Bangladesh. Those that do are rarely imposed. There are yet no restrictions on the present e-mail providers. However, it is highly probable that information travelling across telecommunications services is monitored by government authorities.

It is thought that the current regulatory climate is due mainly to the little exposure the government has had to data communications and telecommunications in general. But is certain that when their awareness to such facilities is raised regulations will be drafted and strictly imposed.

Electronic communication has no precedence in Bangladesh, but it is clear that as popularity increases, electronic communication will also be closely monitored. The government plays a very active role in regulating information content and flow and care has to be taken to be sensitive to this issue, not to mention the local culture and tradition.

1.3.2 LOCAL INITIATIVES / PROJECTS

Only two electronic networking initiatives were visible in Dhaka. One is being run by a commercial service provider (PraDeshta Ltd.) and the other an NGO, (UBINIG). Both these initiatives are relatively new and serve a small user base. Other organisations in Bangladesh are in the process of computerisation with plans to eventually establish in-country and international connections.

PraDeshta Ltd

PraDeshta is a private company that specialises in systems integration and network services. They have recently set-up an e-mail node at Dhaka and have around 28 users. They provide UUCP-based e-mail and Usenet services. PraDeshtaNet links to the Internet site SLUGNET at Singapore using IDD lines. Charges for their international e-mail service vary between Taka 1,000/= per month to Taka 4,000/= per month. Users pay higher rates if they require their mail to be sent out on a priority basis. The company is exploring possibilities of a TCP/IP link to the Internet.

Policy Research for Development Alternatives (UBINIG)

UBINIG, an NGO based in Dhaka, has been operating a Fido host for at least a year. They connect directly to GnFido at GreenNet, London over IDD. Access on this network is open to NGOs and development organisations. However, at present only a couple of organisations are using this link. UBINIG has not yet publicised their services as they are at the stage of acquiring expertise in operating and managing a network host. They are likely to open out services as a full-fledged host for e-mail and conference traffic within the following year.

International Centre For Diarrhoeal Disease Research Bangladesh (ICDDR)

ICDDR-B has drawn up plans to migrate from an IBM 4361 mainframe set-up to a system of LANs to interconnect its various departments. The plans include introduction of e-mail services across the LAN with a gateway into international networks. Further study would be required to assess bandwidth requirements of ICDDR-B to justify a host-site on campus with a high-speed link to an Internet gateway. Though a host at ICDDR-B could possibly service other organisations, as a specialised centre of disease research, the institute would need to go beyond its mandate to cater to the varied information needs of potential users from other sectors.

Bangladesh National Scientific Documentation Centre (BANSDOC)

BANSDOC is a central organisation that serves as the focal point for scientific and technical information. They have launched a three year data communications project. In the first phase they hope to automate the science, technology, research and development libraries, the university libraries within Dhaka and 7 libraries outside Dhaka. The second phase would interconnect participating libraries to the central host at BANSDOC and the third phase would provide connectivity to international networks.

1.4 LEVEL OF IDENTIFIED EXPERTISE

A fair level of expertise in general computer applications was evident amongst the participants at the Workshop. Almost all organisations were using standard computer applications such as word-processors, databases and spread sheets. Every organisation represented, had at least one staff with basic technical skills to manage general computer use. Around 10% to 50% of the staff of organisations were computer literate.

Expertise in computer communications was available in only 3 organisations. Out of these, UBINIG, is familiar with Fido technology. They have about a year's experience in running a Fido host and are connecting to GreenNet over IDD lines. They provide communication channels through their facility to other NGOs. Through GreenNet, they are connected direct to the Internet.

ICDDR B has experience in accessing international databases over IDD lines. They have a well-equipped computer infrastructure with an IBM mainframe, 40 terminals and 300 PCs. They are in the process of converting to a network of super-mini systems with an e-mail gateway. As recent as April 1994, ICDDR-B hosted a team from the Asian Institute of Technology (AIT), Bangkok, who were conducting a 2-week study on "Information Technology Strategy".

The AIT team not only assessed the effectiveness of ICDDR B's computer systems, they also recommended upgrades to the existing computing facilities and in particular improvements to present communication links. The recommendation makes provision for a direct high speed Internet link to the ICDDR-B mainframe. The recommendation was based on the fact that a number of organisations find their postage and telecommunications costs drop by 50% as traffic moves through the Internet. This works out to a significant saving considering that ICDDR-B spent in 1993 USD 114,704 on postage and telecommunications.

PraDeshta Ltd. is a private commercial e-mail service provider run by a highly competent individual well versed in UNIX communications systems. They provide UUCP connections to other organisations and operate a commercial dial-up with international connectivity. They connect twice a day to a UUCP provider in Singapore.

1.5 LOCAL REQUIREMENTS IDENTIFIED

Infrastructure capacity building stands out as the primary requirement for electronic networking to take root in Bangladesh. There is need to establish a carrier host with high bandwidth capacity and high speed link to the Internet or other global networks.

In the present situation, there are only two operators providing limited services to a small group of users. Both the existing initiatives show promise and need to develop technical capacity to provide sustainable services.

Universities, libraries and information centres need support in system integration to provide connectivity across local area networked systems to a central host with facilities for on-line database access.

Training and extensive exposure to network features and services is the second most important requirement for both host service providers and users. Potential host sites need training to set-up, operate and administer a communications network. Users require training in navigation of global networks and general skills in use of e-mail and other services.

All organisations keen on participating in a communications network need to be further sensitised on the differences between host providers that function as carriers and host providers that focus on information content. Clarity on this issue could promote co-ordination and resource sharing between emerging host service providers.

1.6 FUTURE DEVELOPMENTS IDENTIFIED

Due to the disparity that exists in the standard of living, care has to be taken to ensure that the networks that evolve have an equitable reach and distribution. Active government support in new initiatives could go a long way to ensuring that the obstacles on the pathway are cleared. Small NGOs are playing a very important role in the country and they need to be supported. Care has to be taken when talking about high bandwidth pipelines to ensure that low cost models are maintained. For necessary data communications penetration into Bangladesh, these are the networks that are more likely to succeed in an hostile environment and with minimal resources.

The existing void in electronic networking services in Bangladesh, is likely to be filled by a few organisations based in Dhaka. In the absence of a national communications backbone, there could be competing endeavours to set one up. It is possible that independent initiatives taken by different organisations would not be known to each other. This could mean duplication of efforts and wastage of resources that could otherwise be shared.

Amongst the known initiatives, it is anticipated that PraDeshtaNet would grow into a more widespread commercial service for general use. On the other hand, the UBINIG host for NGOs can be expected to expand its user base in the short-term. Fido technology used by UBINIG can provide viable dial-up links with organisations based outside of Dhaka.

1.7 RECOMMENDATIONS

While the Bangladesh government is engaged with the task of increasing capacities of its telecommunications infrastructure, it is likely to be a long time before free and equitable access to communications resources becomes a reality for a majority of organisations in the country. Present tariff structures for leased line links and satellite channels are prohibitively expensive for development organisations. A national communications facility could become viable and self-sustaining only if a broad base of institutions is brought under the network. Even so, the cost of providing adequate bandwidth and high speed links to this large base of institutions will still too high excluding participation by smaller organisations. The country is in dire need of connectivity points that could serve as gateways into global networks. Developments in the sphere of networking can be expected from BANSDOC and University libraries in the near future.

The NGO sector is fortunate to have connectivity through UBINIG at this early stage of the country's networking history. This initiative needs to be encouraged and supported, firstly because it has chosen to employ a low-cost, appropriate technology, and secondly because it caters to a vital sector that would in the normal course of events be side-lined in any major cost-intensive network.

Recommendations for Bangladesh aim at supporting initiatives to develop basic networking infrastructure, integration of low-cost technology with high-speed high-cost carrier hosts and promotion of joint endeavours to enrich information content of

emerging networks. Towards these ends, we recommend:

- Collaboration with efforts to set-up a national carrier for Internet traffic;
- Training a core team of technical resource persons in various networking technologies so that they can play a meaningful role in planning and designing a suitable network model for the country;
- Intensive training and exposure of user community to tools for accessing e-mail and information;
- Facilitating collaborative efforts around areas of common interest so that the content of information generated on the network is relevant not only to development projects within the country but also to those within the region;
- Consolidation of the Fido host for NGOs into a sub-centre that feeds into a larger national network, to better improve the potential of this dial-up technology and to promote its implementation in far-flung district centres.

1.7.1 MODELS

Due to the preliminary stage of evolution of networks in Bangladesh, it is recommended that a further study be undertaken to establish the feasibility of networking initiatives. Unless a method is evolved to ensure equitable and sustainable networking that can have a wide reach, it may not be wise to support any single initiative. In most cases capacity building activities can be undertaken by associating with existing initiatives of various organisations.

1.7.2 PARTNERS

Due to the embryonic nature of the research done in Bangladesh no partners have been recommended. Some organisations expressed an interest in further contact with the IDRC programme, but further research is required to determine their capacity for further involvement in any data communications project.

2.0 COUNTRY REPORT - CAMBODIA

2.1 SCHEDULE

PHNOM PENH 23 April - 26 April
Workshop - A workshop was not held in Phnom Penh.
Scheduled Interviews 23 April - 26 April

Organisations Interviewed	Contact
Secretariat for Rural Development Kingdom of Cambodia	Jaffer Nurmohamed Project Co-ordinator
Co-operation Committee of Cambodia (CCC)	Rosemary Harbridge Librarian
Lutheran World Service (LWS)	Norbert Klein Cambodia Representative
Lutheran World Service (LWS)	Janet Ashby Administrative Assistant
National Library of Cambodia	Mr Kruoch Chhoeun Deputy Director
Ministry of Posts & Telecommunications	Koy Kim Sea Under Secretary of State
Cambodia Development Research Institute (CDRI)	Johann Paquet Co-ordinator Documentation Centre
Australian Embassy	Paul Given Business Adviser
Australian International Development and Aid Bureau (AIDAB)	Katherine Bourke PASU Manager
United Nations Development Programme (UNDP)	Patrick Gremillet Programme Officer Programme Support Unit
United Nations Volunteers (UNV)	Keith Hargreaves UNV Program Manager

2.2 OVERVIEW

The 4th poorest country in the world presents us with some intriguing possibilities for networking. Rapid development in all sectors of the countries infrastructure is taking place with primary financial assistance from France, Japan, USA, Canada and Australia.

Distributing much of this aid and development funding is the countries ex-pat NGO community. These NGOs provide expertise, training, community liaison and other specialised skills in considerable collaboration with the Khmer government.

It is not often that we see an NGO community work so closely with government. Even rarer is the government's open endorsement of NGO activities. Without them Cambodia would be entering the global domain at a much slower rate than it is now.

With this in mind it is feasible that any new initiative introduced to Cambodia could aid in its infrastructure development, and perhaps even skilling sectors of its potential work force.

An impressive amount of technical resource is being poured into this country. Addressing local "environmental" conditions, assistance towards creating easy and cheaper access to exposure to new technologies and skill development it is easy to foresee that Cambodia could become technically literate in a very short period of time. But to do so, it would need strong external support sensitive to local needs and requirements.

As there was no scheduled workshop in Phnom Penh, the consultants met with both government ministries and services, NGOs and international agencies. As a result of these meetings there was no doubt that there were strong needs amongst both the government and NGO communities for more training and regular exposure to information technologies as well as e-mail access. The latter to overcome difficulties experienced due to high costs for communications and poor telecommunications infrastructure in general. Addressing these needs will be a challenge for the IDRC Pan Asia Networks Programme, but with creative modelling and close collaboration with a number of potential project partners these barriers could be overcome.

But as the political situation is far from stable there is general uncertainty around sustained reconstruction and development throughout Cambodia. Under such conditions network development could easily be overshadowed by more immediate needs in food production and distribution, health and sanitation, transportation and of course, defence. Any networking programme must take into consideration this potential constraints.

Having said that, at this stage of its national reconstruction and development Cambodia provides excellent opportunities for the introduction of models for electronic networking. Models which aim at creating equitable access to capacity building plans for communities beyond NGOs and government departments. The recommendations presented in this report reflect this view.

2.3 TELECOMMUNICATIONS CONDITIONS

The state of Cambodia's telecommunications system could be described as archaic. With foreign assistance it is developing capacity for growth to accommodate increasing demand for public and private services. But at present, with only 5000 active telephone lines in the entire country, unpredictable political and environmental conditions, it is unlikely that improvements will occur in the quickly in the short term.

But, Mr Koy Kim Sea, Under Secretary of State Ministry of Posts and Telecommunications was certain that the following developments, planned for implementation within the next two years, will occur despite current constraints.

Telecommunications developments planned for the term 1994 to 1996:

- Improvements to local exchanges;
- Improvements to cable network with French and Japanese investment;
- Installation of an additional 5000 lines in Phnom Penh;
- Installation of a 6000 line exchange financed by French government;
- Installation of an extra 20 000 lines financed by Japanese government;
- Design of telecommunications standards (i.e. modem approval specifications) with foreign assistance;
- Reduction on telecommunications tariffs and charges.

By the end of the century it is perceived that up to 100, 000 lines will be available. Some of these will have come from the "moth-balled" national VSAT network built by Australian Telecom for the UN ATUG. Tenders for its refurbishment have been called for. It is envisaged that it would provide up to 5000 lines routing all the provinces via Phnom Penh.

The Posts and Telecommunications Ministry charges USD 250.00 for installation, though up to six different companies can provide the same service at competitive rates. They claim to be able to install new lines within a week.

Three separate mobile phone operators exist to compete in a small market yet are surviving due to the reliability of their services. As the cable network improves these businesses may find it difficult to sustain themselves off a limited client base. Even with the potential for improved telecommunications divisions access to these facilities will be for only those that can afford it. In today's Cambodia, its largely the government and international community in centres such as Phnom Penh that have both the need and resources to procure telephones, fax machines and even modems.

The Post and Telecommunications Ministry operates and controls the country's telecommunications infrastructure in association with foreign and local investors. It assures uniform network installation and access across the country as well as approving all subscriber-end equipment. The Ministry sets all telecommunications service rates and charges. Subscribers pay the Ministry for usage. The Ministry then in turn pays a percentage of its revenue to its various investors. The remainder is paid to the State.

Though not often adhered to by the private value-added service providers (see 2.3.2), the following rates are standard for international calls:

<u>Per minute rate</u>	<u>Destination</u>
USD 3.80	Thailand
USD 3.80	Australia
USD 4.80	USA

Table 1. *International call rates from Phnom Penh*

2.3.1 LOCAL TECHNICAL FACTORS

The following constraints could impose on any future communications programme for Cambodia. That's not to say these impediments cannot be overcome, they simply need to be recognised as the major technical factors influencing growth of networking in Cambodia today.

Power

Power outages are frequent. So too is "power theft". Power lines in certain districts are often "tapped". The most common method of tapping is slinging a suitable cable over an active one to draw a current off it. Though dangerous, for many people it is the only source of affordable power.

Most Ministries and NGOs use solar power where ever possible. The wealthier organisations will use an uninterrupted power supply (UPS) as a backup for unpredictable outages.

Line Quality

Telephone exchanges that are currently active are of such a poor quality, they can generate far too much line interference (line noise) for reliable interactive network access.

Poor Technical Backup and Maintenance

Cambodia's record for computer technical backup and support is not a good one. Local expertise in the field is poor. When required computer parts have to be imported taking a simple repair several weeks, sometimes 2-3 months to complete. The staff from Australia Telecom/Telstra have been known to offer technical support to various organisations but this is clearly an unsustainable situation.

Khmer language tools

Development of software, interfaces and keyboards in the Khmer language is very slow. One probable reason for this is that the Khmer language is so little spoken outside of Cambodia that research in the area would be almost, if not totally non-existent.

Environment

NGOs in Cambodia are isolated by high communications costs and difficult telecommunications conditions. Telephones can be difficult to procure, faults with the phone and electricity networks are common and international phone calls are very expensive.

Cambodia's weather is unkind to computers. Where possible computers are placed into air-conditioned environments to maintain performance.

Not only must computers be kept in an air-conditioned environment they must be free from dust as well. Instances of computers being exposed to dust and malfunctioning as a result are common.

2.3.2 FACILITIES/SERVICES

Packet Switched Network

There is no packet switching network available in Cambodia. Various foreign telecommunications companies have expressed interest in installing one, but due to limited number of users in the short term investment in such a utility is unfeasible.

Telecom - Telstra

The Post and Telecommunications Ministry pointed to encouraging infrastructure development by the Australian based company, Telecom/Telstra. Telstra have been installing international and local gateways since 1989.

Telecom/Telstra has funded telecommunications infrastructure development, and provided technical expertise for installation and training. In more recent times, Telstra entered into a Business Co-operation contract with the Ministry for Posts and Telecommunications. The contract stipulates that the Ministry set a tariff on all services installed by Telstra (see above IDD charges) from which Telstra would then receive a percentage of the revenue.

Telstra's involvement in Cambodia has been in the following:

- installation of 5000 lines in Phnom Penh;
- domestic international gateway (satellite);
- optic fibre cabling around Phnom Penh;
- provision of pay phones;
- installed national VSAT network on contract to UN; and
- technical training provision.

Private Communication Services

Telecommunications facilities, such as UniLink and other such private store and forward fax, telex and e-mail services are emerging. Charges tend to be 10% - 20 % higher than official rates. But use of the Ministry's facilities for such value added services is considered illegal.

With few regulations and processes to implement them many such facilities operate with ease. It is hoped that with increased standardisation these facilities will either conform to more liberal pricing policies or become redundant.

Internet

This is no active Internet host in Cambodia.

2.3.3 REGULATORY ENVIRONMENT

In the field of telecommunications few defined regulations yet exist. As so much of Cambodia's economic, political and social infrastructure is being reconstructed. Thus, whatever regulations do exist are hard to enforce in the absence of formal procedures

to implement and oversee them.

Given current conditions the following possible regulatory scenarios were hinted at by the post and telecommunication authority:

- Basic telecommunications network to be operated by post and Telecom authorities and should be uniform in terms of engineering and tariff standards.
- Mobile phone services and wireless are considered as non-basic services and are not likely be covered by any regulations.
- It is also likely that the Government might impose an approval procedure for the use of fax and data communication equipment used over its lines.
- Current import duty structure for IT equipment is not very clear. This too might become more defined.

However, at present certain formalities exist to either ensure the success or failure of telecommunications ventures. An Australian Telecom official suggested the following three steps towards a successful application to the Post and Telecommunications Ministry:

1. Inform all relevant Ministries of proposed venture
2. Develop collaborative arrangements with Ministries
3. Develop collaborative arrangements with other parties already active in Cambodia

To ensure that Cambodian telecommunications facilities are developed in accordance with international standards the International Telecommunication Union (ITU) is preparing a master plan for the country. This plan will take into consideration not only the immediate needs of centres such as Phnom Penh, but those of the country-side as well.

2.3.4 LOCAL INITIATIVES / PROJECTS

The high costs of IDD calls and the poor quality of most exchanges have encouraged various organisations, particularly the NGO community, to experiment with any alternative available to them. The more prominent of these initiatives are described below.

Cambodia Committee for Co-operation (CCC) Network

CCC has been actively evaluating the potential for the use of networking amongst their member NGOs. They promoted a number of different network models to their board, each with varying degrees of success.

After sending a representative to the SEAFDA/Interdoc Asia Pacific International Workshop on Low-cost Networks they began a trial of the Australia based, Pegasus Networks. This proved a costly exercise. Interactive IDD calls were required to maintain connectivity and these were of very poor quality. Line noise would continually break the call. Use of Pegasus's off-line reader, which would have reduced on-line costs as well as maintained calls despite line noise, was not an option as they were keen to offer a model for networking in Phnom Penh for their members. Messenger could call out but cannot receive calls such as is required by a host network.

To gauge interest for the service amongst NGOs in Phnom Penh CCC circulated a questionnaire to 26 members. Ten out of the 26 organisations already had modems and all responded enthusiastically on the need for network services.

TOOLNET, approached CCC with a proposal which would have seen them establish a TOOLNET hub, or TOOLNET Access Point (TAP) in their office. TOOLNET offered e-mail, fax and literature search services. CCC have been trailing TOOLNET, but have opted for Pactok

a) Background to CCNet

The Co-operation Committee for Cambodia is a membership organisation for NGOs working in Cambodia. It was established in 1991 by NGOs themselves and the Cambodian government, international organisations and others supporting relief, reconstruction and development efforts. CCC currently has 58 member agencies , working in a variety of sectors.

b) CCCNet

CCC is establishing an electronic mail network for NGOs working in Cambodia in collaboration with the Pacific Community Computer Networking project, Pactok.

c) CCNet Objectives

CCCNet aims specifically to encourage cost-effective information exchange between NGOs working in Cambodia and their overseas partners in order to enhance their efficiency and effectiveness.

d) Host management

The network manager is the Executive Secretary of CCC, but the daily running of the network will be the responsibility of the Technology Resources Assistant. This person's duties also include a range of technology based activities including

publication production, database management and management of CCC's NGO time-share computer facility. Overall responsibility for the network is in the hands of a Management Committee.

TOOLNET Cambodia

The Partnership for Development in Kampuchea (PADECK), a Dutch NGO, has entered into a partnership arrangement with TOOLNET. PADECK are offering subscribers a 2 month free trial period. At this stage the only charges are for the sending of e-mail set at USD 0.25 per kilobyte.

Lutheran World Service (LWS)

LWS Cambodia program is a country program of the Lutheran World Federation. They are members of the Sustainable Agriculture Network (SAN) which is also active in Vietnam, China and other countries in Asia.

Keen to use e-mail LWS Cambodia Representative, Norbert Klein, experimented with various forms of networking technology. His experience in the field goes back some years so his awareness to the constraints imposed by limited and poor telecommunications conditions is high.

Oxford University, United Kingdom, assisted in the installation of the communications package, Waffle. LWS would poll Oxford on a frequent basis for the exchange of e-mail. The Swedish Foundation for Promotion of Science provided LWS high speed modem and subsidies for communications costs to Cambodia. This model worked successfully for some months until an undefined fault with the software configuration put an end to the polls to Oxford. As local expertise in the use of Waffle is non-existent the LWS to Oxford link had remained dormant till mid-August. Polls to Oxford have resumed and a willingness to co-operate with CCC has been extended.

In the interests on raising awareness to the benefits of e-mail and networking in general LWS organised a demonstration of the Oxford link. Over 25 local NGOs attended indicating a relatively high level of interest in the medium.

LWS have also experimented with cellular phones but the high cost of calls is prohibitive to sustained use for e-mail.

One of the main reasons for this determination is to maintain regular communication with SAN as well as encourage the establishment of a network for the NGO community. To that end they have been supportive of CCC's efforts and will of course be an excellent resource when such facilities become broadly accessible in Cambodia.

Cambodia Development Resource Institute (CDRI)

CDRI is one of the best equipped NGOs in terms of technical infrastructure and human resources. They are in a position to play a key role in information technology related activities. Their intensive involvement in research, analysis and training of issues concerning sustainable development policies can provide ready made source of information for any emerging electronic network.

CDRI are keen to use e-mail. Currently they rely on fax and telephones to co-ordinate their international joint projects and research activities.

Oxfam Cambodia

Oxfam Cambodia had established a dedicated network with their office in England. At the time of writing this link was not operational. There was no one at Oxfam who was able to determine the source of the problem.

Oxfam is an enthusiastic member of CCC who have argued for a reliable and low-cost network for the NGO community in Cambodia. They expressed a willingness to extend their co-operation to CCC's plan to for an e-mail host.

United Nations Development Programme (UNDP)

The UNDP uses the standard United Nations internal e-mail system, Higgins - Group Productivity Software. UNDP plans are to link their LAN/WAN to the UNDP office in New York and then to the Internet. A satellite dish was recently installed by the Indonesian company, INMASAT, to the frustration of the Posts and Telecommunications Ministry. Necessary permissions for the ground station installation were not sought for by the UNDP.

INMASAT will provide the UNDP with four open channels, two of which will be made available to UNICEF. One of either of the two channels is for fax and e-mail exchange.

United Nations Volunteers Program (UNV)

The UNV is currently using UNDP's network to communicate with their Geneva office. Field officers throughout Cambodia, who are not able to gain access to the UNDP network, make extensive use of radio or mobile phones. Due to limited resources the UNV do not have any immediate plans to extend e-mail to field staff. Though, they would like a system enabling them to access UNV databases available from Cyprus.

UNV staff appear to be network literate and would make liberal use of a distributed network should one be available in Cambodia.

2.4 LEVEL OF IDENTIFIED EXPERTISE

The range of expertise in Cambodia is clearly defined by the exposure to IT to the indigenous community, the ex-patriot Cambodians that have returned to take key positions in government and the foreign based organisations. The latter two tend to have a far greater range of IT skills and awareness available to them.

The following organisation breakdown we can see clearly where the levels of expertise dip and peak.

Government / Ministries

- Computers are not widely used by the Government

- General awareness to the technology is poor
- IT training is available

Training to government personal is conducted by:

- Foreign companies such as Australian Telecom/Telstra
- Foreign NGOs

International NGOs

High level of exposure to basic computer applications:

- Word processing
- Desk-top publishing
- Database management

CCC maintains an information resource centre from which the following IT related services are available:

- Provision of both programme information and practical information of interest to agencies working in Cambodia;
- Liaison with other resource centres and libraries both within Cambodia and outside to facilitate networking and the sharing of information resources and skills.

CDRI has computer specialists on staff which provides services for:

- Data base management
- IT training
- Research
- Database creation and management
- Desk-top publishing

2.5 LOCAL REQUIREMENTS IDENTIFIED

Networking is recognised in Phnom Penh as serving the following needs:

- Reduced communications costs;
- Diverse and broader research capabilities;
- E-mail communication with colleagues locally and abroad;
- Remote database access;
- More efficient local and international project collaboration;
- To overcome the particularly poor telecommunications conditions.

2.6 FUTURE DEVELOPMENTS IDENTIFIED

The following developments have been identified:

- Installation and training for the management of a Pactok host at CCC;
- An active TOOLNET - TAP operating out of PADEK;
- Proposed addition of up to 100 000 lines by the end of the century;
- Re-activation of the national ATUG network;

- Proposed provision of a Packet-switched network in the long-term.

2.7 RECOMMENDATIONS

With vast plans for national reconstruction and development in process the advantages posed by access to broad information technologies has not gone unnoticed by the Cambodian government. But with increasing pressure to stabilise its political and social agenda IT is finding itself less of a priority.

In the meantime, Cambodia's foreign NGOs have moved to introduce a variety of IT programmes into the country. Those with strong international partnerships were quick to realise the value of IT in national reconstruction plans, and have remained active in skilling various sectors of the community now exposed to IT.

The following three recommendations outline a programme for network provision in addition to the existing IT services. It has been considered that these recommendations can contribute to national capacity building in IT overall.

Concerns for long term sustainability, equitable access to developmental planning processes, and capacity building of local communities have shaped these recommendations. The third recommendation in particular outlines processes towards sustainability.

1. Information Technology Resource Centres (ITRC) and Community Capacity Building

An ITRC, or Telecottage, is a “one-stop-shop” providing the community with a range of facilities, information resources and training in IT. Telecottages may be seen as a self-sustaining service centre, charging a range of fees for services. It is recommended that such a facility be developed for installation in Phnom Penh, with a view to extending the model to the provinces as economic and political climate stabilises.

ITRCs would provide a broad community with access to not only e-mail but a wide variety of IT facilities. Generally, such facilities are not readily accessible to a vast majority of the community. An ITRC would not only ensure that such access became mandatory, it would contribute to overall sustainable equitable development activities in Cambodia.

The NGO community has shown foresight in the introduction of IT into Cambodia. With their expertise in community liaison and general IT resource development and NGO would be best suited in the short-term to facilitate, manage and sustain an ITRC. In the long-term, ITRC could be run by local communities themselves with locally (ITRC) trained expertise.

The network component of the ITRC would be DOS based, thus relatively easy to maintain. It would act as a “hub” to local users then route all e-mail for international destinations across an IDD link with a host network situation elsewhere in the region. The host network would then distribute e-mail to its various destinations as well as route messages back to the Phnom Penh hub.

2. Regional assistance in the installation and development of ITRCs

Neighbouring countries such as Vietnam, China and Thailand have made impressive progress in IT. As such there are many skills and services available to Cambodia from the region that would aid in Telecottage and other network development.

Expertise could also be drawn from countries where ITRCs have already proven successful. In Australia, England, Scotland and various European countries Telecottages, as they are known there, have become integral to the reconstruction of communities impoverished by drastic changes in the local economy. As such, it is recommended that further research be conducted into the feasibility of drawing broad-range expertise, both from the region and internationally, into ITRC development in Cambodia.

3. Sustaining network services

E-mail networks integrated into an ITRC in Cambodia have tremendous potential to become self sustained (i.e. run on a cost-recovery basis). This is due to the high demand for international fax and e-mail services.

To ensure long term sustainability of such a service it is recommended that:

- Maximum use of all available IT resources be made;
- Broad and ready access to ITRCs be mandatory;
- Collaboration with existing service providers be investigated;
- Research and development be key component to provision of all user services;
- All services are charged for in accordance with local conditions;
- All technical equipment be kept in a suitable premise where they are not prone to extreme heat, to dust, etc.

2.7.1 MODELS

The consultants identified clear and immediate needs for e-mail and database access in Phnom Penh. But due to poor infrastructure, lack of equipment and telephones lines, hazardous environmental concerns, conditions for a full blown network service is unfeasible in the short term. As conditions improve, and some say perhaps within five years, a distributed network service would be possible.

In the mean-time, it has been considered by both Cambodian NGOs and the consultants that an alternative solution, the establishment of ITRCs, or Telecottages, be investigated and eventually introduced into the country. The Telecottage would enable the broad community to have access to e-mail and other IT resources without having to secure equipment of their own.

The first ITRC would be established in Phnom Penh with provincial centres operating when economic and political conditions improve.

High costs of IDD calls make it imperative that all such initiatives receive calls from outside to link them to international community.

At present DOS based technology for e-mail networking is the only workable option for Cambodia.

2.7.2 PARTNERS

The implementation of an ITRC model in Cambodia would require an organisation already IT literate, well connected in the community and able to liaise with both government and NGO clients/users.

Two such organisations are CCC and CDRI, with CDRI complementing the activities of CCC.

CCC would make for a suitable partner for the following reasons:

- CCC has expressed interest in providing a public e-mail service.
- CCC is a membership organisation and therefore accountable to users.
- CCC has expressed strong interest and shown capacity to even experiment with e-mail links during recent past.

- Being a cross-organisational membership entity CCC is more likely to attract users from a broad cross-section of the Phnom Penh community.
- ITRC could be incorporated into their existing structure of service provisions.
- CDRI's Programme co-ordinator is on the CCC executive board. This may assist establishing creative collaboration between CCC and CDRI. This could result in CCC being able to take full advantage of CDRI's experiences & skills in the provision of IT training.
- Recommendations from the September 1993 Annual meeting of CCC members included the exploration all possible ways and means for CCC to participate in a National Committee for Reconstruction and Development of Cambodia (NCRDC). This type of active relationship with other agencies beyond their members ensures that any capacity building activities undertaken by CCC would benefit the broader community including government.

2.7.3 FURTHER RESEARCH RECOMMENDED

Research for Project Formulation

CCC is exploring possibilities of setting up e-mail host. Further research in terms of how their current initiative could become a logical component of the more adventurous capacity building project - ITRC. Such research would aid formulating realistic goals, enquire into potential collaborations and further more, other financial contributors to this project.

Though technical skills to sustain ITRC are in short supply there are sufficient groups / individuals with enough background experience to initiate the project. Yet one does need careful planning in terms of training of trainers for an ITRC. In other words investigating feasibility of using technical and other resource persons from region (i.e. Vietnam, Thailand) would be essential to ensure necessary technical support for such a project. If required one may even investigate feasibility of linking this project with similar work done in the Asia Pacific region.

Technical Areas

Environmental and infrastructure factors leave the choice of appropriate technology and tools wide open for selection. Systematic experimentation or inventory of what tools, software, hardware, quality of phone lines is essential to ensuring the right choices are made at the outset.

Providing exposure to large scale shareware and freeware libraries available in other parts of the world, sharing experiences with similar projects in Africa (with similar or even worse infrastructure conditions) could become part of further research and investigations into Cambodia's network development requirements.

Another concrete area for research would be investigating the feasibility / viability of gaining Internet access via Thailand, or Vietnam for international e-mail connectivity.

Tariff structure for telecommunications and IT is evolving in Cambodia. Future policies in this area may influence some of the likely choices for the recommendations made in 2.7. On-going evaluation of emerging policies and options available would assist steering the project towards realistic goals.

3.0 COUNTRY REPORT - CHINA

3.1 SCHEDULE

BEIJING	14 May - 17 May
Workshop - Xiyuaun Hotel	15 May
Scheduled Interviews	16 May - 17 May

Organisations Interviewed**Contact**

Science and Technology Information Centre

China Environment News

Li Qirui
Vice-president
Deputy Chief Editor

NANJING	17 May - 21 May
Workshop - Jiangsu Provincial Academy of Social Sciences	18 May
Scheduled Interviews	17 May - 21 May

Organisations Interviewed**Contact**

Jiangsu Provincial Academy of Social Sciences

Prof. Li Zhangyun
Vice Chairman

Dept. of Computer, Southeast University

Prof. Gu Guanqun
Director CIMS Research Group
Head of Computer Network
Group

Jiangsu Academy of Agricultural Sciences

Jin Zhiqing
Associate Professor

Jiangsu Science and Technology Commission

Mr Li
Vice-Chairman

KUNMING	22 May - 25 May
Workshop	23 May
Scheduled Interviews	22 May - 25 May

Organisations Interviewed**Contact**

Yunnan University

3.2 OVERVIEW

Little information circulates in China about the various developments shaping the future course of data communications there. The most reliable and accessible information on China data communications is found outside of the country. Much of it is freely available to users of international data communications networks such as the Internet. The three workshops held in China (Beijing, Nanjing, Kunming) both identified and assisted in addressing this information gap.

Numerous network activities, mostly concentrated in academic and research centres, are occurring simultaneously in China. Many are occurring with little or no knowledge of each others initiatives. This may not necessarily be seen as a duplication of efforts. Given the size of the country and its extensive population there may well be need for several data communications providers each serving large sectors of the country, eventually linking to each other for intra-country data exchange.

The fastest developing data communications centres are Beijing and Nanjing. Parts of South-China, cities like Shanghai and other free trade zones are not lagging behind. In these areas demand for networking is largely dominated by the business sector. In the commercial centres of South-China special provision of low-cost international communications has been developed on the basis of Hong Kong's proximity to the mainland. Elsewhere development is driven by research and economic needs addressing the scope for capacity building.

University staff are generally technically confident and aware of the challenges of establishing broad-scale information and other data communications in China. Economic reform and the liberalisation of international trade agreements is influencing the way that many universities sustain their academic and research activities. It is generally considered that in the near future support from State institutions will dwindle. With this in mind, some universities have begun to develop links with the private sectors, both nationally and internationally, to support R&D activities in data communications.

For instance, the Beijing municipal government is hoping to attract information organisations and enterprises from across the country to aid in the creation of an "information network" in the capital. Along with local partnerships the Beijing Economic Information Centre will utilise a USD 6 million loan from Japan to build the network. It is envisaged that when completed, in 1998, the network will provide national and international economic information for governmental organisations and enterprises.

All in all there is a complex mixture of economic factors and organisational and institutional partnerships influencing the future agenda of data communications in China.

There is a strong and articulated interest in integrating emerging networking technologies into the day-to-day activities of organisations. Existing regulations can complicate the development access to these networks. But driven by both economic and political necessity (China does not wish to dawdle on the Information Super

Highway) these facilities will continue to emerge.

However, the provision of support to these embryonic networks, to ensure their accessibility by broad cross-sections of the society/community, to strengthen their capacity for contributing to equitable sustainable development is not going to be without its hurdles and challenges.

The IDRC initiative was well received, if not enthusiastically. Correspondence received from various organisations, post-Study Tour, is evidence of both their commitment and expectations. Though not all their expectations may be met, they do point to basic communications infrastructure needs that are surprisingly easier to address in the other country's reviewed by this study.

All in all, 33 organisations came into contact with the Study Tour. Table 2 is a city by city breakdown of organisations represented at workshops and interviews.

<u>CITY</u>	<u>ORGANISATION</u>
BEIJING	18
NANJING	11
KUNMING	4
TOTAL	33

Table 2. China city by city breakdown

There are promising networking initiatives are to be found in each of the three cities, though Internet connectivity is most certainly advanced in Beijing. There is no work being done at present to extend Internet access out to the remote provinces, and very little to bridge any concurrent developments cross-country.

3.3 TELECOMMUNICATIONS CONDITIONS

An enormous amount of telecommunications infrastructure development is active in China. The broad spectrum of facilities are being either upgraded or installed with vast amounts of both local and foreign investment. Conditions for data communications are excellent. Developments planned are described in detail in Section 3.3.2.

At present there are 48.1 million local and 533, 000 long distance lines active throughout China, bringing the total of actual phones in the country to 21.85 million. These phones and lines are of the "pulse" variety and are generally high standard. Little or no line noise is apparent. There is currently no charge for local calls.

As more and more families want their own telephones the waiting list for them is growing. Within the first six months of 1993 a total of 4.52 million applicants had their phones installed. There were no figures available on the number of outstanding requests.

Regardless of the stable conditions highlighted above, there are two key issues that

stand out as potential impediments to networking both locally and internationally in China.

1. Access to computers and other telecommunications infrastructure

Computers

Many funding agencies, including IDRC, have provided computers for research purposes to hundreds of institutions. One such agency alleged that most of these computers have ended up under lock and key. Principle researchers have limited access or none at all with computers ending up on only the most “privileged” of desks. In other words agencies assisting their Chinese partners cannot guarantee that support will enable access to computers by those whose projects they had been assigned to. Often researchers must seek permission from a “gatekeeper” or senior academic before a computer can be made available to them.

Institutional LANs

Many workshop participants in each of the three cities cited examples where LAN access was only available to the highest level of professor. Researchers had limited or no access at all.

CHINAPAC

It was highlighted during the workshop that CHINAPAC, the national packet switching service provider, often issues accounts to only those it wants to. And even then it cannot promise delivery. It was alleged that at least four prominent research units were not be granted accounts on CHINAPAC. In other words, CHINAPAC policies can be unpredictable and inconsistent. Some Beijing users found CHINAPAC - an unwieldy and difficult service provider and often experienced technical problems.

2. Regulatory Processes

Existing regulations are severe and cannot guarantee data communications access to the ordinary citizen. They could also impede further development on international links for many institutions. (Refer to section 3.3.3).

3.3.1 FACILITIES/SERVICES

China National Public Data Network (CNPAC)

- Largest wide area network (WAN) in China;
- Uses X.25 packet switched (PS) equipment;
- Designed to carry data at speeds varying between 1.2 and 9.6bps;
- CNPAC hub and network management centre is located in Beijing;
- Packet switches sighted in the major cities of Shanghai and Guangzhou;
- PS concentrators in eight other major cities;
- 26 packet assemblers/disassemblers (PADs) located elsewhere;

- Beijing hub provides an international access point connecting CNPAC to other countries;
- CNPAC used mainly for foreign trade and commerce;
- Little academic use due to high tariffs.

CHINAPAC

- Installation of CHINAPAC commenced in 1993;
- Intended to be major public data network backbone in China;
- When completed will have 5, 500 nodes covering all provincial capital cities of the Mainland, with Canton links to Hong Kong and Macao;
- Beijing to link rest to the of the world;
- Six countries presently linked to Beijing;
- International link runs at 64Kbps;
- Supports CCITT X series protocols including X.25 and X.75;
- Supports SNA, SDLC, 3270, DSP and BSC protocols;
- User links vary from 1200bps through 64Kbps;
- Users can connect to CHINAPAC through leased lines (X.25, 9.6Kbps through 64Kbps) or through dial-up (X.32, 9.6bps; or X.28 1200/2400bps);
- Currently, more than 20,000 user nodes in 267 cities in all provinces -- including remote Tibet, Qinghai and Xinjiang;
- Application can take up to 15 days to process.

The following CHINAPAC charges are quoted in Yuan (8RMB = USD 1):

International Access Charges

Connection Charge:	RMB	0.80/Minute
Traffic Charge:	RMB	0.07/Segment

Domestic Access Charges

Connection Charge:	RMB	0.20/Minute
Traffic Charge:	RMB	0.025/Segment

	1200 bps	2400 bps	4800 bps	
Registration Charge:	100 RMB	100 RMB	100 RMB	
Subscription Charge:	150 RMB	200 RMB	300 RMB	Equip
Test Charge:	200 RMB	400 RMB	600 RMB	
Protocol Test Fee:	100 RMB	100 RMB	100 RMB	

SprintNet International

US based public data network provider is in the process of installing the following:

- Three Tele-mail messaging systems to be installed in Guangdong Post and Telecommunications Administrative Bureau;
- Public e-mail services to be provided from Guangzhou, Shenzhen, and Jingmen;
- An X.400 connection to be made available for access to SprintMail.

Beijing Posts and Telecommunication Public Mailboxes

- Beijing Posts and Telecommunication Administration (PTA) is establishing an e-mail gateway between its packet switched mail service and the Internet;
- SprintNet is researching requirements for establishment of this gateway;

- Users will have access to an electronic mailbox provided by the PTA and accessed either remotely or directly from local post offices;
- Proposed that satellite access be made available to academic and research institutions at no charge;
- Considered that this service may relax intra-China connections separated by saturated terrestrial links.

Internet

See section 3.3.4, Local Initiatives/Projects, for details.

Finance and Trade Networks

According to sources from the Ministry of Post and Telecommunications, 22 trunk fibre-optic cables in addition to digital microwave lines and satellites, will be in place by the year 2000. This network will serve three of the following “gold projects”. Technical development for these projects is provided by the Southeast University, Nanjing.

- Golden Card - EDI for financial exchange (credit cards)
- Golden Customs - Foreign trade
- Golden Bridge - Economic information
- Golden Gateway - EDI Customs, trading companies and banks
- Golden Duty - Automated tax collection system
- Green Card - Organised by PTA for financial transactions

The following sites will be connected to the network:

- All provincial capitals;
- 330 prefecture cities and industrial cities.

At present, 38, 660 kilometres of optical cable has been installed and has become operational across the country. The entire network will be completed with foreign investment of up to USD 7 billion in addition to investment from the ministry and its local departments.

3.3.3 REGULATORY ENVIRONMENT

Regulations signed by the Premier Li Peng on February 1994 put computer information networks under the supervision of the Ministry of Public Security.

An extract from the relevant Act reads:

“The goal of computer network security work is to protect such important areas of as national affairs, economic and defence construction and advanced scientific technology”

“Any Organisations Interviewed or individual may not use computer information systems to engage in activities which go against the national or collective interests or violate the legal rights of citizens.”

These regulations require:

- Any system linked to international networks must be registered with state security departments;

- Computer networks to submit to police inspection.

Fax machines also need to be registered with the local Post and Telecommunications Authority. There are stiff fines for violating this regulation.

To date these regulations do not seem to have posed any threat to extending data communications internationally. Though there is some speculation that all data traffic leaving the country may have to pass through Chinese Customs.

3.3.4 LOCAL INITIATIVES / PROJECTS

There are number of local initiatives aimed at establishing simple links to information providers within the country, and/or internationally. For instance, participants to the Kunming Workshop described access to the US based Dialogue database service as very common. One organisation makes up to 3000 calls to Dialogue a year.

In most cases these initiatives use CHINAPAC of long distance calls to reach each other. Some organisations even allow access to their databases to selective users over modem links. But these links are elementary and not very efficient.

Metropolitan and Campus Networks

Each of the networks described below have evolved independently to their present stage. Each has its own technical team, financial resources, strategic planning processes and international connections. If they had access to the resources each would probably maintain their own international leased line. Since there is not an abundance of financial support for China academic networks, co-ordination and co-operation amongst them is imperative should they wish to achieve some of their long term goals.

National Computing and Networking Facility of China (NCFC)

- NCFC is a demonstration network linking Tsinghua and Peking Universities to various research institutes of the Chinese Academy of Science (CAS);
- NCFC funded by the PRC State Planning Commission and the World Bank (over USD 10 million);
- Regarded as best metropolitan area network (MAN) in China;
- Likely to become China's major connecting point to Internet;
- Consists of three campus LANs:
 1. Tsinghua University Network (TUNET);
 2. Peking University Network (PUNET);
 3. Chinese Academy of Science Network (CASNET).

- High demand for network links (especially Internet access) from scientists of all three institutions;
- Currently, about 2,000 hosts on three campus networks of NCFC, and the Academy of Sciences alone has another 2,000 computers waiting to be linked to the network;
- NCFC established full Internet connection using facilities of Sprint International in first quarter of 1994;
- NCFC plans to establish a Network Information Centre (NIC) to be used as a shared facility for all Chinese academic networks.

The Tsinghua University Network (TUNET)

Tsinghua University is considered the “premier technical university” in China. It has developed an impressive range of networking services with Canadian assistance. The TUNET Message-Handling System (MHS) was developed by the University of British Columbia and conforms to the CCITT X.400 standard.

Tsinghua University has developed an aggressive approach to commercialising its R&D efforts in computer and network technology. Currently it is contracted to do local user training for Microsoft and AT&T. Some of its own research projects have evolved into commercial products.

Access to TUNET is currently limited to researchers and scientists only.

TUNET e-mail system development includes:

- Migration;
- Chinese localisation;

- Menu adaptation;
- Implementation of remote user agents.

TUNET provides the following services:

- E-mail;
- Telegraph;
- Teletext;
- Fax;
- Videotext;
- Voice; and
- Image transfer.

TUNET has three major networking facilities:

- A circuit switched network based upon an integrated services PABX;
- A PSN based upon X.25 switches and PADs;
- Ethernet LANs interconnected through a 100-Mbps FDDI optical fibre backbone.

Bottom-line charges for TUNET are:

Registration: 2 000 Yuan per year
Usage: 1 000 - 2 000 Yuan per year

Chinese Academy of Sciences Network (CASNET)

- CASNET links up to 125 research institutes of the Chinese Academy of Sciences to each other;
- CASNET comprises three major hubs located at the Computer Network Centre (CNC), The Institute of Acoustics and the Institute of Computing;
- CNC serves as the monitoring centre of the NCFC metropolitan network;
- CASNET connects to external networks via CNC;
- The domestic wide area network connection is via CHINAPAC;
- The World Bank is expected to contribute funding towards a super-computer facility at the CNC.

Peking University Network (PUNET)

Peking University is considered to be one of the “foremost” science education institutions in China. It is host to the third of the NCFC academic networks, PUNET.

A major library information retrieval system is being developed under the auspices of the Peking University. It is expected to become one of the “major educational resources of the Beijing area”.

At present, PUNET users can access one of the largest scientific literature collections in the PRC.

Currently, PUNET links more than 300 PCs, 40 workstations and over 20 mainframes.

PUNET provides the following network services on campus:

- Electronic Mail using the SMTP protocol;
- File Transfer using the FTP protocol;
- Remote Login using the TELNET protocol;
- File Services and Disk Storage using NFS and Novell’s Netware file service;
- Name Service using the BIND Name Service protocol;
- Print Service for PC users, using Netware print services;
- Automated library management and retrieval system services.

Chinese Education Research Network (CERNET)

The Chinese Education Research Network is sponsored by State Education Commission and enjoys a long time relationship with CIDA.

It intends to establish a network of CD-Roms for State Libraries.

Department of Phonetics and Computational Linguistics (DPCL), Chinese Academy of Social Sciences, Beijing

The DPCL are keen content providers. They expressed a clear interest in information provision to suitable network development in China.

The DPCL identified the following databases and materials they would make available to the network:

- Database of China's minority languages (more than 80 languages);
- Acoustic database of Tibetan and Mongolian languages;
- Operating system for multi-minority writings;
- Tibetan Text-to-Speech system;
- A government consulting system on the use of the Chinese language across various social sectors (a project supported by IDRC);
- Database of publications concerning minority studies in China after 1949.

On-site communications for the United Nations World Conference on Women

As with previous UN World Conferences, the Association for Progressive Communications plans to offer communications services to NGOs in Beijing during the United Nations World Conference on Women (UNWCW), 1995. The central focus of this initiative will be to ensure regular provision of on-line information and documents during the event, from both the NGO Forum and the UN Conference, so as to create a direct information link with NGOs around the world. On-site communication services will also be provided where possible at UNWCW regional meetings through the regional programs.

This will also enable distant groups to participate in on-going discussions in such a way that, parallel to the event itself, a world-wide on-line event will be taking place that will significantly increase levels of participation in the Conference debates and dissemination of the main issues.

APC plans to provide the following services:

- Collect and upload documents from the event and co-ordinate with journalists to ensure regular on-line coverage of proceedings, with a particular focus on NGO activities and view-points;
- Provide services to NGOs present in Beijing, including electronic mail services between the NGO Forum and UN Conference sites, and connectivity to international networks (communication with partners at home, etc.);
- Provide e-mail services for NGO media networks to report back to their country offices and/or disseminate on-line information;
- Offer on-site training and user support in use of the computer communication systems;
- Organise a series of thematic workshops such as the use of electronic networking as a tool for NGOs.

The APC plans to provide at least 20 computer terminals at the NGO Forum site and 15 at the Conference site, which will be permanently interconnected, and will offer international connectivity through the Internet. Conferences and databases will be made available on the network.

The on-site project is to be co-ordinated and implemented by a women led team of technicians, trainers, user assistants and information facilitators from global and regional women's networking programmes. A volunteer team will be recruited to work in areas such as transcription, translation, scanning and uploading of documents, as well as user support and training.

The project is already being planned in co-ordination with UN agencies, the NGO

Planning Committee, the Chinese authorities and Conference organisers.

For the NGO Forum, priority will be given to working in co-ordination with women's and NGO media groups that require technical services during the event. Consultations are already underway with the following entities: UN Division for the Advancement of Women, UNDP, UN NGO Liaison Service, UNIFEM; NGO Forum Planning Committee; All China Women's Federation; regional and international media coalitions organising around Beijing.

3.4 LEVEL OF IDENTIFIED EXPERTISE

General exposure to computer technology is not very high, though where data communication development is concentrated expertise is highly specialised. Amongst the organisations interviewed it would appear that familiarity with computers in general was far greater in the natural sciences than the social sciences.

Local expertise could indeed be sought in development of communications projects, but due to the high level of specialisation exposure to a variety of communications technology, such as low-cost Fido, Waffle and UUCP options, is very poor.

In Nanjing and Kunming in particular such knowledge is scarce. There seem to be more skilled technicians focused on X.400 than basic DOS based applications.

3.5 LOCAL REQUIREMENTS IDENTIFIED

General requirements:

- E-mail software in Chinese language;
- E-mail connectivity to Internet;
- Facilities to allow on-line access to databases nationally and internationally;
- Cheaper and faster access to international databases;
- Information about networking initiatives and resources available on various networks;

Technical and financial support to set up LANs.

Beijing institutional and organisation requirements:

- Current priority of China Environment News (CEN) is to establish national network facilitating efficient links for their 50 reporters based in different parts of China;
- National Park Reserve: E-mail links with UNESCO initiatives and other countries using GIS to manage natural resources, national parks/reserves;
- National Bureau of Mapping wants fast e-mail links to US to exchange large volume of data (1 MB every day costing approximately USD 150 via CHINAPAC);
- Institute for Minority Studies would like to find ways to share their databases nationally and internationally.

Nanjing institutional and organisation requirements:

Jiangsu Provincial Academy of Social Sciences (JPASS) identified the following requirements:

- to connect to e-mail networks in Asia and other parts of the world;
- to link their offices in other provinces and cities;
- to link with IDRC office; and
- to increase use of computers for social research.

Jiangsu Academy of Agricultural Sciences (JAAS) identified the following requirements:

- LAN within campus to connect entire institute together:
 - a) to exchange research amongst scientists; and
 - b) for more effective administration.
- WAN within Jiangsu Province:
 - a) to link 9 regional institutes located in different regions;
 - b) to link 6 vegetable institutes in different cities;
 - c) to co-ordinate various projects;
 - d) to network together up to 62 counties; and
 - e) to transfer research results to extension stations to aid farmers.
- JAAS aims to connect to a National and International Network for:
 - a) extensive Internet access;
 - b) consistent and regular exchange with IRRI, IDRC and other relevant foreign agencies; and
 - c) to establish an environmental information exchange network.

Kunming institutional and organisation requirements:

The Institute of Scientific and Technical Information of Yunnan Province (ISTYIP) identified the following requirements:

- Set-up on-line access system for their databases;
- Access to electronic communications to facilitate regional and international collaborations and information exchanges;
- Use electronic networks to reduce costs of using fax.

The Yunnan University would like to:

- Compile databases on various subject and make it available on-line.

Yunnan Provincial Commission of Science & Technology (Patent Management Division), YPCST, would like to:

- Computerise patent information and make it available on-line;
- Access other patent databases on-line.

Many of the above requirements could be met with current data communications services. But much more co-operation is needed amongst institutions to ensure that those that need it are adequately briefed.

3.6 FUTURE DEVELOPMENTS IDENTIFIED

China plans to quadruple its telephone lines to 100 million by the year 2000.

On April 13, 1994 China's Telecommunications Minister unveiled plans to build two nation-wide digital information networks to aid in economic development. These networks will provide "special digital circuits" to customers in 21 high-tech export companies, and particularly for those with manufacturing joint ventures in China.

At present, due to limited information on data communications use there is only a small market to draw a user base from. But, it is clear that with the extensive development occurring now the market for networking and information will most certainly grow. Whether there broad access, free-flow of information in-country and internationally remains to be seen.

3.7 RECOMMENDATIONS

Formulating recommendations which can aid in equitable sustainable development processes is a formidable challenge in light of the following constraints:

- Regulations on use of telecommunications infrastructure;
- Department of Public Security influence on data communications use;
- Considerable language barriers;
- Virtually no presence of active local NGO community to influence broad access.

With the above taken into consideration the following activities are recommended to aid in process of liberalising access to data communications in China.

Disseminating Information About Networks

To address the information gap in China on data communications and in-country developments it is recommended that:

- Updates on data communications services in China be disseminated in the local language;
- Information on networking uses, glossaries and other helpful documents be made freely available to all interested parties.

The State Science and Technology Commission (SSTC) would be invited to identify potential contributors from various universities and scientific institutions to assist in compiling such documents in non-technical Chinese. The SSTC could also co-ordinate, publish and disseminate this information throughout China via its own “networks”.

Training Workshops

There is a deep and growing desire to understanding the potentials of electronic networking. It seems that there few avenues to get exposure and training in the field. This appeared to be the case, in particular, for organisations conducting social research. With such little exposure it would limit the growth, let alone implementation, of any data communications initiative. Bearing this in mind it is recommended that:

- A series of data communications workshops be conducted in both Chinese and English in the major centres of the country
- These workshops would include:
 - a) on-line demonstrations;
 - b) hands-on-training; and
 - c) experience sharing.
- IDRC partners would be invited to host such workshops with the help of local and foreign expertise.

Supporting Experimental Links

To set in motion the linking up of various like-institutions and IDRC partners it is recommended that:

- A feasibility study be conducted on options for experimental e-mail nodes.

The following nodes would provide national and international connectivity and are capable of implementing and maintaining them.

- China Environmental News, Beijing;

- Jiangsu Provincial Academy of Social Sciences, Nanjing;
- Members of Park Reserve Networks, Kunming.

These networks would be used as case studies to evaluate future course of activities in this field.

Technical Support and Software Development for Database Access in Chinese

The majority of institutions interviewed can be considered as information providers. They have created numerous databases which could be shared with other institutions and field researchers. To do so would require the development of database standards to ensure efficient and accurate data exchange/retrieval in both Chinese and English.

Such support would particularly assist the following organisations who's needs in this area are acute:

- Institute for Minority Studies, Beijing;
- Jiangsu Academy of Agricultural Sciences, Kunming;
- Institute of Scientific and Technical Information of Yunnan Province, Kunming;
- Yunnan University, Kunming;
- Yunnan Provincial Commission of Science & Technology (Patent Management Division), Kunming.

Feasibility study in the potential for the establishment of Information Technology Resource Centres (ITRC)

Providing e-mail access to large sections of the society will take a long time in a country like China. Existing regulations, high telecommunications charges, poor exposure and imposed resource management practices are some of the constraints preventing small organisations and individuals from using new technologies.

To address some of these issues it is recommended that:

- A feasibility study be conducted into the possibilities, benefits and constraints to the establishment of widely distributed and networked ITRCs.

The study would seek to identify:

- Project partners;
- Technical requirements;
- Economic feasibility;
- Benefits to the community;
- Provincial and district IT training requirements;
- Provincial and district information requirements;
- Potential for enterprise assistance schemes.

3.7.1 MODELS

It has been considered that IDRC's involvement in data communications in China would be in the following ventures:

- supporting information dissemination in the form of a news letter or, technology fact sheets, on data communications;
- organising training workshops / seminars on issues related with electronic

networking;

- establishing experimental e-mail hosts in Beijing, Nanjing and Kunming utilising PC based technology where ever appropriate and the use local links for Internet / international connectivity;
- supporting software development projects to enable on-line database access in Chinese and English;
- evaluating the potential for ITRC establishment in remote provinces.

3.7.2 PARTNERS

The following organisations/institutions demonstrated clear willingness to develop and maintain data communications facilities on-site, as well as having on hand the necessary expertise to do so. These organisations/institutions are all well placed to implement the recommendations made in this report.

Beijing:

- The State Science and Technology Commission
- China Environment News
- Park Reserve Network
- Institute for Minority Studies

Nanjing:

- Jiangsu Provincial Academy of Social Sciences
- Jiangsu Academy of Agricultural Sciences

Kunming:

- Institute of Scientific and Technical Information of Yunnan Province
- Yunnan computer centre (also known as Yunnan Research Institute of Computing Technology)

3.7.3 RESEARCH

Further research and network exposure expeditions can enrich understanding of emerging networking practices, its impact and future challenges in China.

Topics for such research can include:

- Regulatory processes in China and its impact on access policies and electronic networks;
- Documenting initiatives that are set to expand the information base available in China. One such initiative is a programme to link together some 6 universities from

Beijing and Nanjing with support proposed from CIDA (no further information was available at time of writing);

- Potentials of using PC based networking technologies for networking in China.

4.0 COUNTRY REPORT - INDIA

4.1 SCHEDULE

DELHI	4 May - 8 May
Workshop - Indian Social Institute	5 May
Scheduled Interviews	6 May - 7 May

Organisations Interviewed**Contact**

Delhi Library Network (DELNET)	Mr H.K. Kaul Director
World Wide Fund for Nature India (WWF)	Mr S.K. Puri Director, Indira Gandhi Conservation Monitoring Centre
Development Alternatives (DA)	Dr Ashok Khosla Director Mr George C Varughese
Education and Research Network (ERNET)	Mr S Ramakrishnan Director ERNET Project
IDRC (SA Office, Delhi)	Dr Vijay Pande Executive Director

AHMEDABAD	8 May - 10 May
Workshop - Indian Institute of Management	9 May
Scheduled Interviews	8 May - 10 May

Organisations Interviewed**Contact**

Indian Institute of Management Ahmedabad (IIMA)	Dr B.H. Jajoo Professor, Computer Science Mr Ashok Jambhekar Librarian Prof. Anil Gupta SRISTI Project
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BANGALORE	10 May - 12 May
Workshop - Hotel Ramanashree Comforts	11 May
Scheduled Interviews	10 May - 12 May

Organisations Interviewed	Contact
Asian Institute of Rural Development (AIRD)	Mr M.V.Rajesekharan Exec. Trustee
ACTION AID - INDIA	Mr Shubhrajith Sen MIS Manager
Resource Group for Technology and Development	Mr. V. Rajaraman Programme Advisor
Indian Social Institute, Bangalore	Fr Lazer Co-ordinator - Documentation & Information

MADRAS Workshop - M.S. Swaminathan Research Foundation	12 May - 14 May
Scheduled Interviews	13 May 12 May - 14 May

Organisations Interviewed	Contact
M.S.Swaminathan Research Foundation	Dr M.S.Swaminathan Director
	Dr Balaji Head Computer Division
Foundation of Occupational Development	Mr Loyola Joseph Secretary

HYDERABAD Workshop - International Crops Research Institute for Semi-Arid Tropics	14 May - 18 May
Scheduled Interviews	16 May 14 May - 18 May

Organisations Interviewed	Contact
International Crops Research Institute for Semi-Arid Tropics	Mr L.J. Haravu Sr. Manager - Library
	Mrs Lydia Flynn Sr. Technical Writer Computer Services
UUNET India, Ltd.	Mr Chandrashekar Rao Managing Director

National Institute of Rural Development (NIRD) Mr. K.A. Raju
Director - Centre on Rural
Development

National Informatics Centre (NICNET) Dr N.V. Koteswara Rao
Senior Technical Officer

4.2 OVERVIEW

India has had a long heritage and keenness for science, however, this has not kept pace with the rapid developments of modern times. Today, the emerging India is at a cross roads. On one had it carries the baggage of socialism and on the other hand there is the great tide of capitalism which is crying out for commercialisation. One of the biggest handicaps and also its uniqueness is the different sects, religions and races that form a non-homogeneous amalgam. The various forces that tug in all directions is what keeps Indian democracy intact. With this backdrop, we can appreciate that a lot of issues that arise are unique to India. Unlike countries where there is a predominant - almost singular language/dialect, its not so in the case of India.

Approaches to infrastructure development in India is undergoing major changes within the context of the challenges emerging from the restructuring of the economy. In this drive towards a globally linked, liberalised, decentralised and competitive economy, changes in Telecom policies are to be expected. The New Telecom Policy being introduced in India is intended to encourage private sector participation in spurring the pace and extent of communications infrastructure building. This should have a significant impact on the capacity of organisations and individuals to participate in networking initiatives at the local, regional, national and the global levels. While this happens, computer-based networking initiatives in the country have to contend with low phone densities, poor quality and unreliable lines, traffic congestion, high-cost and inadequate facilities.

Existing facilities like Packet Switched Data Network (PSDN), are expensive by international standards and lack in quality and availability. State controlled and regulated networks like the Education and Research Network (ERNET) and the National Informatics Centre Network (NICNET) are yet to revise policies to bring down costs and provide open access. Private commercial service providers which were recently launched, operate under a state of flux and looming threat of stringent regulatory controls and licensing policies. In addition to this the private services have to be market driven and function in ways to make their venture profitable. While the network service providers in the country strive to improve service and capacity on limited infrastructure, potential users of computer networks look for a service provider that would reliably carry their information traffic.

Many organisations in India are gradually becoming aware of the immense possibilities of computer-based networking for speedy and wide-ranging exchange of information. The competitive advantage of efficient information flow is recognised not only by government, industry, business and commerce but also by development organisations. Everyday new institutions are emerging to meet the variety of demands for information from the various sectors. Even within organisations, departments are being set-up or restructured to provide information support services. And in most organisations, computers have become standard equipment for various information processing functions. Many organisations have graduated from using computers for basic word processing to specialised functions such as accounts, inventory, CAD/CAM. Organisations are now producing, managing and maintaining databases of information. The older institutions, like libraries are rapidly adapting to the new technologies and many of them in city centres are moving beyond computerisation of records to

networking and resource sharing. However, general awareness on computer-networking issues does not go beyond knowing that this is possible. Awareness is low on questions like: how to take part in such networks, what is needed, what is the difference between the various services provided, and which network to join.

Computer networking in India is still in its infancy. And where-ever it exists, it is confined mostly to the large institutions. Big industry in private and public sector like Indian Railways, Bharat Heavy Electricals (BHEL), Indian Oil Corporation and many others are setting up their own dedicated networks using leased lines or satellite links. Academic and research institutions as well as some of the larger NGOs and international agencies have access to ERNET but this is not broad based. Networking initiatives of a broader community of institutions in the development sector, especially the NGOs are constrained by high cost and policy restrictions of existing network and gateway service providers.

Organisations in India welcomed the present IDRC study as a well-timed initiative. In the five cities visited, the response was enthusiastic. Those who are already initiating networking activities were keen on collaborating with any venture that would enrich and strengthen their endeavours. Others were looking for low-cost opportunities to participate in a network relevant to their information needs.

In all, contact was established with 91 organisations across the country. Table 3 shows the city-wise break-up of the organisations.

<u>CITY</u>	<u>ORGANISATION</u>
AHMEDABAD	14
BANGALORE	20
DELHI	26
HYDERABAD	10
MADRAS	21
<hr/> TOTAL	<hr/> 91

Table 3. *Number of organisations represented at Workshops*

Amongst the electronic networking initiatives in India that hold promise of future growth are (1) the library networks in the various cities, (e.g. DELNET at Delhi), (2) the NGO networks like IndiaLink and DAINET.

4.3 TELECOMMUNICATIONS CONDITIONS

The telecommunications sector in India has seen rapid changes in the last few years. While basic telephone services are still unavailable to vast sections of society, the telecommunications sector has been moving ahead from basic telephone services to a host of value-added services like electronic mail, voice mail, video conferencing, paging, cellular phones and ISDN. Services such as facsimile, remote area business message network (RABMN), packet switching data network and paging electronic mail have already been introduced. A long distance transmission network consisting of over

90,000 route kilometres of microwave coaxial and optical fibre now serves the country.

At the time of independence in 1947 the telecommunication network comprised of telegraph and telephone services. There were only 80,000 telephones served by 321 exchanges. Today there are 10 million lines served by 18,000 exchanges. The telephone penetration of 0.8 phones per 100 persons is very low and well below the world average (10 lines per 100 people). It is also lower than that of many developing countries of Asia, like China (1.7), Pakistan (2), Malaysia (13). Nearly 1.4 lakh villages out of a total of 576, 490 villages in the country are covered by telephone services. There are more than 1 lakh public call offices in urban areas. With the current expansion rate of 18 percent, it is anticipated that the 2.4 million waiting list will be wiped out in one and a half years. There are 470,000 employees of the Department of Telecommunications and there has been no recruitment since 1985 - the existing staff has been retrained and redeployed.

A National Telecom Policy is presently being introduced to open up the Telecom Sector to private companies. Till now manufacturing of telecommunications equipment and value-added services (such as electronic mail, voice mail, data services etc.) had been opened up to the private sector but the basic service of telephone operations continued to be with the government. With the new policy government monopoly in the area is expected to be removed. The new National Telecom Policy (NTP) allows entry to the private sector, including foreign companies and multinationals, into basic telephone services. The objective is to provide universal telecommunication facilities to all at affordable prices and of world quality. Currently the debate is on the level of equity participation, while the government is willing invest up to 49% the multinationals are looking for far more.

4.3.2 REGULATORY ENVIRONMENT

The first telephone exchange in India was commissioned in 1881 at Calcutta. In 1885, the Indian Telegraph Act was passed. This act largely protected the British rulers and is still the act in force today. It is largely unchanged. In 1993 an initiative was taken to enact a new law. The New Telecom Policy, as it is known, is the outcome of those efforts.

The policies that may affect the Pan Asia Programme are related to the permissions required for use of data communication equipment. It requires any device that is to be plugged into the telecommunications network to be "TEC approved". There is no clear cut policy on services and this issue is being tackled in the New Telecom Policy.

Department of Telecommunications (DOT) policy

A DOT policy is being prepared. This could have a significant impact on the Pan Asia Programme for India. On one side, there are news that the DOT plans to regulate all e-mail and other value added services. This could have effect on size, permissions required and tariff structures. On the other hand there are very positive signs of opening up to the private sector. Already policy for privatisation for telephone exchanges has taken shape. This could also mean that the network would need to survive in a competitive environment.

The final shape of the policy on value added services is still uncertain. Close monitoring of developments in this area is essential.

4.3.3 FACILITIES/SERVICES

Packet Switched Data Network (PSDN)

The national PSDN network - I-NET has been commissioned at 8 locations: Bombay, Calcutta, Delhi, Madras, Bangalore, Hyderabad, Ahmedabad and Pune. It offers three types of connections X.25, X.28 leased and X.28 dial-up.

With an X.25 connection a subscriber can receive and originate several simultaneous calls to other subscribers on PSDN using special equipment (X.25 PAD, card etc.) at their premises. The speed of the connection can be 2400 bps, 4800 bps or 9600 bps. A subscriber with an X.28 leased connection can receive or originate one call at a time. The X.28 dial-up connection enables a subscriber to only originate calls to others.

Gateway Packet Switching Service (GPSS)

GPSS provides X.25 data communications in India. One can either get a X.28 dial up to one of the PADs or a leased line X.25. Dial up speed is limited to 2400bps whilst leased lines support 2400/4800/9600bps. Existing tariff structure includes charges for connect time and volume of data flowing through the network. Use of X.25 for large volume of data communication can be very expensive and in fact using high speed modems with IDD calls proves to be cheaper than GPSS.

Satellite network

Indian telecom network which has largely relied on land lines and at some places radio links, connects most of the metros and small towns. The rural and remote areas are large untouched by the public networks. Most of this network is of primarily low quality voice grade network offering low band rates. Thus, it offers very little capability to transfer data or image, resulting in poor quality transmission of even fax messages on these lines. The call establish rate for the system is very poor and cross connections are common. Satellite networks are now being commissioned to overcome some of these problems.

A master earth station at Sikandrabad in UP provides connectivity for remote area business network. The scheme provides packet switched data services for low speed data between subscriber-owned very small aperture terminals (VSAT) located at far flung places. The network unfortunately is very slow and is capable of providing interactive data communications for speed up to 1200bps in general and 9600bps on a limited basis besides access to international data networks through VSNL gateway packet switching system (GPSS).

NICNET makes use of satellite communication for most of its data. Here again the speeds are very low 1200bps/2400bps down-link and at places 9600bps up-link.

The 8th Five Year Plan provides for satellite transmission of data at 9600bps and above up to 64Kbps along with limited speech facility through 64Kbps VSAT network for business users.

The DOT Guidelines for Value Added Services of March 1994 has a section on 64Kbps private data link. This channel is being proposed to be provided via the Indian INSAT-2B satellite on the extended C-Band only. The proposed licence fee however is Rs. 50,000/- (Note 30 Rupees = USD 1) per subscriber per annum subject to a minimum of Rs. One crore per year (Rs. 10 million) for the first 2 years and Rs. One crore fifty lakh (Rs. 15 million) per annum for the third year.

Fibre network

India has a relatively low fibre network density. Primarily experimental links have been laid and the response has been good. However, due to the size of the country, preference is given to the satellite network rather than the fibre network.

ISDN

Experimental ISDN project is underway at Bangalore and three business exchanges have been installed at Bangalore Central Exchange, Ulsoor and Malleswaram. ISDN network at Bangalore is to offer transmission node for voice, telex, fax, picture and package data transmission.

Education Research Network (ERNET)

ERNET was initiated and managed by the Department of Electronics (DOE) with initial funding by the UNDP. The ERNET provides Internet connectivity to all the premier educational and research institutions in India. Recently they have been opening out the network to other institutions for research purposes. Typically one has to pay Rs. 100,000 per annum as subscription to ERNET. All cities visited during the Study Tour (except Hyderabad) have an ERNET node. Bombay and Bangalore in fact have high speed links (64Kbps) to the ERNET gateway at Bombay which again is a 64Kbps link to the US. There are already some other nets that ride on ERNET such as the Scientific & Industrial Network (SIRNET) which is operated by the Indian National Science Documentation Centre (INSDOC). One recommendation would be to look at ERNET as the backbone for a proposed Pan Asia Network for India, carrying all its inter-city and inter-country traffic. ERNET is still in the process of upgrading its inter-city linkages. There are cities which do not have reliable or high speed ERNET connectivity. Madras, for example, is one of them.

Commercial networks

There are a couple of commercial networks attempting to establish country wide linkages. At present they are of little significance, although developments in this sector need to be monitored.

INET / GPSS Gateway packet switching services are available at all the cities visited. This enables users to cut costs of long distance calls. It is a relatively new service provided by the Government and at this point of time is not a robust and reliable system. It is a low bandwidth network with dial up access at only 2400bps. Though there are some cost savings, it is not cheap and in cities where high speed modems work well, its much cheaper to call at full rates on long distance. During early mornings and evenings, the STD rates are half and during late evenings they are quarter the regular rates.

Cost Factors

While just a couple of years ago getting a new phone line in the metros meant waiting for 6 to 7 years, its now a matter of 10 to 12 months. In rural areas the situation is

still grim. Almost all exchanges in the metros are on electronic exchanges and those that are now shall be by the year 1995.

Cost of new lines:

Installation: Rs. 800/-

Advance Deposit:

General Category: Rs. 3,000/-

OYT: Rs. 15,000/-

Tatkal: Rs. 30,000/-

Rental (Every 2 months):

General: Rs. 380/-

OYT: Rs. 190

Charges per local call:

0-150: Free

151-500: Rs. 0.80

501-1000: Rs. 1.00

1001-2000: Rs. 1.25

2001-above: Rs. 1.40

Distance in Kms	Week Days			National Holiday & Sundays	
	Full Rate 8-19 hrs	Concessional		Concessional	
		6-8 19-22 hrs	0-6 22-24 hrs	6-22 hrs	22-24 0-6 hrs
20-50	36	48	48	48	48
50-100	12	24	48	24	48
100-200	8	16	36	16	36
200-500	4	8	16	8	16
500-1000	3	6	12	6	12
Above 1000	2	4	8	4	8 (pulse rate per seconds)

Table 4. Official rates for STD (Subscriber Trunk Dialling - National long distance dialling)

	Neighbouring Countries +SAARC Countries	Africa, Europe Gulf, Asia & Oceania	American Continent and other places in Western Hemisphere
Pulse Rate	2.0 seconds	1.2 seconds	1.0 seconds

Table 5. Official rates for IDD (International Direct Dial)

Modem:

Installation - Rs. 500/-

Licence fee per annum - Rs. 300/-

Fax:

Installation - Rs. 1000/-

Licence fee per annum - Rs. 3000/-

(Note, modem and fax have to be TEC approved.)

4.3.4 LOCAL INITIATIVES / PROJECTS

In all of the cities, except Bangalore, almost 50% of the participants who attended the workshop were already using e-mail to some extent. Of these, the large non-NGO institutions were regular users. Others had just begun to use available services. At Bangalore only 5 of the 20 participating organisations were on e-mail. Table 6 indicates the distribution of e-mail users across the cities.

	AHMEDABAD	BANGALORE	DELHI	HYDERABAD	MADRAS	TOTAL
NO E-MAIL Connection	8	15	10	5	11	49
USE E-MAIL	6	5	16	5	10	42
TOTAL	14	20	26	10	21	91

Table 6. Number of organisations using e-mail

(The above figures relate to only those organisations who attended the Workshop. Some questionnaires were not returned.)

Most of those who were on e-mail were connected to ERNET, either directly or through a sub-node, like IndiaLink-UNV system. Users on IndiaLink-UNV are mostly NGOs, small, medium and large. As Table 7 indicates all those who are not on ERNET are spread out amongst a variety of other networks. This would mean that there was little or no exchanges between these users. The connectivity was being used primarily to reach out to global links.

	AHMEDABAD	BANGALORE	DELHI	HYDERABAD	MADRAS	TOTAL
CGNET				1		1
ERNET	6	2	9	2	8	27
GPSS				1	1	2
ICNET	1		1	1	1	2
IndiaLink						
MCIMAIL			1			1
NICNET		1	1	2	3	4
RABM				1		1
SIRNET			1		1	2
TOOLNET		2				2
UUNET		1		1		2
Total	7	6	13	9	14	44

Table 7. Number of organisations connected to the various networks in each of the 5 Indian cities

1. AHMADEBAD

At Ahmedabad, participants attending the workshop were mainly from the library sections of a widely divergent range of large institutions. Representatives were present from The British Library, the National Institute of Design, Gujarat University Library, Physical Research Laboratory, Institute of Rural Management, INFLIBNET (the library networking project of the University Grants Commission), National Information Centre for Textiles and Allied Subjects, Institute for Plasma Research.

Most of the institutions were already on e-mail through ERNET. A few others like the National Institute of Design (NID) and some of the voluntary organisations like the Self-Employed Women's Association (SEWA) were keen on getting connected but were unsure of which service to subscribe to. NID was in the process of taking an experimental subscription with the commercial e-mail service provider, ICNET while SEWA had put in an application for a dialup account on INET, the packet switching service.

Institutions already on e-mail were not content with exchanges via e-mail and electronic conferences. They were looking for more direct access to on-line database services. Almost all of them expressed the need to have available within the city a centralised or even a distributed database system which they could access on-line.

Two local initiatives to promote networking amongst the city-based organisations stand out. The Indian Institute of Management Ahmedabad (IIMA) has done excellent work in setting up a host site on campus and extending networking facilities to the various departments of the institute. INFLIBNET, a programme of the University Grants Commission, is attempting to provide linkages between Libraries, Institutions and Industry not only within the city, but across the country. Both these initiatives rely on ERNET as the backbone for providing linkages.

Indian Institute of Management Ahmedabad (IIMA)

The IIMA is a premier management education institute in Ahmedabad that ranks amongst the country's elite institutions. IIMA has had an institute wide LAN (Local Area Network) as early as 1991 and has since significantly improved its infrastructure. There are 16 wings in the institute which are spread across a large campus. Computer resources range from PC-XTs to 486 based systems and one SUN 3 and SUNIPC workstations. There are approximately 300 PCs (XTs: 108, ATs: 70, 386s:100). IIMA is one of the few educational institutions in the country that provides Ethernet connectivity to every faculty member and through shared machines to all students.

The LAN at IIMA runs a shareware mail package, LIFELINE, which has been adapted to SMTP protocol so that users have a common software when writing both local (within campus) and remote mail (gatewayed to Internet through ERNET). The main link with the outside world is via a very low speed (1200bps) modem that polls ERNET at Bombay. Thus using UUCP protocol mail packets are exchanged with Bombay every night. The e-mail facility is available to faculty members as well as students.

The network also has a bulletin board facility for faculty members where they can post information/comments for others to read. This has proved to be a useful feature and has encouraged a lot of faculty members to use the network. The information is periodically backed up to tape and stored off-line. IIMA has also developed in-house software for office support and library management.

E-mail is being used extensively. A lot of information including billing details for the e-mail usage is distributed via e-mail. Currently, IIMA bears the cost of the link to ERNET but there is a movement towards recovering the cost of the mail. At this point no payment has been made (for the last 3 years of ERNET subscription) but now that they are planning to pay they are working out cost recovery mechanisms. IIMA is very keen on direct IP connectivity and considers this as vital. As such they are exploring two options: 64Kbps VSAT (small aperture satellite dish) or 64Kbps leased line between Ahmedabad and Bombay (ERNET). This being a high cost link, they are looking at sharing this link with other large organisations.

IIMA also has a bibliographic database of library collections which they plan to put on the network for on-line access. A Current Awareness Service is already available on the campus LAN. They are now looking for on-line access to international databases. They plan to set-up a node through which such access would also be provided to other institutions in the city. They would need to have direct access to Internet gateways in order to be able to provide such services.

2. DELHI

Organisations in Delhi have varying levels of experience in using electronic communications technologies. Some institutions have accounts on global networks like Geonet and MCIMAIL. They have been accessing these networks through X.25 packet switching services (GPSS) or through direct long distance telephone calls. Though these institutions have had active accounts on these networks for up to 5 years, regular and extensive use of these links have not been made due to the high costs of X.25 and long distance connections. Most of the premier educational and research centres have connectivity through ERNET.

Over the last two years, access to ERNET was opened up to organisations capable of paying an annual subscription of around Rs 100,000 (approx. USD 3200). Currently the majority of e-mail users in Delhi are connected through ERNET. A few organisations have subscribed to private commercial e-mail service providers such as ICMail of ICNET and aXcess of BIIT. However many institutions especially the NGOs are yet to get connected. The primary constraint for most organisations is the high costs associated with connecting to these local hosts.

E-mail use has been restricted largely to communication with contacts/partners on international networks or requests for information from global electronic conferences. Very few institutions have access to on-line databases on global networks either through ERNET or GPSS. Within this environment some institutions have come forward with initiatives to set-up host facilities to promote networking amongst fraternal organisations. Significant among these are the efforts to network Delhi libraries (DELNET), non-governmental organisations (IndiaLink), sustainable development and environmental organisations (DAINET). Besides these, INSDOC, the Indian National Scientific Documentation Centre provides connectivity to various institutions through SIRNET (Scientific and Industrial Research Network) a sub-node of ERNET.

Delhi Library Network (DELNET)

DELNET was initiated by the Librarian of the India International Centre (IIC), New Delhi. It was registered as a society in June 92. It presently functions from the Library of the IIC.

Its roots go back to a meeting at IIC in January 1988 when a group of library and computer specialists suggested that a network of Delhi libraries be established for the sharing of resources and effective dissemination of information. The National Information System for Science and Technology (NISSAT - an institution under the Department of Scientific and Industrial Research) provided the grant. DELNET was formed with the following objectives:

- to promote sharing of resources among the libraries in Delhi by developing a network of libraries and collecting, storing and disseminating information through computerised services;

- to undertake scientific research in the area of information science and technology;
- to offer technical guidance to the member libraries;
- to facilitate establishment of referral and/or research centres and maintain a central on-line catalogue of books, serials and non-book materials of all the participating libraries;
- to develop specialised bibliographic databases of books, serials and non-book materials;
- to develop databases of projects, specialists and institutions; and
- to co-ordinate with other regional, national and international networks and libraries for exchange of information and documents through e-mail.

DELNET aims to build a strong library network within the city with links to international networks. Some progress has been made in that direction. A host system has been set-up at the IIC library which provides e-mail facilities to about 40 member libraries. The X400 protocol is being used for e-mail. DELNET has organised various training programmes for librarians in the use of CDS/ISIS software for library applications, implementation of the Common Communication Format (CCF) developed by UNESCO, AACR-2 cataloguing, and electronic networking. They are in the process of helping Delhi libraries convert their records into machine readable formats. The formation of a centralised database of bibliographic records is also underway but they are yet to set-up an on-line database query facility. Currently queries are serviced off-line through e-mail. A union Catalogue of Current Periodicals in Delhi Libraries was prepared by Jawaharlal Nehru University Library. This union catalogue has helped libraries to rationalise their periodical collections.

Managed and run by professional librarians with technology support from NISSAT, DELNET is a highly specialised network concentrating on linking city based library resources and operations. As such they would not be a suitable site to host field-based documentation and services for development organisations.

Development Alternatives (DA)

DA is one of the most well known of NGOs in India. It has made substantial contributions in the field of appropriate technology development and environmental management. To support R & D in design of low-cost and environment friendly technology applications in rural areas, DA has set up an effective information centre. The information centre is rich in materials on technology and environment. They also house a collection of research reports and papers on experimental field projects. They see their information centre as a National Information Facility (NIF) on environmental issues.

DA is now working on plans to link up their partners in India and abroad in a communication network. They have about 300 network partners in India and another 300 partners in other countries with whom they have frequent exchanges on various subjects. They are also working on Geographic Information Systems (GIS) pertaining to environmental conditions. Their plans envisage the establishment of an Information Host Facility (IHF) to channel and disseminate the information generated through their SIF (Spatial Information Facility - i.e. GIS) and NIF. Using traditional communication channels, their response time to service information request varies between 2 weeks to 4 weeks. This they expect would come down to a couple of hours or days if they were to use data communication links.

DAINET is therefore an endeavour to network the independent sector institutions or NGOs. DA is currently exploring the various options available for setting up host sites in various cities to provide connectivity to partner organisations. DA is one of the institutions which has experimented with an e-mail account on Geonet via GPSS over the last 5 years. They were active members of IndiaLink at the time of its formation but are now taking their own initiative in setting up a national network. DAINET presently has an experimental Fido link set-up with TOOLNET. Under this arrangement, TOOLNET polls the DA system twice a day over international direct dial lines.

DA is also undertaking a feasibility study for networking in India under the SDN programme. This is also an IDRC sponsored project.

3. HYDERABAD

Of the 10 organisations that were represented at the Hyderabad workshop, 5 were already using e-mail. The other 5, though not using e-mail, were keenly looking out for opportunities to get on-line. Two organisations had connectivity to the ERNET node at Madras, one was using the packet switching network (INET) to connect to CGNET, two were connected to NICNET. One organisation, a large public sector company, was using the Remote Area Business Network (RABN).

The university libraries were part of the INFLIBNET and the Hyderabad Library Network (HYLIBNET) initiatives. These library networks are however still at the formative stages. Though they do not have any electronic connectivity as yet, the library networks are preparing the ground to get linked to ERNET or any other network that becomes available in the city. The University of Hyderabad is being

considered as the nodal point for the INFLIBNET programme.

Two institutions visited stand out as having sound infrastructure and plans for some kind of networking. They are NIRD and ICRISAT.

National Institute of Rural Development (NIRD)

NIRD is an autonomous organisation supported by the Ministry of Rural Development, GOI. The Institute endeavours to promote and help achieve development of rural communities. Towards this end, they conduct training programmes, conferences, seminars and workshops for senior level development managers. They undertake research, analyse and propose solutions to problems encountered in planning and implementation of rural development programmes and disseminate their findings and recommendations through their publications.

The Centre on Rural Documentation (CORD) of NIRD, acts as a referral and clearing house of information for the rural development sector. It has a well organised library of over 70 000 volumes. The library documentation is being fed into a super-mini computer system to provide access through a spread of 50 terminals in the Library and other sections of the Institute. The system runs under Unix 5.3.2 with mailing facilities between users. In addition to Library Management applications, this system is also used for high order data processing of rural development projects and other management information systems.

The institute also has another multi-user computer system with 5 terminals which is used for data processing, applications development and other general tasks. However, this system runs under a non-standard DOS environment and thus poses problems of file transfers to the super-mini computer and PCs. Other stand alone systems (6 PC ATs and 7 PC XTs) attached to printers, plotters and digitisers have more general applications.

The institute offers its services to different ministries/departments of the central and state governments, banking institutions, public and private sector undertakings, voluntary bodies, non-governmental organisations and international agencies concerned with rural development.

NIRD has a dialup link to NICNET through which they can access databases on the NIC network. Presently they do not have access to global e-mail systems. They are part of a working group on setting up a network to bring together various rural development institutions.

International Crops Research Institute for the Semi-Arid Tropics (ICRISAT)

The ICRISAT Asia Centre operating from Hyderabad actively networks with its partners in Asia, Latin America and Africa. The networking takes place through meetings and structured correspondence. At the national level, ICRISAT collaborates with many kinds of organisations - national agricultural research systems, universities, non-governmental organisations, and private companies. The collaborations are in the form of joint research programmes, information exchange, training and networking. There are various working groups that co-ordinate different networking initiatives. ICRISAT has a large number of collaborative ventures with the Indian Council of Agricultural Research.

Support for the information systems at ICRISAT is provided by two mainframe

computer systems with connections to around 400 PCs and terminals. The institute is connected to CGNET via packet switching services (INET and GPSS). They also have access to various global databases such as DIALOG. Their monthly average e-mail traffic is about 3000 messages incoming and 1500 messages outgoing. Incoming e-mail from CGNET addresses is about 1400 messages (4000Kbps) per month and the traffic is almost the same from non-CGNET addresses. Outgoing mail to CGNET is about 1000 messages (4000Kbps) and 500 messages (1200Kbps) to Non-CGNET addresses. In addition, outgoing e-mail faxes can be up to 100 messages (250Kbps) a month.

Apart from using e-mail on CGNET, ICRISAT is not connected to any of the national networks like ERNET. They would like to have local linkages and it should be possible for them to be part of the networking initiatives of the Indian Council of Agricultural Research (ICAR).

Scientific and Industrial Research Network (SIRNET)

SIRNET is a fast expanding network of R & D labs, academic institutions, corporate bodies, etc. Approximately 110 users are scattered over the length and breadth of India. The network which commenced in 1989, is being implemented by the Indian National Scientific Documentation Centre (INSDOC), a constituent establishment of the Council of Scientific and Industrial Research (CSIR) of India.

World Wildlife Fund (WWF)

The WWF-India, a charitable trust established in 1969, aims at wildlife education and conservation. It has affiliates and associates in 27 countries world-wide. The Indra Gandhi Conservation Monitoring Centre (IGCMC) based at WWF-India functions as a national facility for information on biodiversity-related issues. It networks like-minded NGOs and other agencies through publications and other traditional means of information dissemination. They are now establishing electronic communications links with their international partners. Though their primary interest is to participate in the networking projects of WWF-international, WWF-India is also keen to tap into the information resources on other global networks. As such, they have been looking for suitable gateways to other networks that promote conservation and have information on environmental issues.

WWF-India has the resources and infrastructure to set-up and maintain a closed network of organisations dealing with environmental issues. With their experience in information service provision on the subject of conservation and their position as a national organisation with regional offices, WWF-India would qualify as a nodal agency for biodiversity information. However, their capacity and interest in handling information on a broader range of development issues remains untested. On the other hand WWF-India could greatly benefit from establishing links with a broad-based network. WWF-India along with its affiliates could constitute a large user base for any computer communications network.

4.4 LEVEL OF IDENTIFIED EXPERTISE

All, except 7 organisations represented at the workshops in India, have computers installed at their office. The number of systems installed varied between 1 to several hundred. Table 4.1 indicates, 36% of the organisations have up to 5 computers each, while another 23% have between 6 to 20 systems. Thus, around 59% of the organisations have up to 20 computers, mostly PCs (ATs and XTs) while 23% have between 21 to 100 machines and only 8% have more than 100 PCs and terminals.

No. of Computers	No. of Organisations		
	No.	%age	Cumulative %
None	7	8	8
1 to 5	33	36	44
6 to 20	21	23	67
21 to 100	23	25	92
Above 100	7	8	100
TOTAL	91	100	

Table 8. *Number of computers in organisations*

The large institutions, especially those with more than 10 desktop computers, are fairly advanced in the use of computer technology for basic applications ranging from word-processing, database management, DTP to statistical analysis and presentation graphics. Those with more than 30 systems generally have a full fledged EDP department managed by trained and competent computer professionals. Computer operations in organisations with less than 10 systems are generally supervised by one computer professional who is usually a diploma holder.

Of the organisations which use computers, 16 (20% of those with computers), do not have technical staff to manage the systems. These are mostly organisations with up to 5 machines.

Number of Computers Systems	Technical Staff Employed				
	NO	YES	Number Employed		
			1 or 2	3 to 10	Above 10
1 to 5	17	16	15	1	-
6 to 20	8	13	10	3	-
21 to 100	3	20	8	10	2
Above 100	-	7	-	2	5
	17	67			

Table 9. *Technical staff employed to manage/use computers*

By and large, the percentage of computer literate staff of these organisations varies between 20% to 50%. There is an indication that more and more senior, professional/executive staff are becoming familiar with basic computer applications. Despite the growing familiarity with information processing applications, only a small minority of computer literate staff have some idea or experience with remote processing and computer communications techniques and systems. Though a significant number of organisations have begun to use e-mail, lack of proper connectivity to global networks leaves them unexposed to the range and extent of possibilities as existing on the Internet. There is an expanding base of computer users who could be trained to make effective use of e-mail systems.

It is valuable to note that in each of the cities visited there are at least one or two individuals who have had considerable exposure to and/or experience in use of e-mail systems. These individuals could be relied upon to champion the promotion of

electronic networking within their own regions. Some of these individuals are highly competent and capable of setting up full-fledged networking systems provided they have cost-effective access to network gateways.

1. AHMEDABAD

Indian Institute of Management Ahmadebad (IIMA)

The IIMA, Ahmadebad is one of the premium management institutions in India. Technically well equipped, they installed their first LAN in 1991. Currently, have over 300 PCs and a few Sun workstations. IT applications and use within the Institute are fairly well developed. They have an excellent campus-wide LAN with e-mail and bulletin board services. The IIMA library staff have well-grounded expertise in IT. The Department of Computer Science, headed by Prof. B.H. Jajoo, has demonstrated a high level of competence in applying computer technology at IIMA. Their strong point is expertise on UNIX and networking systems. IIMA has all the capability under the leadership of Prof. Jajoo to set-up and run a host node with high-speed links to Internet gateways.

2. BANGALORE

Indian Institute of Science (IISc)

The Indian Institute of Science, Bangalore is without question an outstanding centre for scientific and technical expertise. The IISc is the ERNET connectivity provider at Bangalore having a 64K leased line connecting it to Bombay. They have offered their technical expertise in support of any future Pan Asian Networking initiatives, and it is recommended that contact be maintained.

Expertise in managing computer communications networks, was not evident amongst the other organisations contacted at Bangalore. There is manifest potential within some of the organisations to acquire skills in network management. Technical training could be considered for organisations such as Action Aid - Bangalore and Foundation for Revitalisation of Local Health Traditions (FRLHT) amongst others who could serve as sub-hosts.

3. DELHI

Development Alternatives (DA)

This is a well known institution in the field of environment and alternate technology. They have advanced level experience in computer applications. Their library has an excellent collection of materials on ecology, environment and technology. Apart from a computerised information system in their library, DA has also done work on GIS. As host for the TOOLNET node at Delhi, they have some experience in Fido communications systems.

DELNET

The Delhi Library Network has excellent plans for pooling resources of libraries in Delhi. They also have sound technical support from member institutions. They have conducted various training programmes in computerisation of library applications. They have experience in X400 mail systems, and are developing expertise in

centralised database systems. They depend on consultant organisations for software support.

indialink

The indialink Hosts at Delhi and Bombay are managed by individuals with considerable experience in IT and computer communications: low-cost Fido-based technology, DOS-UUCP systems and Unix communications systems. Over the last 5 years, they have conducted a series of training workshops in computer communications, CDS/ISIS, statistical analysis and other applications software. They have also assisted many organisations, small, medium and large NGOs as well as international organisations in designing and setting up software systems.

The Delhi host, is situated within the Documentation Centre and Library of the Indian Social Institute (ISI). This Documentation Centre is well known amongst NGOs in India for its relevant and specialised collection of materials on various development issues. It is also amongst the first of the documentation centres of NGOs to computerise its index cards and library collection. Thus in addition to technical know-how, the Delhi host is well equipped and experienced in information networking functions.

The Bombay host, which works closely with the Delhi host, operates over a LAN with a gigabit of storage. It has 4 high speed dial in lines, shortly to be increased to 7 lines. Combined, these hosts provide an international e-mail gateway to NGOs in India through GreenNet, London.

4. HYDERABAD

International Crop Research Institute for Semi-Arid Tropics (ICRISAT)

ICRISAT has a full-fledged Computer Services Division of around 16 technical staff. They have developed a wide range of applications on a mainframe computer set-up (2 VAX 4000-100 systems) with a network of 400 PCs. With the Semi-Arid Tropical Crops Information Service (SATCRIS) database as its central resource, they provide a package of information products and services. The centre demonstrates excellent use of IT in their information management and exchange programme. The institute is connected to CGNET via packet switching services (INET and GPSS). They also have access to various global databases such as DIALOG and BRS.

Currently, ICRISAT participates in six networks: one in Asia, one in Latin America and four in Africa. With abundant technical, human and information resources, ICRISAT is capable of playing a major role in any electronic networking initiative in the region. However, beyond their mandated areas of research, they may not be able to broaden the scope of their activities and dedicate technical staff to manage and run a host site for generalised information networking.

National Institute of Rural Development (NIRD)

The Computer Centre at the National Institute of Rural Development, Hyderabad, is

a recognised institution for the provision of computer training. It is well equipped with human and hardware resources for IT training. The training facilities at the Centre's Computer Lab include 25 PCs, data projection equipment and computer based tutors. The centre provides training programmes on various computer applications related to DBMS, Spreadsheet, Word processing, Statistical Analysis, Expert Systems. The centre's technical capacity is also reflected in the software development projects it has undertaken.

Through their dialup connection on NICNET, the centre has access to district centres across the country. Though the centre's staff do not have prior experience in using global e-mail networks, there is potential for building capacity as a communications host site.

5. MADRAS

M.M.Swaminathan Research Foundation (MSSRF)

The Informatics Centre of MSSRF besides managing an in-house CD-ROM library, has experience in on-line database access through DIALOG. They have experimented with connectivity to SIRNET, ERNET and MCI mail. They have also designed and developed an impressive Mangrove Ecosystems Information Service. Though their present level of experience with communications networks is as users, the foundation has a core team of technical staff proficient in IT applications. A short training programme on communications tools could very well equip the Informatics Centre to function as a network host for NGOs at Madras and surrounding areas.

Foundation of Occupational Development (FOOD)

FOOD functions as the indialink, Madras Host. They provide connectivity and information services to a handful of Madras-based NGOs. The staff of FOOD are acquiring skills in setting up and operating both DOS-UUCP and Fido host sites. The management at FOOD exercises sound marketing acumen in popularising appropriate technologies for development. This marketing ability could be used effectively to stimulate interest in networking issues and introduce a new technology to an NGO community that is traditionally wary of IT.

4.5 LOCAL REQUIREMENTS IDENTIFIED

The primary need in India is reliable high capacity, high speed links between cities. The link between ERNET sites in cities are not uniformly on high-speed 64Kbps links. While Bangalore and Delhi have 64Kbps links to the ERNET's gateway host, others are still using dial-up lines. The need for inter-city links on high band-width lines becomes imperative as organisations look beyond simple e-mail to live Internet connectivity and graphical interfaces and on-line access to databases sites.

E-mail is beginning to attract the interest of organisations as fax machines did a few years ago. Besides, the cost factor there has been a exposure in the media about connectivity and organisations are actively participating in networking at individual site-levels. This opens up a new and highly attractive market. However, at this early stage of development, organisations contacted in most cities are not sufficiently aware of the possibilities and potential of existing networks. There is urgent need for training and awareness building on networking issues. There is evidence of confusion amongst organisations about which service to subscribe to even at this point of time when the choice is quite limited. In the present scenario, it is not surprising to find that affiliated organisations in different cities are on different networks and often end up exchanging e-mail routed through some site in a distant country. So far the DOT has discouraged inter-networking between various e-mail providers so the mail usually travel to distance countries and return to the recipients even if the sender and receiver are in the same city. Situations of this nature could be avoided if attention is paid to

developing a well-knit national network and educating the user community on available options. The workshops conducted in the various cities have made a beginning at creating such an awareness.

Institutions already on e-mail were not content with exchanges via e-mail and electronic conferences. They were looking towards direct access to on-line database services. Almost all of them expressed the need to have available within the cities a centralised or even a distributed database system which they could access on-line. Setting up a database system (centralised or distributed) would involve a high level of co-operation among network partners. In a centralised model, issues related to ownership of the database and cost-sharing amongst contributing members would need to be resolved. If a system of distributed databases is to be maintained, the city would need a set of institutions with adequate infrastructure to function as database host sites and strong links would have to be built to prevent breakdown. A distributed database model would involve a higher level of investment in infrastructure building across organisations, than a centralised one. Issues such as updating, validation and duplication of information would need to be resolved.

Specific requirements at each city:

- AHMEDABAD - A high-speed high-capacity link to an Internet gateway.
- BANGALORE - Selection of a suitable site to function as an information host for development organisations.
- Obtaining connectivity between such a site and the local Internet gateway.
- DELHI - Co-ordination and consolidation of existing initiatives.
- Setting up of a forum of network service providers to avert duplication of services.
- MADRAS - A high-speed high-capacity link to an Internet gateway.
- An information host site for development organisations.
- HYDERABAD - A high-speed high-capacity link to an Internet gateway.
- An information host site for development organisations.

4.6 RECOMMENDATIONS

India is in a transitional stage. There are moves to modernise, build infrastructure and form regulatory policies. While rural India has a distinct lack of infrastructure, urban India has a lot of modern facilities. Although there are pockets of fairly well developed areas, like the metros, the vast majority of the country is still relying on very archaic equipment. In stark contrast, 90+% of the country's metropolitan cities have electronic telephone exchanges.

There is a growing awareness and acceptance that information technology must be a major thrust area. A number of initiatives have recently been taken, the most visible

amongst them being the DOT Telecom Policy. For all its history, DOT has been a monopoly and only now are there signs that this might be a thing of the past - at least in some respects.

Rather interestingly, both the educational/research sectors and the NGO community were one of the very first to realise the true potential of this technology and have invested time and money in making it a reality. While the large education and research institutions with the necessary resources have gone in for large scale connectivity, NGOs have chosen the low cost solutions such as FidoNet for their e-mail/conference connections. Part of the impetus for this arose from the cajoling of the international community. It was not difficult to see and identify that electronic connectivity was the appropriate way for present and future communications. The dependency on paper and fax based communication has been eased out having been replaced by e-mail. However, since pockets of people and mutually exclusive initiatives took place, there is a need to consolidate these and work on economies of scale. Its pertinent to point out that very many felt that they could work together towards a common network although there is scepticism about the controls and the privacy of the information on the network. A model which seemed to evolve was that of a backbone network with the purpose of carrying data which plugs into hosts that cater to the various needs of different sectors.

While the backbone can cater to the carrying of information, its likely that a dual approach will be needed. Most NGOs would want a closer-to-home, simple network while others like research institutions would only be able to wet their appetite with e-mail. They are more keen on going further with services like, on-line databases, and direct connectivity to the outside world - the world of the Internet.

1. Regional Recommendations

A striking fact that emerged in South Asia was that regional connectivity was very poor. It was almost impossible to dial out from neighbouring countries. At the same time, calling neutral countries not too far away, although far more expensive, was much more successful. Calling Singapore for example was possible from India, Nepal, Sri Lanka, Bangladesh without a hitch. However, calling say India from either Nepal or Bangladesh was an ordeal. Added to that, the line condition was not conducive for data communications. It is clear that, a host in a country like Singapore would serve a much better and neutral goal rather than one of the South Asian countries. Thus, it is necessary to look at this option in greater detail when considering intra-country and international data flow. If the scales allow satellite stations/leased lines rather than dial up connections, the above considerations might become diluted.

Taking note of existing initiatives, level of user awareness on networking issues, available expertise and limitations of present infrastructure, it is recommended:

- Support existing initiatives to avoid duplication of high-cost high-speed links between city centres;
- Promote co-operation and co-ordination amongst network providers within city centres to avoid duplication of services targeted at the same user group;
- Selection of single host per city to serve as an information host to focus on network information content relevant to the development sector, development research institutions and NGOs;
- Assist hosts to upgrade storage capacities with CD-ROM technology and build capacity for on-line access as well as off-line processing of information requests;
- Assist city based host to gateway into suitable backbone or carrier (e.g. ERNET) for national and international linkages. Subscription cost for sub-domain account can eventually be recovered by host from the user base to enable the host to be self-sustaining;
- Give priority to low-cost yet self-sustaining models to enable participation of small projects and NGOs;
- Encourage set-up of Fido-based points in remote urban and rural areas to use low-cost dialup technology to feed into city centres;
- Training Support to:
 - a) Sensitise and train user base for efficient use of networking technologies;
 - b) Promote research activity towards enriching information content of networks and encourage local exchanges; and
 - c) Build local expertise for troubleshooting and technical support and network management.

2. Language issue

- Support multi-layered networking by providing electronic means of communication as one level of information carrier. Other means like paper based information exchange can be used for hard to reach places. Centres can also perform the task of translation to regional language to some extent where necessary. Functioning as information clearing house so that local organisations can participate in information exchange;
- Promote research in development of networking systems compatible with local language scripts.

4.6.1 CONCLUSIONS

Despite the very positive scenario around in the networking environment in India, its amply clear that the cost is going to be high for quite some time to come. This is likely to create a scenario of haves and have-nots of the electronic community. An active role has to played to negate this imbalance. While on one side the opening up of the policies and the commercialisation is going to have a positive effect, its not going to ensure a level field or a place for everybody. Equitable access for a large section of society may remain a distant dream. Hence, there is room and potential for projects by agencies committed to social justice and sustainable development at this formative stage to shape the evolving networks.

1. Protection of Users' Rights

Current policies demand that the person(s) operating the systems is responsible for the contents of mail flow. Whilst considered by some organisations as “a ridiculous idea”, it is thought it could be used by agencies that want to restrict access to select groups only.

Almost all networks currently in operation “sniff” mail. Privacy is not maintained.

Encryption techniques may have a role to play in these environments.

2. Promoting Sustainable Models

Use of appropriate technology and low cost solutions at local levels can help meeting goals of sustainable development. BBSs largely run on DOS based computers have played a key role in creating awareness about electronic networking. These are rapidly expanding, as are their user bases. It would be imperative on us to ensure that plans for future development in telecom infrastructure does not undermine lessons and experiences gained by using low costs technologies for electronic networking in this region. BBS have a special role to play and their service can not be undermined or overlooked when designing future networks. In many ways, these close-to-home systems reflect the “people-networking” of communities and closely follow the

changes helping society evolve into the capacity to use the higher bandwidth networks of tomorrow.

4.6.2 MODELS

The situation in India indicates that within the next one year a few new networking initiatives will emerge from the commercial sector, the Govt. and the development sector. International UN organisations, funding agencies, local NGOs have indicated intentions not only to go on-line but also to establish a network of their partners in the country.

For a country as large as India, a single network model would not be feasible. In fact it would not be possible or desirable for any single organisation to have sole monopoly over networking services. A functional model for the country would be a system of independent networks riding on a common backbone or with gateways into each other. All networks could use a common Internet backbone, but each network could operate their own information host sites.

Backbone with Hub and Spoke model

India needs a solid and functional backbone. A distributed model seems the most appropriate due to its size and diversity. Users can access local systems and the hosts can ride on the backbone to provide connectivity.

This model can easily incorporate diverse set of users - be it Governmental, Education & Research or NGOs. Each can have a domain for themselves. This model will also have the flexibility of catering to a larger bandwidth of users with one end of the spectrum catering to high cost-high speed users to the other end low cost and appropriate technologies. In such a model equitable cost sharing can be done and networks can pay by the bandwidth used.

In functional terms, taking into consideration existing infrastructure, a suitable network model for India should comprise of:

- An information host site in each city based on 486 or 586 PC/ATs with 500MB or more disk space capacity and at least two telephone lines;
- A dial-up link between the information host and the local backbone carrier like ERNET node or any other carrier host that is an Internet domain. If resources permit, and the bandwidth used justify it, a leased link to the Internet node can be taken;
- Local/regional small-host sites based at district centres and other key cities. These sites would connect over dialup lines to the nearest city host. Fido technology would be best suited for these centres because of its efficient performance over dial-up links.

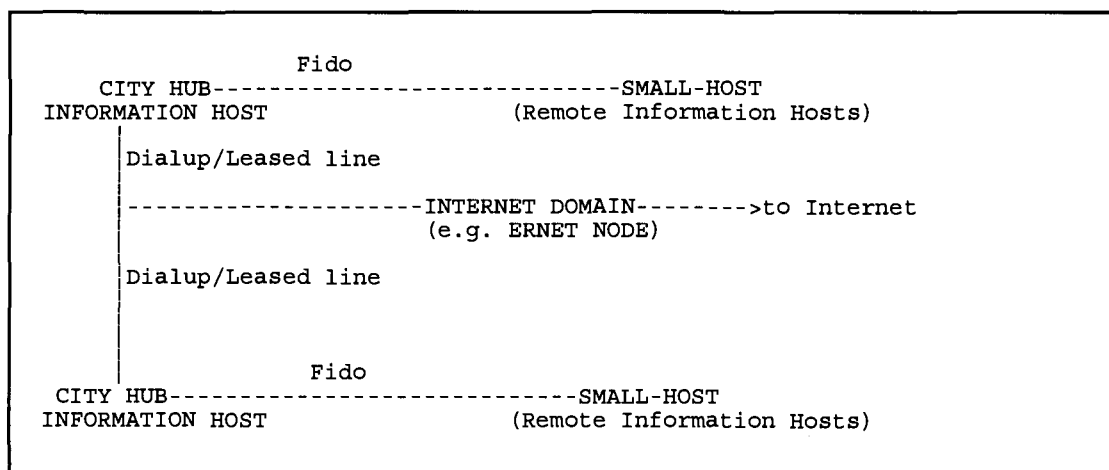


Fig. 2 Recommended India Hub and Spoke model

5.0 COUNTRY REPORT - INDONESIA

5.1 SCHEDULE

JAKARTA	7 May - 11 May
Workshop - PDII-LIPI, Jakarta	9 May
Scheduled Interviews	9 May - 11 May

Organisations Interviewed	Contact
PDII-LIPI	Mr B Sudarsono Head of PDII-LIPI
IPTEKNET	Dr Finarya Legoh Manager
UNDP	Mr Henry Gultom & Mr Walid Badawi
INDOSAT	Mr Syaiful Rizal Manager, Data Communication
University of Indonesia	Dr Rachmat Samik Ibrahim Network Manager Computer Science Centre

5.2 OVERVIEW

The Indonesian archipelago consists of some 13, 667 islands, 6 major religions, 16 principal ethnic divisions and an overall estimated population of 190 million people. Ensuring equitable access to basic commodities is a challenge enough. Extending telecommunications facilities out to all 27 provinces and each of the islands seems a daunting task, but one not without its pioneers.

National cohesion is the prime motive behind telecommunications developments in Indonesia. It has brought about the emergence of several parallel data communications initiatives serving various sectors of society. These networks are employing a variety of technologies such as packet radio, microwave links, UUCP, Fido and more recently, the Internet.

There are over 763 000 domestic telephones spread throughout Indonesia linked by a reasonable inter-island microwave system. Suitable for general purpose communications, it is in most instances unsuitable for modem based communications. Line quality is poor so the adventurous have taken to explore the various options outlined above. This report details the developments in these areas and makes recommendations in light of their suitability, cost-effectiveness and of course, sustainability in a country where telecommunications is going hi-tech very quickly.

Indonesia has led the region in satellite communications gaining valuable ground on all its competitors. INDOSAT has been extending its satellite "footprint" to encompass parts of the Pacific Islands as well as Indochina. It has now become integral to cross-regional telecommunications developments.

But the concept of equitable sustainable development in such a country, where it is apparent that Jakarta is the economic success of the Republic, where people talk of following in Singapore's example, is difficult to fathom when the greater percentage of Indonesia's population still lives in third world conditions. Whether improvements, research and development of data communications in this country will address these problems, as so many institutions believe they will, remains to be seen.

A further challenge will be the Internet itself. With the banning of various publications, authors and playwrights, the imprisonment of select publishers and distributors it will be advisable to observe whether access to the Internet would be regulated, how those regulations are monitored and enforced. Such regulations, as identified in China, may impact severely on the flow of information in and out of the country.

All in all, 58 organisations came into contact with the Study Tour. They represented both government and non-government institutions and organisations.

<u>CITY</u>	<u>W/shop</u>	<u>Interviews</u>
JAKARTA	50	8
TOTAL		58

Table 10. *Study Tour breakdown*

Of the 50 participants at the workshop, 19 returned questionnaires distributed there. These identified common needs, constraints and even recommendations. This report reflects these and other findings.

5.3 TELECOMMUNICATIONS CONDITIONS

Telecommunication facilities are very well developed in the cities like Jakarta, though only 11 of the major centres can be reached successfully via modem calls. Providing connectivity to the thousands of islands in the archipelago is another matter altogether. Innovative use of packet radio, satellite links and other technologies which do not require cable based telecommunications infrastructure are seen as viable alternatives. These are being extensively explored by such institutions as the University of Indonesia and Institute of Technology, Bandung.

5.3.1 LOCAL TECHNICAL FACTORS

Local technical factors to take into consideration are:

- Poor telecommunications infrastructure in provinces and islands;
- Use of non-cable based telecommunications required in remote areas;
- Existing international links are expensive to maintain;
- Direct Internet connectivity is immanent;
- A variety of active low-cost network providers in Jakarta;
- Most international connections are expensive to maintain; and
- UUCP across X.25 for international links is a viable low-cost alternative .

5.3.2 REGULATORY ENVIRONMENT

Packet radio appears to be the major data communications technology constrained by Indonesian telecommunications regulations. Thus far, there has been no allocation of a radio frequency for specific use by the education and community based sectors. Bandwidth is considered a commodity, therefore not readily subsidised nor given away.

Despite tough regulations around the distribution of frequencies, experiments in the field go on regardless. Enforcing these regulations has not been so easy for the Indonesian authorities as there is yet to be an effective monitoring system of telecommunications activities.

It is not yet clear what regulations will evolve with the advent of direct access to the Internet. Though it is considered by various academics that some level of access will be moderated, if not curtailed all together.

5.3.3 FACILITIES/SERVICES

INDOSAT

Indonesia begun developing its own satellite system in 1976. Since then a few international companies have established their own private satellite networks.

The premier network active not only in Indonesia, is INDOSAT. Until recently, INDOSAT had the lions share of the market. Now the Ministry of Telecommunications Under the Ministry of Telecommunications has agreed to allow Sprint International and British Telecom to provide international carrier services. Local companies are also allowed now to resell these services.

But INDOSAT still enjoys a monopoly on certain key areas of telecommunications development. For instance, it appears that INDOSAT has enough pull to decide how Internet services can be used in Indonesia, and who will have access to it. In other words all international data communications service development and implementation will involve INDOSAT in one form or another.

INDOSAT provides 64Kbps leased digital lines compatible with the TCP/IP standard. It hopes to provide a national host service for the Internet. Though some institutions felt that INDOSAT may well have the infrastructure behind them, they do not have the necessary expertise, nor the experience to administer an Internet host.

This may well be true. The representative from INDOSAT interviewed during the Study Tour had no exposure to e-mail and had to be briefed on various aspects of the Internet before the interview could proceed.

INDOSAT is providing a 64Kbps line to US via SprintNet for the IPTEKNET pilot Internet project. The pilot is to be used strictly for non-commercial purposes. INDOSAT is considering maintaining its own Internet facility for commercial. A decision on this will depend on the outcome of the IPTEKNET pilot (see Section 5.6 for more information on IPTEKNET).

IndoInternet and Graha Informatika Nusantara

This joint venture is a recent initiative (launched August 94) set to provide direct commercial access to the Internet. It has a direct Internet link via INDOSAT. New users may dial-up to one of 25 lines and register to the network on-line. This is an exceptionally low cost service.

Services:

- E-mail
- News groups
- Telnet
- FTP
- WWW
- Gopher
- WAIS

Charges:

Registration Fee:	Rp 50, 000 (USD 25)
Monthly charge: time)	Rp 40, 000 (USD 20) (plus 15 hours connect time)
Additional connect time:	Rp 2, 000 per hour (USD 1)

There are 25 lines available from 1200 to 14.4bps. IndoNet also provides an on-line registration service.

Sistem Komunikasi Data Paket (SKDP)

SKDP is the local X.25 carrier. Concerns of inefficiency and high cost were raised during the Workshop.

Public Dial-In Service up to 1200 bps

RATES: All prices are quoted in USD.

For Dial-In Service:

Subscription Charge: 50.00 (one time fee)

Ongoing Charges: 75.00/Month for 300-1200 bps
10.00/Month/NUI

Connection Charge: 0.29/Minute

Traffic Charge: 0.015/Segment

Sprint International

The Jakarta based node of SprintNet offers an affordable X.25 service.

Ongoing Charges: USD 33.00 Month for 2400 bps

Hourly Rate: USD 25.00

5.3.4 LOCAL INITIATIVES / PROJECTS

University of Indonesia

The University of Indonesia has a UUCP node, INDOGTW, which polls various Internet sites across normal dial-up lines. Access charges are very high, up to USD 0.75 to send or receive one kilobyte of data.

Dialup speeds are available up to 22Kbps via modems with turboPEP, or V.32bis up to 14.4bps. Users must access the network with UUCP software such as Waffle. Basic terminal emulation/interactive dial-up is not possible.

Individual accounts are not available, but organisation with "low to medium" volume traffic are able to register. E-mail within Indonesia is free of charge. International traffic is charged per kilobyte. A very simple pricing structure has been adopted. It is anticipated that international e-mail charges will drop by the end of 1994.

Registration: No charge

Ongoing charges: 0.50/Month

0.20 - 0.75/Kilobyte for outgoing international data

The University Computer Science Centre has been considering the establishment of a BBS, Kalawarta 2.0. It will be a separate organisation to INDOGTW, and will have a direct connection with IPTEKNET.

Indonesia Paguyuban Computer Network

The Paguyuban Computer Network is an informal network established for education, research and non-profit based organisations/institutions. It is accessible from Jakarta, West Java, Middle Java, and East Java. It is a project of the Institute of Technology, Bandung.

This networks used a variety of technologies to enable connectivity from the various centres of activity. They are:

- High Frequency (Short-wave) packet radio TCP/IP network;
- Very High Frequency packet radio TCP/IP network;
- Ultra High Frequency packet radio TCP/IP network;
- UUCP - Unix to Unix Copy Programme dial-up;
- Local Area Network TCP/IP and/or Novell 10Mbps;
- Sistem Komunikasi Data Paket 2400bps; and
- Leased line.

It has international links with UUNET, DIALix, Germany, the US, an experimental link with Japan and, a VitaSat link to the Internet. It also supports a national link with IPTEKNET.

It is interesting to note that due to the high cost of local telecommunications services, the Institute of Technology built their own radio network for data communications.

NUSANet

Founded and hosted by INFID, NUSANet is an NGO only network.

NUSANet poll via UUCP the University of Indonesia (UI) and INDOTap for transfer of international data. The UI link is very expensive. Due to the high UI charges, large files from foreign locations have been known to cost up to Rp. 2,000,000 to receive.

Indonesian Centre for Energy and the Environment (IndCEE)

IndCEE is an energy and environment organisation, founded in October 1992, which is providing information and communication services. Thus far, it is the only energy and environmental BBS in Indonesia, offering e-mail and electronic conferencing.

Its membership base is not restricted to NGOs. It invites participation from the government and private sectors involved in energy policy formulation.

IndCEEs long-term objectives are to:

- Provide NGOs with the simplest and most efficient means of communication;
- Provide NGOs with relevant information regarding current issues; and to
- Introduce inter-NGO data communication.

IndCEE's short-term objectives are to:

- Act as a gateway for NGOs in exchanging information with domestic or foreign NGOs;
- Provide comprehensive databases on environmental issues, in particular on energy and climate.

IndCEE is a UUCP based network. It polls the Institute for Global Communications (an APC member) in San Francisco via SprintNet. All international traffic passes through this link. It is relatively cost effective to maintain as the SprintNet charges are by far the lowest PDN charges in the country.

All users are provided with Waffle as the user-end software. Training and manuals are available.

INDOTap

INDOTap went on-line in December 1993 as a node off TOOLNET. It is used by a small number of non-government organisations. The Netherlands based, TOOL Foundation, subsidises communication costs between Jakarta and the Netherlands for all international traffic. The subsidy ended June 1993. It is not certain whether INDOTap will be able to sustain the cost of its international link to the Netherlands.

The network is based on a Fido model (store and forward) and is similar to Pactok. A common concern raised by some organisations about INDOTap was the Netherlands poll. It is clearly outside of the region, expensive without the subsidy and only supports e-mail. NGO based information from local and international sources is not available.

As yet there are no set subscription nor usage fees. Though this is expected to change now that the international link is no longer subsidised.

Users are spread across Indonesia (14 members at time of writing). A feature of the networks is that all users receive an Internet style of address.

5.4 LEVEL OF IDENTIFIED EXPERTISE

Though the level of available expertise in Jakarta is high this is not the case in the provinces, islands and other major centres. Many skilled technicians find employment overseas leaving telecommunications development in some sectors to slump back home.

The need for more training opportunities in the area of networking became apparent when several institutions blamed the slow progress of developments on a short-fall in the technology skills base.

It is clear that a certain degree of "human resource development", as outlined in the paper, "Indonesia Network Recommendation", prepared by Dr Onno W Purbo of ITB, is required to ensure both high-end and low-cost data communications developments occur concurrently throughout the Indonesia Republic.

The projects identified in this report have excellent resource people at their disposal. All highly qualified and dedicated, with an aptitude for thorough research and development process as well as an awareness of both technical and user needs and requirements.

5.5 LOCAL REQUIREMENTS IDENTIFIED

Results from the questionnaire, interviews and correspondence received post-Study Tour, identified the following requirements:

- Access to cheap and efficient communication networks;
- Low cost international communication;
- Local and international access to locally based databases;
- Access to international databases;
- Link databases and other information providers (i.e. libraries, documentation centre) to existing e-mail service providers;
- To create connectivity among existing networks;
- Facilitate access to e-mail networks for people in remote islands;
- Use of packet radio or micro wave links to alleviate geographical constraints;
- A network of local hubs that can be connected to an international network;
- High speed and broad bandwidth links for local and international links;
- Improved interfaces communications software;
- More emphasis on training in network installation & maintenance;
- Emphasis on training graduate programmers for research and development.

5.6 FUTURE DEVELOPMENTS IDENTIFIED

1. Indonesian Science and Technology Network (IPTEKNET)

IPTEKNET is a pilot project sponsored by the Government and administered by the Agency for the Assessment and Application of Technology. This project is likely to provide a major boost to national networking as it will provide the first direct link to Internet for academic research purposes.

It is anticipated that the outcome of the pilot phase of this project will aid in the formulation of a funding proposal to the World Bank. The proposal will set out funding requirements for the construction of nation-wide telecommunications infrastructure.

Some of the key purposes / aims of this project is to:

- Improve conditions for transparency of information exchange to users;
- Improve management, technical and regulatory conditions affecting data communications;
- Develop capabilities to support a variety of data communications tools (packet radio, microwaves, satellite, etc.);
- Encourage technology transfer;
- Encourage use of IT in agribusiness;
- Provide equitable access from all secondary centres in Indonesia (moving emphasis away from Jakarta);
- Encourage practical and smooth co-operation among various institutions; and
- Prove itself as an asset to Indonesia motivating the Government to give special facilities to such networking projects.

IPTEKNET's primary objectives are:

- To provide:
 - a) Remote on-line database access and searching
 - b) Electronic document delivery
 - c) Off-line database search service
 - d) Elaborating standards for a management system
- Provision of information to a number of key Governmental decision-making bodies;
- Establish and maintain a direct connection to the Internet.

IPTEKNET will provide the following key services:

- Supporting and co-ordinating the building of domestic databases;
- Bringing selected international information sources to Indonesia rather than accessing them abroad; and
- Exploiting the resources available on the Internet.

The Government has agreed to subsidise the costs of a 64Kbps leased line to the Internet. The link was opened in May 1994. IPTEKNET is expected to accrue enough academic institutional use of the link to cover its costs beyond the first year.

The Government's plan for IPTEKNET's sustainability are considered to be optimistic at the very least. IPTEKNET expects itself to be self-sustained within 5 years. In the meantime, they will be encouraging their member networks to charge their users, increasing the potential for sustainability of both primary and secondary network services.

At present there appears to be a lack of commitment within IPTEKNET for user-end training. Most databases compiled by IPTEKNET members are on a DOS platform. Information and training on transferring this data onto a Unix platform for local and international networking is not readily available. Many IPTEKNET members are looking for resources to implement this aspect of their commitment to the pilot project.

Access to IPTEKNET beyond the academic community is still uncertain, though according perceived trends with the organisation access may well be provided to the NGO community. If this proves to be the case then the cost of maintaining international connections will drop dramatically, making sustainability of the low-cost networks more a reality.

2. Sustainable Development Network (SDN Indonesia)

The Indonesian SDN is yet to become operational. Partners are being sought under a programme supported partially by the United Nations Development Programme. The Ministry of Environment will work as the host organisation appointing 4 node co-ordinators representing the following:

- Private sector;
- NGO community;
- Academic (University of Indonesia - Centre of Computer Science);
- Government.

SDN activities will be co-ordinated by a steering committee made up of one representative from each of the 4 nodes. A national co-ordinator is yet to be elected.

During the first year of operation, the SDN will be operating on a pilot project basis offering access to its network at no charge. Hardware and maintenance costs during this first year will be covered by the UNDP. Communications costs will be borne by each of the partners.

After the pilot phase is complete a schedule of charges will be drawn up and users will then have to become fully paid up subscribers.

3. NGO Community Plans

The Indonesian Legal Aid Foundation has received some funding from Canadian government to create e-mail facilities where people can use a single computer to connect to a variety of networks. It aims to experiment with community models of networking, such as Telecottages.

NUSANet

NUSANet are looking into further UUCP options. They are considering following IndCEEs experience by doing UUCP across SprintNet or international X.25 to an APC site (either the US or Australia).

Pactok

There are a small number of Pactok users spread across Indonesia, though no in-country host. All poll the Sydney hub for data exchange. There is an emerging proposal that may see the establishment of Pactok hosts in Jakarta and Bandung. The in-country hosts would poll each other, whilst only one of them will dial internationally for overseas exchange. As with NUSANet, it is being considered that the most cost effective option could be to use X.25.

5.7 RECOMMENDATIONS

Indonesia is at a cross-roads in terms of electronic networking activities. The IPTEKNET Pilot project will provide cheaper and faster direct access to the Internet for local sites. Academic, research and perhaps the NGO communities will benefit from these developments. Telecommunications authorities are also expecting further developments in building state-of-the-art infrastructure. These plans will clearly improve facilities for remote islands. SprintNet and British Telecom have begun providing data communication services which have created cheaper alternatives for international communications. In the years to come, the World Bank's probable support for national telecommunications infrastructure may consolidate all these projects.

However, human resource development for building networks (low-cost networks parallel to the Government supported commercial and academic research networks), for developing information resources in local languages, ensuring network access to groups and individuals from remote islands, facilitating on-line access to information providers, user training programs requires substantial investment. Without these skills at hand extensive low-cost network development will be hindered. This problem is particularly acute in the remote regions, if not everywhere outside Jakarta.

The further spread of low-cost networking models, sustained by a diverse user community, may not necessarily be tolerated within a country that mediates individual opinion and "progressive" publications. Freedom of expression has been the strength of the Internet. It has been the driving force behind its extraordinary growth and certainly the inspiration for much of the voluntary technical work that has given its users so many more tools and levels of connectivity to navigate it with. The low-cost networks now active in Indonesia are able to avoid such potential hazards, but will need to be strengthened should they survive the immanent telecommunications expansion and its corresponding regulations.

In other words, these significant developments need not discourage support for local, low-cost, community based networking initiatives. It was clear from discussions throughout the period of the Study Tour in Jakarta, that many sectors of the local community wished to make their own choices as to the networking tools they needed, to ensure diversity and an equitable share in Indonesia's developmental processes. Creative collaboration with existing initiatives such as the SDN and NUSANet could provide practical solutions to ensuring equal access in the construction of the information highway.

The following recommendations are an attempt to contribute to an optimistic future for data communications in Indonesia.

1. Responding to the needs of current and potential users, the few activities are considered as necessary to advance both user skills and confidence. Many potential users require some level of assurance from the service provider that the network can easily be integrated into their work patterns. If the service provider is under-resourced, training and back-up information is often unavailable.

It is therefore recommended that:

- Communications training programs be designed and scheduled for a wide range of users and network services;
 - Training and support materials be published in the major languages of the Republic;
 - Information fact sheets detailing the various networking options available in Indonesia, and their charges.
2. Various programs responding to the needs of network providers are also required:
- Scheduled workshops with hands-on training for technicians in the area of network set-up, management and maintenance;
 - Internship for network staff either in-country or overseas to both share experiences and extend the local knowledge base;
 - Assisting software development projects. Software that will seamlessly upload information from a variety of database platforms is urgently required.
3. Projects addressing the needs of information providers.
- Communications and information dissemination training for information providers;
 - Software development facilitate the broad networking of information currently available on a variety of database platforms.
4. Initiatives aimed to serve rural communities:
- The establishment of independent networks catering for the needs of NGO and other social movement and community groups;
 - Workshops to increase network awareness among rural communities and encourage information sharing amongst community groups.
 - Support for an international gateway for NGO and community use.
5. Improve co-ordination and collaboration amongst service and information providers.
- Conducting national level seminars and workshops to facilitate co-ordination among various institutions participating in networking activities, to strengthen awareness among users and share their experiences.

Some of the developments in urban parts of Indonesia create a images of the country which has solved all the problems of sustainable development. Experiences of ordinary people in urban areas and rural population in general challenge these images. Needs

for activities which can ensure democratic expression for all and allow citizens to claim fair share from development are still exist. Initiatives and activities in the field of electronic networking will require to respond to some of these aspirations to ensure equitable sustainable development else they can easily create information super highway only for those who can ride on it.

Constraints and the recommendations to alleviate them, to further develop and strengthen networking could not be better articulated than by Dr Onno Purbo. Dr Onno has done extensive research into the needs, requirements and status of data communications in Indonesia. His submission to the IDRC Pan Asia Programme, "Indonesia Network Recommendation", is attached. Refer to Appendix D.

NOTE: The above recommendations are largely based on observations and discussions about activities concentrated in the urban areas (in particular, Jakarta). Additional input reflecting the priorities of rural Indonesia is required to ensure a thorough examination of networking requirements.

5.7.1 MODELS

To aid in the development of the above recommendations, establishing partnerships with existing service providers and resource persons will be essential in ensuring that any network projects will be implemented in accordance with local needs and conditions.

The following model outlines a possible relationship between IDRC, local network expertise and international resource persons in a partnership implementing the recommendations listed in Section 5.7.

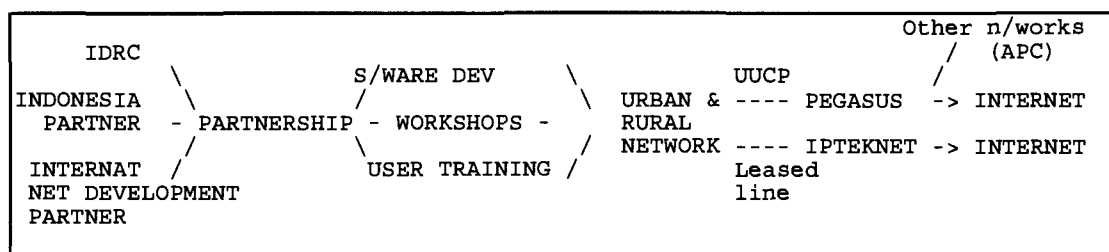


Fig. 3 Proposed Indonesian network development partnership

5.7.2 PARTNERS

It is recommended to make further contact with the following partners:

1. Institute of Technology, Bandung

This institution has on hand an excellent skills base of technicians and extensive expertise in a variety of networking technologies. They have a sound infrastructure,

and support various networking initiatives already.

The ITB would be best suited to aid in the co-ordination of both human resource development and training activities in Indonesia.

2. INFID (International Forum for Indonesian Development)

To co-ordinate NGO and community groups access and participation in electronic networking activities

5.7.3 FURTHER RESEARCH RECOMMENDED

Further research is recommended in the following areas:

- Activities which can provide better exposure to needs of rural Indonesia and the constraints to networking there.
- Evaluating experiences of community groups using electronic networking to assist in the understanding of what level of democratic aspirations can be guaranteed via data communications in a given social and cultural context.

Investigate the extent of expected donor support to networking initiatives. (i.e. CIDA are funding an Eastern University Development program, organised by Dr. Chris Dagg, Project Director Eastern University Development Project, Simon Fraser University (SFU), Burnaby, British Columbia, for network activities in Eastern Indonesia. No further information on this initiative is available.

6.0 COUNTRY REPORT - NEPAL

6.1 SCHEDULE

KATHMANDU	19 May - 21 May
Workshop - Hotel Bluestar	20 May
Scheduled Interviews	19 May - 21 May

Organisations Interviewed	Contact
Mercantile Office Systems	Sanjib Raj Bhandari
Royal Nepal Academy of Science & Technology Manager Computer Systems	Suresh Man Singh
NCC	Dirgha Khatri Ramesh Thapa
NTC	Mrs Laximi Kanta Shrestha Manager Mr Lochan Amatya Computer Engineer
UNDP	Mr Om Rajbhandary

6.2 OVERVIEW

Nepal is a mountainous country with a small population of some 19,100,100 people. As many people live in remote regions, as the country's shifting economy is heavily influenced by the country's that surround it, access to communications is invaluable in strengthening capacity building and self-identification as an independent economy and culture.

Due to its difficult terrain, communication is very difficult. A poor telephone service renders data communications near on impossible. Existing penetration of telephones is very meagre. Waiting periods for new connections is extremely long. The load on the present infrastructure is overbearing and a lot needs to be done at basic levels.

In recent times communication links with the outside world have somewhat improved. Satellite and radio transmission links are employed where ever possible. But with the dependence on radio-links for voice communication has made it difficult to operate any high speed data communication links with the other countries.

Nepal is at a critical stage of its development. With growing wide spread awareness of the potential of computers and communications, there is a pent-up demand - both from within and outside, to improve the countries telecommunications infrastructure. It was noted that a telecom policy is being drafted by the government, but this process could take up to two years. Considering the state of play it is considered that any support provided to Nepal in its capacity building programme would greatly assist the country in shaping its overall direction as an emerging South Asia economy.

6.3 TELECOMMUNICATIONS CONDITIONS

Nepal has its own satellite earth station and introduced direct dialling in 1984. Dedicated fax lines are also now available. With a low telephone density of 0.3 per 100 persons, the country is in the process of upgrading and expanding its telecom infrastructure. They have made progress with the introduction of improved digital switches and by 1997 hope to lay a network of high-quality cables. There are no plans at the moment to lay any fibre networks.

Overseas communications via the satellite earth station is generally quite satisfactory. However, calls to neighbouring countries like Bangladesh and India, are via land line or radio links and are prone to noise, echo and poor call-establish rates. This error prone link makes voice communications an ordeal and reliable data communication a chance event at best.

Despite these odds, some of the foreign/international organisations (e.g. USAID, WINROCK) have been using dial-up lines for modem communications since as early as 1984-85. Presently, the National Telecom Corporation (NTC), which is responsible for telecommunication infrastructure and services in this country, is drawing up plans to introduce packet switching services for data communications. Under this scheme, X.25 packet switching services are scheduled to be available within 6 months to a 1 year. When operational 2400bps to 4800bps lines will be available. The present dial

up lines have trouble supporting 1200bps connections over existing voice-grade circuits. Since these new links are being planned over satellite connections, quality connections will be much higher, if not excellent.

A new telecom policy is in the making and due within the next 2 years. The policy will reflect the experiences gained from soon to be introduced commercialised packet switching services.

6.3.1 LOCAL TECHNICAL FACTORS

The primary factors affecting telecommunications and connectivity in Nepal is the poor quality phone lines and low baud rates.

While Kathmandu, the capital city is better served, the conditions in other districts and rural areas was not encouraging. In the absence of adequate data communication experience and experimentation within the country, it would be difficult to dismiss the present infrastructure as all together unsuitable. Using appropriate low-cost technologies (i.e. FidoNet, UUCP) appropriate for poor line conditions, networks can be designed to overcome some of the limitations posed by the country's present telecommunications infrastructure.

Computers and modems are easily available in Nepal. Besides the name brand computers and software, locally assembled computers are available. Typically, a 14.4bps modem costs around Rs 17,000/-.

Getting a new telephone line however, can mean years of waiting. To get a telephone line immediately is almost impossible. The waiting period for new telephone lines is almost 8-10 years! Under a special scheme, known as Own Your Telephone (OYT), by paying Nepalese Rs. 47,000/-, this process can be expedited. Even so, it takes anywhere from 1 month to a year to get a line installed.

6.3.3 FACILITIES/SERVICES

Nepal Telecom Corporation (NTC)

The NTC is presently at a stage of rapid computerisation. Though they use e-mail in-house, services on a commercial basis are yet to be introduced. Within the organisation, e-mail is used for co-ordinating the computerisation programme as well as to obtain data for design of digital switching public telephone exchange.

Overall, a process of expansion is underway, both throughout NTC and the telecommunications infrastructure it maintains. It is working on establishing the X.25 service, which incidentally is being modelled on the Indian system. Other data services are being planned although no concrete projects were elaborated on.

6.3.2 REGULATORY ENVIRONMENT

Currently, there is no national policy or guideline on telecommunications, although there are registration and licence fee charges for use of certain equipment on telephone lines.

To connect a fax to a telephone line, a registration charge of Rs 6000/= per annum is levied. Since modems are not installed in numbers and their use is relatively new, there is no policy on the use of modems on telephone lines. Unlike fax there is no charge as yet levied for use of modems. In general, regulatory policies for value added services and data communications are yet to be worked out. The NTC is examining the policies of other neighbouring countries and plans to introduce a new telecom policy in 2 years time.

Since the local telephone service is poor, and reach of the service is not sufficient, some organisations and networks obtain leased lines. Leased line are again difficult to get and costs are high. They can cost up to Rs 1.5 lakhs (150,000) to Rs 2 lakhs (200,000) per month for a 1200bps leased line and around Rs 5 lakhs (500,000) for 9600bps leased line.

6.3.4 LOCAL INITIATIVES / PROJECTS

National Computer Centre (NCC)

The NCC provides support to government organisations in data processing and systems design. They have undertaken various software development projects. For example, message switching system for civil aviation and the computerisation of land records.

The NCC is seeking help from Network Information Centre (NIC), India, in setting up facilities similar to NICNET. They would like to serve as a network node for both Government organisations and private institutions in Nepal.

Royal Nepal Academy of Science and Technology (RONAST)

RONAST is developing network services with a view to providing low cost links and access to the Internet throughout Nepal.

As the key institution for science and technology research and development in the country, RONAST is well placed to promote communication technology and provide a platform for better connectivity. They have a mandate from the government to work on IT applications and promotion of electronic connectivity in the region.

RONAST obtained a UUCP link to ERNET in India in late 1993. This connection was taken on an experimental basis to test feasibility of IDD links with India for data communication. Unfortunately, this experiment has not been a satisfactory one. Simply establishing a reliable connection with the India site has been difficult. To add, the cost of the IDD calls have been very high further reducing prospects for such links. Only recently the connection improved but not sufficiently to maintain reliable and frequent use.

The ERNET site at RONAST provides connectivity to about 25 users from within the academy and a teaching hospital in Nepal. Once the network stabilises, they intend to invite other institutions to join the network. The International Red Cross Society has already approached them for network services. They plan to become the focal point for an Internet in Nepal providing an open access based service. Already, RONAST in its effort to become the defacto Internet site in Nepal, has applied and received two Class C address allocations through the Asia Pacific Network Information Centre (APNIC).

RONAST is working hard on obtaining a IP connectivity and domain net services for Nepal. They are considering a proposal to UNDP seeking support for their networking initiative.

Provision is being made for a VSAT link in the next fiscal year. RONAST is looking out for backup support in technology and expertise which can help them establish these networks. They are willing to work to provide low cost links from their pipeline to the Internet.

Mercantile Office Systems (MOS)

MOS is establishing commercial network services and has thus far created reliable links to the Internet for basic e-mail traffic. They are further developing this initiative with a variety of data communications options. They are well established both technically and administratively to maintain broad range data communications services. A company profile has been included in this overview of MOS.

MOS, one of the leading computer companies in Nepal, is also pioneering computer communications technology in the country. One of the divisions of the company is experimenting with different communications software and connection routes to find a viable link for network service provision in Nepal. Under the auspices of the Computer Users Association, they run a local BBS which is accessed by about 100 users locally. Besides this, they are also a site on ERNET in India.

Since March 1994, they have been connecting to an Internet site in Singapore over IDD for their UUCP link. A dedicated phone line provides 24 hours service to about 25 users. Access for users is restricted but currently free of charge. They connect to Singapore 3 to 4 times a week and find the link reliable.

They are studying developments in the local telecommunications infrastructure with a view to launching a commercial e-mail service in the country. They see before them three options: a VSAT link (subject to government permissions and cost effectiveness), purchase of bulk time on an X.25 PAD (which is shortly being launched by NTC), and a leased line link.

a) MOS Company profile

The Mercantile group has been in operation in Nepal for over four decades. Today it has two flag ship companies - Mercantile Traders and MOS. While Mercantile Traders is into office automation, MOS is into computers.

Mercantile Office Systems is the leading computer company in Nepal employing over 80 professionals with wide interests. Occupying in excess of 10,000 square feet, Mercantile Office System's head office is situated at Durbar Marg, is in many ways the most prestigious and exclusive location in Kathmandu.

In November 1991, Mercantile Office Systems set up its first branch office in Biratnagar, the second largest city in Nepal. This branch office is set up primarily to support clients in Eastern Nepal. Similarly, the establishment of branch offices in Birgunj and Pokhara is under way. These branches will provide support to their clients in the Central and Western Nepal.

b) MOS Computer Network

The computer network at MOS is equipped with 3 file servers (with a total storage capacity of over 3000 megabytes), over seventy 286, 386, and 486 work stations and an IBM Systems/36 mini-computer, e-mail gateway and print servers, the network runs on Novell Netware with an Ethernet bus/10 Base-T topology, and has an arcnet

distributed star topology. Over half of the work stations are dedicated to handling daily business activities of Mercantile Office Systems and the rest are used for training and development. A Reuters Terminal connected to a satellite receiver receives and displays on screen real-time financial data and the latest world news.

This is a young company with the average age of employees being only 27.

MOS is the national distributor for the following companies:

Epson Corp., Japan
Novell Inc., USA
Acer Inc., Taiwan
Square D Company, USA
American Power Conversion Corp., USA
IBM Corp., USA
Gandalf International, Canada
Newport Systems Solution, USA
Lotus Inc., USA
Summagraphics, USA
DataCard, USA

c) Software Division

The Software Division consists of over 20 professionals consisting of system analysts, programmers, trainers, project managers and secretarial support staffs.

d) Hardware Division

The Hardware Division of MOS is staffed by six engineers and 25 trained technicians. In addition to the STD/ISD telephone and facsimile facilities, MOS have employed the Lotus-developed e-mail software package, cc:Mail, in order to accelerate the flow of information within MOS and principals overseas.

e) CAD Division

The Computer Aided Design (CAD) Division of Mercantile is a relatively new addition to the company. This division comprises of a seven-member team of architects and engineers who design buildings and building complexes on PCs using AutoCAD. With these facilities they provide GIS services . The CAD facility is equipped with 386 and 486 PCs, digitisers, plotters, and other specialised equipment.

Research Centre for Educational Innovation and Development (CERID), Tribhuvan University

CERID is an educational research centre under the Tribhuvan University. The centre focuses on rural development through non-formal education programmes, women and environmental related research. It conducts experimental, evaluative and innovative educational research.

CERID has plans to computerise its library and documentation. They also expressed the need to communicate/collaborate with agencies abroad as well as access international databases. Though CERID has not so far initiated any electronic networking activity, their potential to provide information host functions for the development sector could be considered.

Various NGO groups

During the past year some NGOs attempted to establish experimental links to international networks. Some of them managed successful experimental links with GreenNet, United Kingdom, and IGC, USA. All though these initiatives are not well planned they do suggest that such experiments can help gaining useful information about appropriate technologies which can be used in a country like Nepal.

One such initiative was undertaken by Mr. Peter Moulton of the Nepalese Electric Vehicle Project. He managed to establish a UUCP link with IGC across an IDD line. He plans to continue with this link and make these services available to local NGOs.

6.4 LEVEL OF IDENTIFIED EXPERTISE

National Computer Centre (NCC)

The NCC is the premier computing facility in Nepal. They have familiarity with connectivity technology such as X.25, PAD, Gateway, LAN Ethernet, FDDI (fibre distributed data interface). They have a number of engineers/professionals well versed in networking technologies working in the Organisations Interviewed. With experience in setting up on-line services for the Election Commission, and providing on-line links between the Road Planning Commission, Nepal Electricity Authority and the Provident Fund, NCC appears equipped to take on the task of establishing a national data network.

National Telecom Corporation (NTC)

The National Telecom Corporation has a high range of skills and expertise in the field of communications technologies.

United Nations Development Programme (UNDP)

The UNDP utilises over 100 computers in-house. This makes it one of the largest computer installations in the country. There is 100% computer literacy within the organisation. Computers are primarily used for database management, library, DTP and in-house administration.

They have been using LAN and e-mail since 1991. UNDP connects to services such as DIALCOM and CGNET through the GPSS pad at New Delhi, India as well as through international direct dial. Due to their high volume of traffic, their annual expenditure on e-mail is around Rs 200,00/-.

Royal Nepal Academy of Science and Technology (RONAST)

The RONAST has been involved in the advancement of science and technology. They have a functional node connecting to ERNET in India via a dial up UUCP link. As such they have been using e-mail on the Internet via this link.

Mercantile Office Systems (MOS)

MOS is the only other site which has e-mail connectivity to the Internet. MOS connects via UUCP to ERNET in India. They have another UUCP connection to a site in Singapore. To add, the staff at MOS have been working on local area networking.

6.5 LOCAL REQUIREMENTS IDENTIFIED

In order for organisations in Nepal to get onto the regional and global communications, the following requirements need to be attended to:

- A national carrier for data communications with reliable high-speed links to the nearest global gateway;
- Improved telephone line conditions both locally and to international sites;
- Intensive training and exposure programme for local organisations to sensitise the user base on potentials, prospects and problems of electronic networking;

Training programmes to build local capacity and expertise to set-up, manage and sustain an electronic network;

- Shared band-width on a high-speed carrier with differential tariffs for development organisations, governmental institutions and general public;
- Content providers updating on-line information to serve the needs of development and research institutions interfaced to international hosts;

- Access to international databases for the Universities and other educational institutions;
- Low-cost DOS based systems to provide connectivity to small NGOs and to interconnect remote stations located in district centres.

6.6 FUTURE DEVELOPMENTS IDENTIFIED

The following developments have been identified:

- Improved telecom infrastructure using better cabling and switching technologies;
- Availability of packet switching services;
- Commercial network services offered by private operators;
- A State sponsored satellite network for Government departments by NCC;
- A University Network (Tribhuvan University - plans to establish e-mail for Universities).

6.7 RECOMMENDATIONS

Existing developments in Nepal suggest that Nepal is on the verge of some major developments in telecommunications. Their choice of technology and design of the network will depend heavily on the kind of information and support they receive. It is crucial at this juncture to facilitate sharing of experiences of other developing countries.

To achieve goals of sustainable development networking it may be necessary to support initiatives of institutions and individuals who are willing to experiment and support low-cost networking technologies. These would be available to a wide community of accessing information useful to sustainable development processes.

6.7.1 MODELS

In Nepal a number of initiatives are emerging from the academic sector, commercial sector, the government and the development sector. Although the model to adopt should discourage monopoly of network carrier services, the question of viability of multiple service providers needs to be considered. Electronic networking technology is just emerging in this country, and as such it would not be feasible to have a large number of competing initiatives.

In a small country like Nepal, a feasible network model could be based on a powerful central host providing high speed carrier services to clusters of small hosts spread

across the country. Such a system of small hosts riding on a common backbone with gateways into each other and into the global networks should meet the needs of diverse organisations. All sites could use a common backbone which links into the Internet, but each cluster could operate around their host sites serving specific information needs.

The primary need of the country is a strong and stable backbone. Once such a backbone has been set up, small host sites distributed through the country could get feeds from this central carrier. The connections between small host sites and the carrier service could make use of a combination of low-cost technologies over dial-up lines and high-cost, high speed links over leased lines. However, given the poor telecom infrastructure and unreliability of local telephone links, a technology designed for noisy telephone lines (e.g. Fido) would be most suitable especially for small hosts located in remote locations. The following figure provides a pictorial layout of a suitable model for Nepal:

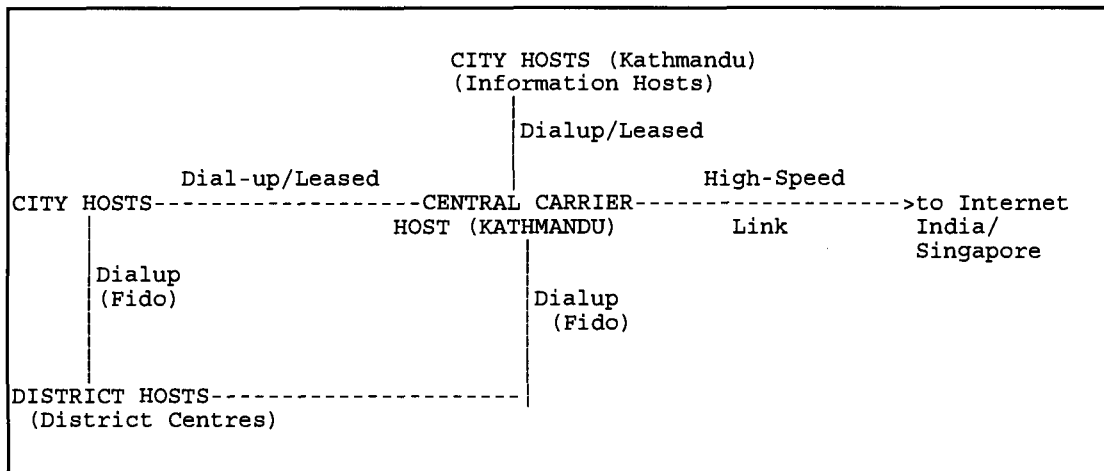


Fig. 4 *Proposed Nepal Connectivity Model*

The central host would be a high-end Unix station with an adequate number of phone lines. Although, new lines are difficult to get, provision would have to be made so that dial up links like Fido or UUCP can receive feeds from this site. The carrier could gateway into an Internet site at a suitable location such as in India or Singapore.

The city host sites serving as information clearing houses can operate with a minimum set-up based on 386 or 486 PC/ATs with 500MB or more disk space capacity and at least two dialup telephone lines. Local/regional small-host sites based at district centres and other key cities would connect over dialup lines either to the nearest city host (distributed model) or to the central carrier (centralised model). Fido technology would be best suited for these centres because of its efficient performance over dial-up links.

6.7.2 PARTNERS

Organisations/institutions documented in section 6.3.4 and 6.4 are recommended as potential partners in any data communications programme supported in Nepal.

6.7.3 RESEARCH

While a regional network would be ideal due to the commonality of the information and the nature of information flow, links to other countries like Singapore and Thailand might prove to be better in terms of reliability and cost effectiveness. These options need to be further explored.

7.0 COUNTRY REPORT - PHILIPPINES

7.1 SCHEDULE

MANILA	11 May - 14 May
Workshop - Approtech Asia	12 May
Scheduled Interviews - There were no scheduled interviews held in Manila.	

7.2 OVERVIEW

Much like Indonesia, the Philippines is a vast, geographically complex Republic consisting of a total of 7,107 islands. Up to 49% of its total population (66,100,000) is concentrated in the major urban centres. Though there are two official languages, Filipino and English, there are at least 87 indigenous languages.

Adding to this geographical, population and linguistic complexity diverse weather patterns such as typhoons, tsunamis, seismic disturbances and an active volcano suggest the need for a reliable communications media to provide information and relief co-ordination where it is most needed.

Unfortunately, telecommunications facilities are concentrated on servicing profitable urban centres such as Metro Manila. Many villages and municipalities have no telephone at all.

Making best use of available resources, BBSs and distributed networks such as Fido, have been very active in the Philippines. Use of low-cost and appropriate technology for community networking has been a part of social movements culture in the Philippines since 1988. The first BBS was up as early as August 1986. A small number of private commercial companies, such as CompuServe, have entered the field. But the Academic and Government sector have been slow to develop data communications till just recently.

When the UNDP proposed an SDN (1992) for the Philippines the NGO community was consulted. This resulted in an impressive input from NGO IT service providers towards the design and policies of the local SDN. This initiative is now well underway (see Section 7.3.4), adding to an existing range of IT services to NGOs and other interested parties.

Early May 1994 saw the commencement of Philnet, bringing a long awaited direct link to the Internet into the Philippines (See Section 7.3.3). Philnet is a network of academic and research institutions with an aim to establish a national network on their Internet link.

Along with scores of local BBSs, PSDN, E-mail Centre, People's Access, Philnet and other local and international service providers, are offering data communications

services in various parts of the Philippines. There is scope here to extend the range of services out of the commercial centres into the provinces and islands. But with an increasing number of service users are faced with similar services competing with each other. This seems to be creating some confusion as evidenced at the Workshop, hosted by Approtech Asia.

<u>CITY</u>	<u>Organisations</u>	<u>Participants</u>
MANILA	24	26

Table 11. *Workshop attendance breakdown*

Almost all participants articulated their aspirations, concerns and perceived constraints to networking in Indonesia. Though, many were computer and e-mail literate the Workshop became an opportunity for users, potential users, and service providers to share new developments and experiences.

Duplication of some services and poor marketing were recognised as a couple of the main problems both slowing development and isolating users from IT in general.

With competition fierce for subscriptions in the metropolitan areas, participants representing organisations from the remote areas saw little in the way of plans for low-cost networking servicing their needs.

With data communications accepted as the primary tool for information gathering and dissemination much more work needs to be done to advance access to the emerging information highway. Organisations and institutions working in rural areas and other remote parts of the Philippines need not be marginalised by IT developments occurring in this country.

7.3 TELECOMMUNICATIONS CONDITIONS

There are approximately 900,000 telephones distributed throughout the Philippines. With most of these phones concentrated in the major commercial centres the remainder of the country is left with a short supply of lines, extremely long waiting periods for new connections or no services at all. It is perceived that with foreign investment this situation will change dramatically, but until then the extent to which data communications in the Philippines will develop into these areas is limited.

Coupled with connection delays are the regular power failures, or “brown-outs”, that challenge any IT initiative. The use of backup generators and UPSs (uninterruptable power supply) is common and seen as a necessity.

Due to the limited supply of lines, even in centres such as Metro Manila, party lines (where more than 1 user has access to an available line in a given area), is very common. Many organisations must share their phone lines with a neighbour or another organisation in the same building.

Despite these constraints, people have been making excellent use of this resource, often a single telephone line, to accommodate the following:

- Incoming and outgoing business calls;
- Incoming and outgoing personal calls to and from staff (often unable to get their own lines at home);
- Shared access due to party line facilities;
- Incoming and outgoing fax; and
- Modem calls.

All the above requires co-ordination and planning with other party line holders. For instance, it is not uncommon for one organisation to schedule all their modem and fax calls with other party-line users.

A number of organisations have excellent information resources which they are unable to make available other than on diskette or direct access from their office. This is considered a constraint to the development of distributed information resources which of course discourages data communications use.

Despite these constraints individuals, organisations and IT service providers have maximised the use of an essential resource in very creative ways. There are lessons to be learnt here for those working in all too often over-resourced organisations in the more developed of countries.

7.3.1 LOCAL TECHNICAL FACTORS

The following technical constraints are still current in the Philippines:

- Long delays in acquiring telephone connections;
- Few lines available in remote regions;

- High cost of modems;
- High cost of computers; and
- Daily power failures.

7.3.2 REGULATORY ENVIRONMENT

There are no known regulations hindering data communications development other than restrictions on the use of satellite and radio frequencies.

7.3.3 FACILITIES/SERVICES

EASTNET

EASTNET provides packet switching services from 110 to 1200 bps. There is little indication that speeds will be increased in the near future.

Rates (All prices are quoted in USD)

Subscription Charge: 15.00 (one time fee)
Connection Charge: 0.20/minute or \$12.00/hour
Traffic Charge: 12.00/kilosegment
Minimum Charge: 5 minutes/call

Philnet Foundation Inc.

Philnet is a network of academic and research institutions providing a national network to the Internet. It links nine primary nodes in four regions of the country.

Philnet is configured as a distributed system, with each primary node acting as a direct link to other members of the network as well as to the Internet. Secondary nodes, whether they are institutions or individuals, can connect to any primary node.

Philnet's vision is to "build electronic bridges between and among people and nations to foster better understanding and shared prosperity."

Subscriptions are available to institutions or individuals, from the academic, research and commercial sectors. Rates

(prices quoted in Pesos)	Primary Node:	P
15,000/month	1gb per month data limit (o/s)	Donor-
Subscribers:	5,000/month	2gb per month data limit
(o/s)	Secondary Nodes:	Academe

3,000/month
Commercial

GO/NGO

7,000/month

5,000/month
Individual

3 0 0 / m o n t h

7.3.4 LOCAL INITIATIVES / PROJECTS

The following initiatives focus on the small-host operators that have clearly been the vanguard of networking in the Philippines. They have developed specialised skills and expertise for their niche market clients, largely made up of NGOs and their partners.

People's Alternative Centre for Education and Services (People's Access)

People's Access provides a series of IT related services to both its members and users. It operates a BBS available to "people's organisations, "people's service groups", and NGOs.

The objectives of People's Access are as follows:

1. Encourage and organise those who have some knowledge of computer technology and other appropriate information technologies and are willing to work with people's organisations.
2. Train persons from the ranks of people's organisations to help them acquire the skills and knowledge necessary to harness these technologies themselves.
3. Evaluate software and hardware products to determine which can be useful to people's organisations.
4. Develop software and hardware which are not otherwise available to meet specific requirements of people's organisations.
5. Acquire and disseminate information about these technologies by: acquiring books and other publications, maintaining a library, publishing its own materials, conducting seminars, and through other means.
6. Help people's organisations analyse their needs, select the most appropriate systems for their particular requirements, and get the maximum benefit out of these systems.
7. Facilitate networking among people's organisations by exploring appropriate ways of information exchange.
8. Determine the effects of computer technology in the livelihood, health and life of the people.
9. Participate in people's movements and offer the essential services required in the advance of the movement.

People's Access provides the following services:

- Bulletin Board System - access to local information and international gateway for e-mail exchange.
- Training Courses - IT based workshops and seminars.
- Library Services.
- Consultancy and Technical Services - Consultancy on all facets of information handling.
- Publications - Monthly newsletter on IT matters.
- Price Canvassing and Bulk Orders - Gathers quotes on hardware and related IT equipment for members.
- Hardware Upgrade and Maintenance Program.

E-mail Centre

E-mail Centre provides e-mail, electronic forums and database services to Philippine subscribers. It also provides a “gateway” to other computer networks world-wide.

The E-mail Centre has 90+ subscribers, more than 95% of whom are NGOs or individuals connected with NGOs. E-mail Centre also provides training and other services related to e-mail connectivity’s.

The following services are under development:

- additional dial-up lines to be installed;
- a fax server;
- a user-pays database of Inter-Press Service articles; and
- distributed database for subscribers who want to put their databases on-line.

A separate experimental node for purely commercial or government users has been installed at the E-mail Centre.

An application for a leased line to Philnet for direct Internet access has been approved by the local telephone company.

E-mail Centre has led the way, setting a precedent in the case of establishing a small southern-based, viable, self-sustaining host. E-mail Centre was the host of an Asian Networking Conference, to which participants came from all over South East Asia.

The E-mail Centre followed this successful event with electronic coverage of the first Asian Indigenous Women’s Conference. This was a first in terms of electronic exchange of greetings and information between women from Asia and interested colleagues and friends from around the world.

Schedule of charges:

One-time joining fee for installation, training and software:	P3,000
Monthly subscription fee:	P 300
Int’l e-mail, outgoing:	P 0.01/char
Int’l e-mail, incoming:	P 0.005/char
Local e-mail/conferences:	No charges

The specific objectives of the E-mail Centre are:

1. To promote networking among Philippine NGOs;
2. To facilitate exchange of data among Philippine NGOs;
3. To link up Philippine NGOs with international e-mail networks;
4. To explore new applications for electronic networking among Philippine NGOs; and
5. To support Philippine NGO campaigns.

Philippine Sustainable Development Network (PSDN)

PSDN has 25 members (Feb. 1993), of which 55% are NGOs. Also members are 2 government agencies, 2 international organisations, 4 educational institutions and universities.

The PSDN currently operates a bulletin board (PSDN-BBS) which links members and other relevant organisations as well as individuals on an electronic medium. Aside from providing conference areas for members, the PSDN-BBS also contains relevant information sources or directories, such as directories of NGOs (local and international), a directory of Philippine Council for Sustainable Development (PCSD) committee members, and simple environment and development facts and figures. To further enhance information and communication exchange on a global level, the PSDN intends to establish and operate a gateway to international databases and networks.

To fully explore the usefulness of the BBS, the PSDN will be working with the PCSD sub-committee on Biodiversity by linking them electronically via the PSDN - BBS.

Organisational Structure:

In the Philippines, the adopted configuration for a sustainable development network is that of a foundation composed of organisations which are actively involved in the pursuit of sustainable development. This Foundation, which is incorporated under the name Philippine Sustainable Development Network Foundation Inc. (PSDN,) is a non-profit and non-stock corporation.

Objectives:

1. To facilitate freer and more rapid access of information to users in governmental, research and educational, non-governmental, and entrepreneurial organisations to move towards the goal of sustainable development;
2. To encourage increased communications about sustainable development among different sectors of the economy in the different regions of the country;
3. To enhance the capacity of member organisations to meet their own needs for information on sustainable development;
4. To support PCSD in the pursuit of its objectives;
5. To provide the mechanism for meeting the information requirement of Agenda 21 in the country.

Since its inception, the Philippine SDN has focused on national sources of information. The priority themes are: clean technologies, waste minimisation, environmental legislation, sustainable agricultural research, funding technology transfer and personal and institutional contacts.

Women's Resource & Research Centre, Inc. (WRRC)

The WRRC is established as an academic-based centre whose main function is to support the development of formal women's studies and academic research on women.

WRRC are active users of the E-mail Centre. They have a mandate to support an Information Development Program (IDP). The IDP, through its co-ordination of the National Women's Information Network and the Southeast Asian Women's Information Network, circulates news, information and advocacy's of the women's movement via print and electronics information systems.

Information from the IDP is available to users of the E-mail Centre.

7.4 LEVEL OF IDENTIFIED EXPERTISE

The level of expertise is quite high in the field of data communications. Most organisations represented at the workshop had high level of exposure to networking, though further training would not go astray. Many, such as Approtech Asia have assigned people to take charge of their IT requirements.

7.5 LOCAL REQUIREMENTS IDENTIFIED

The following requirements were identified through the course of the Workshop:

- Access to information and databases compiled by organisations in developing countries
- Technical and other support for information providers to make their information available on-line
- Information clearing house to facilitate information marketing and access to wider communities
- Common protocols for networking of databases
- Improved communications software interface
- Easy to install communications software
- Financial and other assistance to smaller community groups to go on-line
- Facilitating access to phone lines and e-mail networks for organisations based in remote regions

- Better networking strategy, co-ordination and planning among network service providers to avoid competition endangering self-sustained operations
- Improved marketing of existing e-mail services
- Improved user support services
- Training in data communications application and use

The above requirements cannot be supported by existing service providers. Many are already stretched to capacity. Demands for training, support and extending e-mail reach out to the provinces is increasing.

7.6 FUTURE DEVELOPMENTS IDENTIFIED

Biodiversity Conservation Information Systems (BCIS)

The PSDN is considering the establishment of this service. In March 1994 a Prototype Concept Paper was published. The BCIS may be accessible via the domestic satellite service, DOMSAT. A BBS would be established to grass-roots organisations to access it.

Objectives of the BCIS are:

1. to deliver and gather information at the grassroots level;
2. to ensure the paired flow of information on a horizontal level - intra-inter community Organisations Interviewed and on a vertical level (Baranggay to Municipal to Provincial to National to International);
3. to create mechanism and strategies for promoting and disseminating Biodiversity Conservation Information to as wide an audience as possible;
4. to ensure capacity building through technology transfer training to organisations that requires it.

The BCIS intends to have:

- a national centre and selected provincial centre (Davao, Cebu, Bacolod, Up-Los Banos, Baguio and Manila) at initial prototype stage;
- the capability to link grassroots and peoples' Organisations Interviewed through various communications strategy and information delivery system;
- the capability to gather, store, search, retrieve, translate, package and disseminate timely relevant and vital information at all levels;
- the capability to train various organisations and upgrade their technological capability through training's and workshops geared to ensure the flow of information;
- the capability to use all available media resources to disseminate information that will promote biodiversity conservation to a wider audience.

As a strategy BCIS will:

- use existing methods and strategies that will facilitate information flow available at reasonable cost;
- maintain and develop existing data and information centres and upgrade them to a level that ensures a timely and accurate flow of relevant and vital information;

- research and develop sustainable communications methods and strategies on all levels.

BCIS will employ:

- the use of computer mediated communications, i.e. modems, communications software's and computers linked through the BBS and the telephones or computer generated data;
- the use of creative methods such as Popular education, Karaoke and trompa cassette radio, community newsletter, Posters etc. at the barrio level;
- the use of computer based encoding and data gathering methods technically available or the development of such systems to enhance and help facilitate data gathering and data dissemination on both vertical and horizontal levels;
- links and access to international advocacy organisations, research organisations and on-line databases and information centres through the subscriptions and use of electronic mail and faxnets;
- links and access to national academic institutions, databanks and information centres, NGOs and government organisations, research organisations, libraries located in Metro Manila and periphery. Information can be delivered through the use of the BBS to the provincial centres through timed long distance calls.

International Rice Research Institute (IRRI)

IRRI has applied for a 64Kbps leased line from Philnet. It plans to use this link to disseminate information to their partners as well link other partners together in the region.

7.7 RECOMMENDATIONS

Since the first BBS went into operation in 1986 there has been a significant increase in the number of data communications service options available to the community. These services are concentrated in the major centres, such as Manila, posing a potential threat to the long-time efforts of small-host operators. A competitive environment threatens to duplicate resources when it is clear that a collaboration and co-operation amongst services providers is needed.

It is clear that there is a high demand for data communications, but the present service providers are stretched to the limit of their capacity. Often, it is the value added services that are required, as listed above, such as IT training, data base networking, and connections for partner organisations in the remote regions.

The following recommendations aim to create an environment of co-operation among various network providers, as well as prioritising needs of organisations based in remote parts of the Philippines.

Support / Subsidies to projects (with special emphasis for rural based smaller NGOs)

- Access to modems via grants or long-term loans;
- Subsidising subscription and ongoing charges for access to e-mail networks;
- Collection of primary data for distribution via e-mail networks;
- Encouraging regional networking initiatives and information dissemination.

Support for existing network providers to enhance

- Strengthen human resource capacity and activities in technical, user services, administrative, marketing and managerial areas to meet the requirements listed in Section 7.5;
- Encourage co-ordination amongst service providers to avoid duplication of resources;

- Technical resources to achieve connectivity with between local networks;
- Access to CD-ROM drives and OCR Scanners to stimulate further database compilation and increase range of information for on-line access.

Support for project(s) undertaking information clearing house activities

Organisations such as People's Access and IBON Databank have been actively encouraging broad-base access to their information resources. To further these efforts it is recommended that:

- Human resource capacity and activities in technical, user services, administrative, marketing and managerial areas be strengthened to meet the requirements listed in Section 7.5;
- Remote access to these information services be further researched;
- Technical development of common protocols for exporting a variety of database formats onto a network platform.

7.7.1 MODELS

Data communications initiatives are well advanced in the Philippines, but support to strengthen human resource capacity is essential to ensure both self-sustainability and reliable and consistent service provision. Addressing the requirements listed in Section 7.5 within the context of the recommendations listed in Section 7.7 is by far the most suitable model to adopt in the short term. A more specific framework would require further research of potential partners.

7.7.2 PARTNERS

Interest in local and regional networking activities was expressed by several organisations attending the Workshop. Of these the one organisation that stands out in potential for broad-based, content-driven service provision is the E-mail Centre.

The E-mail Centre provides networking services to individuals, the commercial, non-government and government sectors. It has been developing its services since 1992 strengthening its resources over this period.

E-mail Centre employs a total of 2 full-time staff members, whose main activities are in management, administration, support, technical maintenance and project consultancy. Technical expertise is very high. E-mail Centre founder had also founded People's Access, and provides extensive IT consultancy, software development and tuition to numerous organisations and companies in the Philippines.

Further research in liaison with the E-mail Centre is required to determine the range and extent of support to strengthen its managerial and operational capacities, and the maintenance of them.

Potential Network Users and Information Providers:

- Haribon Foundation

- National Statistic Office
- Philippine News and Features Service
- IBON Databank
- Philippine Institute for Development Studies
- Green Forum
- International Rice Research Institute
- Women's Resource and Research Centre
- Approtech Asia
- ISIS International

7.7.3 FURTHER RESEARCH RECOMMENDED

Project Partner

This report has made a recommendation based on the successful history of a data communications provider in the Philippines. To ascertain the extent of the partnership, and the support provided to them it is necessary to conduct further research.

The research would determine:

- Future plans of the organisation;
- Technical requirements;
- Administrative requirements;
- Support services requirements;
- Training requirements;
- Marketing requirements;
- Potential for extending current range of services.

8.0 COUNTRY REPORT - SRI LANKA

8.1 SCHEDULE

COLOMBO 25 May - 27 May
Workshop - Marga Institute 26 May
Scheduled Interviews 25 May - 27 May

Organisations Interviewed	Contact
MARGA Institute	Mrs Hema Gethananda Chief Librarian
Canadian Co-operative Association	Jane Cooper
Centre for Regional Development Studies	A.H.H. Perera
National Poisons Information Centre	Prof. Ravindra Fernando
Sri Lanka Library Association	N.U. Yapa
Centre for Peoples Dialogue	Freddy George
Natural Resources Energy and Science Authority	W. Amaradasa
Peace Brigade International	Michael Valliont
International Centre for Ethnic Studies	S. Varatharajan
Industrial Development Board	C.R. Fonseca
Sri Lanka Institute of Development Admin	P.M. Pius Fernando
University of Maratua / INFOLAB	Gihan Das
Institute for Occupational Health and Safety	Dr Sunit Ratnaprity
Computer and Information Technology and Technology Council	Mr Rohan N Wijeratne Chairman
Info Engineers	
InfoLab	Gihan V. Das
Sri Lanka Network	Hyacinth Silva

8.2 OVERVIEW

Sri Lanka is a small island with a remarkably high literacy rate. Awareness of technology, computing, etc. is high with a great deal of enthusiasm to learn and integrate more if it. The country has been politically unstable for some years. Due to the ethnic divide, it shows up in mutual distrust and security alertness exhibited at various walks of life.

The telecommunications sector in Sri Lanka, though not highly developed, is making steady progress. Due to political reasons communications to certain parts of the island are cut off and severe restrictions to its use are in place. Where communication is possible, institutions and individuals have reasonable access to basic telephone services. Additional services like packet-switching and leased circuits for data communications are available, but at a price. Only large corporations can afford leased links and dedicated X.25 connections.

Despite the steep pricing of some of these services, a few potential users of computer communications technologies have begun to experiment with various options to international networking. Some use direct IDD facilities, others are experimenting with packet switching services. A couple of private operators are waiting for the right signals from the government on its revised telecommunications policy and tariff changes to pioneer a launch into the data communications market. There are presently at least two connectivity providers in the commercial sector, though these are still on an experimental basis. On the whole, the environment for data communications is characterised by expectant users and hopeful service providers.

In all, 16 organisations participated in the Workshop at Colombo. Half of them were small organisations with a total staff of up to 10 members. Three organisations were medium-sized with 30 to 50 staff members, 4 were large (50 to 150 employees) and one had over 150 employees (Table 12). Computers were in use in all except one small NGO. Computer literacy was fair with word processing and database management being the most popular of applications. Communications is a relatively new field for most.

Number of Staff	Number of Organisations
1 to 10	8
31 to 50	3
51 to 150	4
151 to 1000	1
TOTAL	16

Table 12. Total number of staff in organisations.

There were 7 organisations represented at the Workshop who have some experience with e-mail and communications networks in general. One organisation was experimenting with host software on a Fido system. The others occasionally used accounts on networks like GreenNet and MCIMAIL. Moratua University was the only organisation with direct dial-up access to an Internet site.

For a country the size of Sri Lanka, there may not be a large enough user base to support multiple host sites. However, the volatile political situation in the country makes networking a sensitive issue. The activities of all voluntary bodies are monitored closely by the Government and permissions are required for a lot of tasks. In such an environment, it would indeed be a very difficult task to promote co-operation and sector integration under one general network. Any attempt to force everyone onto one common network is not likely to succeed. Privacy and tamper proof connectivity would be an important aspect to the network. A network model for Sri Lanka would need to take note of these factors and offer an appropriate solution so that access to the technology is equitably distributed across different kinds of organisations: government, academic, research, international, voluntary bodies, NGOs, etc.

Another factor to contend with is the competition that is bound to arise amongst newly emerging services, especially in the commercial sector. On one hand, this factor could contribute positively towards stimulating growth and new services as well as maintaining some level of price stability. On the other hand, users would find it difficult to choose an appropriate service that meets their diverse and perhaps at times divergent information needs.

A new technology that is seeking a market with high costs to recover at the initial stages of inception will need to face many challenges. The complex situation prevailing in Sri Lanka requires further in-depth study for any serious attempt to provide broad-based networking facilities. This report outlines some of the present trends and attempts to make some recommendations based on information that could be gathered from a first visit.

8.3 TELECOMMUNICATIONS CONDITIONS

Sri Lanka compares favourably with respect to other South Asian countries in terms of telephone density (1.0 per 100). The quality of the lines are tolerable for basic data communications especially where-ever there are electronic exchanges. Though the cost of installing a new telephone is high, call costs are comparatively lower than in India. This applies also for IDD calls where rate structures are different for various country groups.

Leased circuits are provided for data communications, at speeds ranging from 4800bps to 64Kbps. Performance over leased circuits are reported to be fair, though the costs are generally beyond the reach of most organisations.

Telecommunications Rates

Annual Subscription for Phone Connections:

Each line for residential or business use: Rs 960.00

Multi-access radio links: Rs 45,000.00

Connection Charges:

(one-time payment)

Ordinary telephone: Rs 13,000.00

Provision of service within one month: Rs 15,000.00
Additional fee for priority connection: RS 5,500.00

Direct Dial (STD & non-STD):

Rates per unit: Rs. 1.20 (per unit for 1st 200 units)
Rs. 1.80 (per unit for 201 units & above)

1. Standard Rate: (8 am to 6.00 pm)

Between two subscribers of the same Primary/Secondary Area
(1 unit = 120 sec's)

Between any two Secondary Areas (1 unit = 50 sec's)

2. Cheap Rate: (6 pm to 8.00 am) - Off-peak hours

Between two subscribers of the same Primary/Secondary Area
(1 unit = 240 sec's)

Between any two Secondary Areas (1 unit = 100 sec's)

This means that a 6 min call costs Rs 3.60 for local calls and Rs 8.64 for STD calls at standard rates (Rates are half of these at off-peak hours).

IDD Rates:

IDD Rates vary from country to country as follows:
(Calculations are for a few select countries).

IDD calls to Germany Rs 12.10 (per unit of 6 sec's)
Australia Rs 9.40
Bangladesh 6.00

This is for 0800-1800 hrs on weekdays and Saturdays. There are reduced rates for 2 categories of off-peak hours.

Category I is: 0600-0800 hrs & 1800-2200 hrs Weekdays & Saturdays

Category II is: 0000-0800 hrs & 2200-2400 hrs Weekdays & Saturdays & all day on Sunday

A 5 minute call should cost:

	Normal	Off-peak I	Off-peak II
Germany	Rs 605	485	395
Australia	470	380	310
Bangladesh	300	240	195

DATAPAC

DATAPAC, the X.25 packet-switched service is available over both dial-up and leased-lines. Whilst the dial-up lines offer speeds only 300 and 1200 bps, dedicated X.25 access is available at speeds of 1200 to 9600 bps.

Dedicated and dial-up packet switched service

Monthly Charge

PSTN dial-up access (300, 1200 bps) per port	Rs 385.00
Dedicated X.25 access (1200, 2400, 4800 bps) per port	Rs 3000.00
Dedicated X.25 access (Synchronous 9600 bps) per port	Rs 4000.00

Usage Charge:	National Rs.	International Rs.
Duration (per min)	1.10	15.00
Volume (per 10 segs)	0.10	5.00

Data Leased Lines

(Annual Subscriptions)

Two-wire: LOCAL	Rs
At each end up to 19.2 bps	960.00
At each end up to 64Kbps	1,440.00

Main Link

Between exchanges 20 Km apart

	Rs	Rs /km
4.8 bps	4,512	+ 264 /km
9.6 bps	9,025	+ 264 /km
19.2 bps	18,409	+ 352 /km
64 bps	31,735	+ 441 /km

Between exchanges more than 20 Km apart

4.8 bps	8,380	+ 188 /km
9.6 bps	16,761	+ 188 /km
19.2 bps	33,520	+ 250 /km
64 bps	83,008	+ 312 /km

International Leased Circuits

(Annual Subscriptions)

14.4 bps leased data circuits (high speed)

	Rs
Zone I 0 - 3000 miles	1,683,000.00
Zone II 3000 - 6000 miles	2,524,500.00
Zone III Over 6000 miles	3,366,000.00

19.2 Kbps leased data circuits (high speed)		Rs
Zone I	0 - 3000 miles	1,836,000.00
Zone II	3000 - 6000 miles	2,754,000.00
Zone III	Over 6000 miles	3,672,000.00

8.3.1 LOCAL TECHNICAL FACTORS

The quality of phone lines vary from place to place depending on the extent to which exchanges have been upgraded. Some of the organisations interviewed reported difficulties in connecting to international networks over IDD lines. Failure to connect was a common feature despite repeated tries. It would appear that line capacity is inadequate for cities like Colombo and traffic congestion is an obstacle to smooth data communications. This needs to be further investigated and trials need to be done to determine the performance.

8.3.3 FACILITIES/SERVICES

Sri Lanka has a fairly developed telecommunication infrastructure. There are 3 PSTNs operational in the country - Sri Lanka Telecom's Datapac, Datanet and Electrotek. Sri Lanka Telecom has access to 2 earth stations, of which one is under construction. Other data channel providers such as Datanet have their own earth stations. Sri Lanka also has cellular and pagers in operation.

All though most the country is linked via copper land lines and radio links, fibre networks are gaining popularity and most of the newly laid trunk routes are already on fibre optic cables.

8.3.2 REGULATORY ENVIRONMENT

Sri Lanka has a fairly deregulated environment. To connect modem or a fax to a telephone line does not require any permission, licence or usage charges. The only condition laid is that a Sri Lankan Telecom approved modem be used. However, it is unlikely that any one will be prosecuted for use of modems that haven't been specifically approved. Private operators frequently use and install modems this way. Under present conditions it would appear that there is not method of enforcing telecommunications regulations.

The Sri Lanka Telecom is a government owned carrier and currently it has monopoly on the public telephone network. However, this may not be the case for long. Already there are several private cellular and data carriers and this is likely to gain further ground.

8.3.4 LOCAL INITIATIVES / PROJECTS

E-mail services in Sri Lanka are yet to attain a firm footing. However, various organisations have begun setting up experimental links. The keen interest to go on-line is evident from the alternative routes that are being explored. Presently there are five different routes through which connectivity to global networks from Sri Lanka is possible. These are illustrated in the figure below:

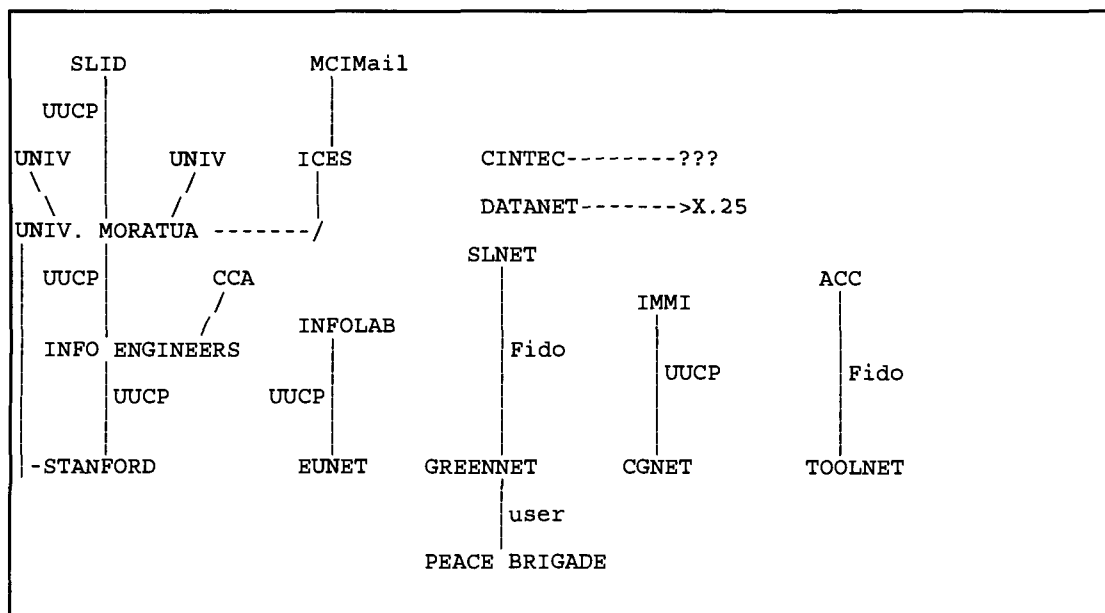


Fig. 5 Present International Connectivity Options

University of Moratua

The University of Moratua has been running a UUCP link to Stanford since 1990. They are polled by Stanford University over IDD once a day for the UUCP transfer.

A couple of Universities in Colombo use the Moratua University system for e-mail. More recently, the University of Moratua, has been testing their link to Stanford through, Info Engineers, a nascent commercial service provider.

The University of Moratua network also provides access to the Sri Lankan Institute of Development Administration (SLID) and the International Centre for Ethnic Studies (ICES). SLID is a sub-domain on the network, while ICES has a user account.

The University of Moratua is seeking government assistance to link other universities via land lines. These links will provide IP connectivity between the universities. In future this link will interface to the Internet and steps are being taken to ensure this level of connectivity.

InfoLab

InfoLab is an initiative that has emerged from the experiments at the University of Moratua. It is a new service, established by Mr Gihan Das who also manages the University of Moratua link to Stanford University. InfoLab aims to provide connectivity to individuals, private companies and NGOs who do not have access to the University network. InfoLab performs a UUCP transfer to EUNET in Holland once a day over a dialup IDD link. They have 2 telephone lines and about 15 users. They provide connectivity at the following rates:

Set-up charge Rs 20,000/- inclusive of modem

UUCP Charges: Rs 1,000/p.m. for 10 messages
Rs 5,000/p.m. for 100 messages

Info Engineers

Info Engineers is one of the first private operators to offer commercial e-mail services in Sri Lanka. All though the consultants were unable to meet with company representatives, information on Info Engineers was provided by one of their users, the Canadian Co-operative Association (CCA).

CCA is a subscriber to e-mail services on Info Engineers. They paid Rs 10,000/= for the initial set-up and a monthly fee of Rs 2,500/=. CCA's experience in communicating with Canada over this link has not been very encouraging. They have found it difficult to obtain consistent connections. It appears that there are very few users on this service and the host is new to the technology. There have been several breakdowns with long periods of delay in re-establishing the link.

As an early entrant into the field of networking in Sri Lanka, Info Engineers could well utilise this advantage to consolidate and expand their expertise. As a private operator, however, their services would be priced to make the venture viable. In the present situation, they have to contend with the high cost of leased links (national and international) and an unexplored market. End-user costs are therefore high at this stage and is likely to remain so in the near future.

Sri Lanka Network (SLNET)

SLNET is a low-cost alternative that provides a Fido link to GnFido at London. It is an experimental link to demonstrate the feasibility of a dialup connection over IDD lines using Fido technology. This venture should appeal to small NGOs, community groups and other organisations in the development sector. There is scope for this experiment to evolve into a viable model for small organisations.

TOOLNET

Another Fido experiment is that of the TOOLNET site at ACC in Colombo. This is modelled after the GNFido links to developing countries.

Computer & Information Technology Council (CINTEC)

The CINTEC of Sri Lanka, an autonomous institution charged with the responsibility of overall IT development in the country, is getting all set to launch a comprehensive computer communications network for the Government and international agencies. They are presently exploring funding sources from USAID and UNDP for 64Kbps link to the Internet.

8.4 LEVEL OF IDENTIFIED EXPERTISE

But for one of the small NGOs, all organisations represented at the IDRC workshop were using IT for general applications. The number of computers installed in an organisation ranged from 1 to 20. Seven organisations had 1 to 5 computers, while another 6 had up to 20 computers. Most of them had at least one staff member with basic computer skills and training in general applications. Computer literacy in general organisations varied considerably. In some institutions, more than 50% of the staff were computer literate while in others the figures varied from less than 10% to around 30%.

% of Total Staff	No. of Organisations	
	No.	%
No Computers	1	6
1% to 10%	3	19
11% to 30%	4	25
31% to 50%	2	12
51% to 75%	3	19
Above 75%	3	19
TOTAL	16	100

Table 13. *Computer literacy of organisations represented at the Workshop*

Applications which are in common use are word-processors, DTP and database management tools. Library management software also appears on the list of popular applications.

Computer Communications

Out of 16 organisations, 7 were familiar with e-mail and on-line access systems. These organisations had some form of connectivity to global networks (refer to Table 14). Most others had heard about e-mail but had no exposure to such systems and were keen to learn more about how they could get connected and what was required.

Awareness was low on facilities available on global networks such as Internet. Most people knew that electronic-mail enabled them to send messages using computers and that it is a cheaper and more efficient means of communications, but they were not familiar with the advantages of electronic conferences and other network services.

Network	No. of Organisations
GREENNET	3
TOOLNET	1
INTERNET	3
MCI-mail	1
CGNET	1

* some organisations have connections to more than one network

Table 14. *Number of organisations connected to various networks*

Amongst organisations with exposure to e-mail, there are a few individuals who are keen on popularising computer communications. Mr Gihan Das of InfoLab/Moratua University, is enthusiastic about the technology and has done considerable work in setting up the University link as well as the independent link at InfoLab. Currently they are in the process of installing equipment such as routers to enable high speed access between Universities. These links will at a later date connect to the Internet and a study is in progress on a suitable model. Others, like Michael Valliant (Peace Brigades International) and Jane Cooper (CCA) are active users with a fair amount of expertise in navigating networks. The Peace Brigades also operate a host and thus are more familiar with the operation aspects of a host node.

CINTEC, a government. agency responsible for IT development in the country has trained staff in computer systems design, maintenance and applications.

8.5 LOCAL REQUIREMENTS IDENTIFIED

The key requirements for building a national capacity for data communications would be:

- Setting up of a national back-bone (carrier) for high speed data transmission both in- country and international;
- Enhancing local skills to new technology and improving existing managerial and technical skills in running a communications network;
- Exposure programmes and training workshops on computer communications to stimulate interest across a wide user-base;
- Consolidation and co-ordination of existing initiatives to minimise division of users over multiple hosts. (This would be a difficult task in the context of the sensitive political situation in the country and the different interests represented by various user groups);

- Access to international academic databases through a local gateway rather than the expensive packet-switched or direct dial services.
- Low-cost local networks based on dialup technologies (e.g. Fido, UUCP) to service small community groups based in remote locations which are not easily accessible.
- A programme to promote sharing of information resources distributed across organisations (libraries, research and documentation centres, etc.).

8.6 RECOMMENDATIONS

Telecommunications is at an evolutionary stage in Sri Lanka. There are many diverse initiatives emerging with immense potential. Care has to be taken to ensure minimum duplication of effort and consolidation of resources whilst giving consideration to the political environment and the distrust that surrounds any communication initiative. Sri Lanka, being a small country, the government plays a key role in all international matters and thus it would be imperative to involve them in any initiative. At the same time, small NGO groups are playing a very active role especially in places that are difficult to reach and are cut off from the main stream due to terrain and political differences.

The single most invaluable form data communications development that Sri Lanka needs at this time are reliable and low cost high speed links. There is substantial awareness at various levels to utilise the bandwidth and enough local expertise and resources to quickly absorb such facilities. A related area to pursue is nurturing of links between evolving networks so as to build a bond for resource sharing. With a strong back-bone link in place, the next step in the evolution would be to encourage information flow and the creation of on-line databases

It is recommended that the use of the local language be developed for various on-line applications. Unlike India, where there are numerous languages and dialects in use throughout the country, Sri Lanka has only the single tongue. This would make such software development far more plausible than in other South Asia countries.

Due to the rapidly changing scenario here, it will be important to further study the situation before any assistance plan can be ratified or even quantified.

8.6.1 MODELS

Due to the encouraging work already being done, it would not be in anyone's interest to ignore this and set-up a different network. Instead it would be more appropriate to assist in consolidating the various initiatives under a common banner whilst ensuring there is equitable reach to the network. Since local telecommunications is already at a fairly developed state, and there are moves to further improve this, use can be made of the existing infrastructure.

From initial tests, it was established that high speed connections to India, Singapore

and US were possible over ordinary dial up lines. Even locally in most places the lines are clean enough to support high speed modem links. Thus, it is indeed possible build regional information resources on the basis that the above recommendations are considered and perhaps implemented. Unlike other countries like Nepal, where communication with neighbouring countries was difficult, Sri Lanka does not face the same problem, presenting a number of productive opportunities. This clearly establishes that more attention has to be paid to content, building databases, sharing and establishment of software and hardware than actual network provision itself.

8.6.2 PARTNERS

The following organisations/institutions could be considered as partners in any data communications programme initiated by IDRC in Sri Lanka. Further research to identify specifics of collaboration is advised.

International Centre for Asian Studies

Suitable as content provider. They are already using e-mail via the University of Moratuwa.

Natural Resources Energy and Science Authority (NARESA)

An information provider interested in putting their material onto a broadly accessible on-line facility. They use a local e-mail network and receive funding from a Swedish agency to enable access to the Internet via the Swedish based network, SIGNET.

Peace Brigades International

The Peace Brigades have established a small NGO host with a view to extending services out to the broader NGO community. They poll GreenNet, London, over an IDD line via their Fido based host.

National Poisons Information Centre

This organisation has put a proposal to IDRC to establish an Asia regional information network on poisons and pesticides.

The following three organisations all expressed interest in content provision to an on-line service:

- British Council;
- Centre for People's Dialogue;
- Institute for Occupational Health and Safety.

9.0 COUNTRY REPORT - THAILAND

9.1 SCHEDULE

BANGKOK	20 April - 23 April
Workshop - Majestic Hotel	21 April
Scheduled Interviews	22 April

Organisations Interviewed	Contact
UNESCO	Jorge Sequeira Programme Specialist in Educational Management Information and Research
Chulalongkorn University	Dr Yunyong Teng-Amnuay Associate Director for Academic Affairs
Institute of Asian Studies Chulalongkorn University	Patcharawalai Wongboonsin
Technolife Company, Ltd.	Yongchai Jerdampai Managing Director

The above organisations and institutions were interviewed on 22 April. An informal meeting with NGOs was held on 23 April. During the Workshop 21 organisations and institutions were represented. A total of 40 organisations were introduced to the IDRC Asia Telecommunity Programme.

CITY	W/shop Participants	Organisations	NGO Meeting
BANGKOK	28	25	

15

Table 15. *Study Tour visit breakdown*

Of the 28 participants to the Workshop 15 returned questionnaires. The questionnaires represent a broad cross-section of organisations attending the Workshop high-lighting both data communications constraints and requirements reflected in this report. Twelve of the respondents were already using e-mail and indicated a high level of exposure to it.

The Workshop host, Dr Jingjai Hanchanlash of IDRC, distributed an Evaluation form to all the participants of which 22 were returned. These represented unanimous support for the IDRC initiative. The majority of respondents had also indicated that the Workshop had increased their knowledge of electronic networking and that those who

were not already using e-mail would when suitable resources could be made available.

9.2 OVERVIEW

Recent economic growth patterns have transformed Thailand into a rapidly expanding industrial economy. Export promotion policies favouring the development of an export-oriented manufacturing base have contributed to this trend.

In parallel with industrial and real estate developments Thailand is bristling with communications services. Though mobile phone requirements are well serviced it is e-mail and access to information resources that is in high demand. Before the end of 1994 it is estimated that up to 10,000 people will have access to the Internet. This is expected to rise to 500,000 users within the next 5 years.

It would not be wrong to suggest that a move to e-mail for people working in Bangkok could reduce the number of cars in the city and the pollution they create. A city with a population of over five and a half million people can hardly ignore the need for accessible communication and information resources particularly when Bangkok is the centre of Thailand's growth out of developing country status.

Of 28 participants to the IDRC Asia Telecommunity Workshop more than 50% were network/e-mail literate, and a good percentage of them had ready e-mail access. This influenced the workshop a great deal, stimulating discussion on a broad range of issues from access, to content and regulatory processes.

Regardless of the level of expertise at the workshop a majority of participants were anxious to receive not only more training, but broader access and assurity that this would be available to a greater majority of the community. These feelings were re-confirmed during a separate meeting with up to 15 organisations represented. Participants discussed issues related to equitable access, promoting sustainable models for networking, using existing infrastructure for building national networks, and using Thai language for communications. The rights of users and their participation in emerging communications infrastructure was a frequent area of discussion across both the Workshop and other meetings.

Due to Government regulations data communications activities, specifically networking, is limited to non-commercial activities. According to service providers such as Thainet and Thaisarn, it is not clear just what constitutes non-commercial activities under the Government's telecommunications guidelines. However, the Communications Authority of Thailand (CAT) are reconsidering their position on data communications with a view to liberalising the existing gateways for commercial purposes.

Thaisarn and Thainet combined have a total of 7,000 users. Both services provide access to the Internet largely for academic research and development purposes. One of the observed complications is the number of "uncoordinated" activities occurring concurrently in Thailand. In most cases, resources are duplicated rather than maximised. As these initiatives become more and more independent and demanding of similar markets it is perceived that opportunities for collaboration could diminish.

Never-the-less, a number of recommendations emerged from the Workshop,

independent meetings and observations that could aid in broadening data communications services in Thailand, establishing content-based services and assist in the co-ordination of them.

9.3 TELECOMMUNICATIONS CONDITIONS

Up until recently the telephone service to the Thai public was adequate, though new lines took several years to install. The country's telephone system has only 1.5 million lines, and a registered waiting list of 1.1 million, which probably understates the current demand. These days the service is improving. In the urban areas a line can be installed within a week. Yet the situation in the country-side has not changed at all. Lines in these areas are hard to come by and of very poor quality.

The official cost of installing a new telephone line is about USD 400 The monthly cost is USD 3 plus USD .15 per local call. Lines can be bought off the black-market from a phone-line speculator. These are often dearer than the public charges, but the service is quicker.

9.3.1 LOCAL TECHNICAL FACTORS

Thailand's Chulalongkorn University pioneered Internet access in the country. It is still by far the most reliable doorway to the Internet. A second and more recent gateway to the Internet, NECTEC, provides four direct dialup lines which are known to be busy 24 hours a day. Such limited access hampers efforts to get on-line. Chulalongkorn University provides 20 dialup lines.

9.3.2 REGULATORY ENVIRONMENT

According to a recent report, the Communications Authority of Thailand (CAT) is soon to provide regulations liberating commercial Internet access. If this regulation is passed private companies will be able use the Internet in Thailand and presumably offer data communications services to the general public on a commercial basis.

The private sector (IBM, Hewlett-Packard, Digital Equipment) has played an important role in bringing the Internet to Thailand. At present their use of the network is limited to research and development purposes.

Lack of clear cut policies for NGO access to Internet services and restrictions for commercial customers has generated heated debate on relevance of CAT's monopoly status in telecommunication services. It has been suggested that the recent changes stated above are a response to growing pressure to liberalise Internet usage in the country.

9.3.3 FACILITIES/SERVICES

Thaipac

Thaipac, the local X.25 carrier, is known to be extremely expensive for high volume data communications. The commercial sector is highly reliant on Thaipac for the majority of their international data communications. Access charges are provided below.

Public Dial-In Service up to 1200 bps
RATES: All prices are quoted in BAHT

Access Charges	International
Connection Charge:	3.50
Traffic Charge:	0.30

Dial-In Service

Subscription Charge:	500.00 (one time charge)
Monthly Service Charge:	350.00
Deposit (refundable):	5,000.00
Additional NUIs:	200.00/NUI/Month

Monthly Charges

X.28/Asynchronous Access	
300 and 1200 bps	1,350.00

According to local network providers in the academic community, the X.25 standard for Thai data communications is fast becoming out-dated. It is perceived that rapid development of Internet services will out-pace upgrades to the packet switching infrastructure. To date Thaipac offer nothing more than 1200 baud access.

Internet

The Internet has been used by various institutions throughout Thailand since 1988. It was initially set-up with the assistance of the Australian International Development Programme (AIDP) and the Australian Academic Research Network (AARNET).

The main gateways into Thailand were the Prince of Songkhla University and the Asian Institute of Technology. The link was upgraded in 1991 and the Chulalongkorn University then became the first full Internet service. In 1992 the link was further upgraded to 64Kbps on a leased line charged at approximately USD 168, 000 p/r. The Chulalongkorn University data communications services are provided under the name, Thainet, and is administered by the Centre for Academic Resources.

The demand for e-mail and content based on-line services from Thai academic circles has been on the increase for some years. However, the current services are still limited due to lack of technical support and funding. At present there are well over 6, 000 users of Internet services, including both Thainet and Thaisarn, the Thai Social/Scientific, Academic and Research Network.

Thaisarn was founded in January 1992 by the National Electronic and Computer Technology Centre (NECTEC) in association with various Universities and private companies. In September 1993 Thaisarn established its own 64Kbps direct link to the Internet.

Bulletin Board Services

Thailand has a large number of BBSs. Many of them provide indirect access to resources available via the Internet. BBSs popular amongst NGOs include the following:

Computer Communication Access for NGOs (CCAN)
Pactok Hub, Bangkok
208/26 Pracha Uthil Rd. Rat Burana, Bangkok - 10140, Thailand
Tel & Fax: 662-428-5615
BBS: 662-428-5615 (7.00 pm to 7.00 am)
Membership: 1500 bath p/y

CCAN charges for international gateways.
CCAN receives a small number of APC conferences via Pactok and Pegasus Networks, Australia.

Post Database Interactive BBS
Tel: 662-238-3901 / 238-3902

The War-On-Virus (WOV) BBS
Data: 662-252-5087 Voice: 662-255-5982
Alan Dawson, system operator
Subscription: 40 bath / month.

AT&T Mail

AT&T Mail is a private Bangkok based service.

Subscription: 500 bath p/m
Rental charges: 350 bath p/m plus Thaipac gateway charges.

9.3.4 LOCAL INITIATIVES / PROJECTS

Though users were very vocal and articulated expressing their needs we didn't come across any local initiative or project responding to most of their aspirations.

UNESCO's Principal Regional Office for Asia and Pacific (Educational Management - Information and Research Department) seems to be the most active articulating some of the concerns described above in various forum. They have been aware of and actively participating in various regional initiatives.

A certain sector of the NGO community have been experimenting with a community based model of networking - CCAN (involving sharing of resources at lowest possible

cost) of electronic networking during last couple of years. They use Fido technology and benefit from indirect access to Internet resources. They do have a plan to connect their network to international networks using local Internet facilities. Lack of consistent policies on the part of Internet service providers, inadequate human and financial resources are some of the factors contributing sluggish and some what unpredictable development of specialised network serving NGO community.

There are number of other BBSs which also provide e-mail access and indirect access to Internet resources to all those who have been able to access above services. These services represent extensive network of technical experts. Some of are motivated are by commercial interest while others do it as hobby while few others consider is as a way to link communities. Despite their excellent track records of providing e-mail services, experimenting with networking in Thai language they haven't been able to provide international networking at affordable prices due to high costs of international telephones. Existing telecom regulations on who can access Internet services have been one of the major factors hindering low costs national and international networking using wide spread network of BBSs.

Assumption University Network (AUnet)

AUnet is a “non-profit regional data communications network” proposing to provide services to up to 100,000 users. It is currently active, but is seeking resources to further develop its network.

The AUnet proposes:

- To educate the students, faculty and staff member and other users about the concepts of local and international networking;
 - To prepare the students to enter into information society where networking will be the norm rather than the exception;
 - To provide full Internet access to all students, faculty and staff members and other users;
 - To facilitate and support the technical development and expansion of AUnet and the Internet as a research and educational infrastructure and information superhighway;
 - To stimulate the involvement of the educational community, government, industrial research organisations and others in the technical development and expansion of AUnet and the Internet;
 - To educate the educational community, government agencies, industrial research organisation and the public at large concerning the technology, use and application of AUnet, the Internet and computer networking in general;
 - To promote educational applications of technology via AUnet, the Internet and computer networking in general for the benefit of government, colleges and universities, industrial research organisations and the public at large;
- To provide a forum for exploration of new AUnet, Internet and other networking applications;
- To stimulate collaboration and exchanges of experiences among parties interested in the technology, applications and operations of the regional AUnet, global Internet and computer networking in general.

9.4 LEVEL OF IDENTIFIED EXPERTISE

General level of exposure to computers is high, though training for current users of e-mail is rarely available.

The NGO networks have excellent bi-lingual technical staff, though they are in short supply. This is considered to be a major limitation to sustaining a professional data

communications service.

Service providers, such as Chulalongkorn University, have extensive expertise at their disposal. Chulalongkorn University provides an excellent user support service spanning a wide range networking needs from LANs to WANs.

9.5 LOCAL REQUIREMENTS IDENTIFIED

Summarising local requirements participant to the Workshop participants stated that, “electronic networking is not transparent, specially in terms of what is available and how much it costs to access it”. Increased involvement of users in planning and designing electronic networks was expressed as one of the key requirements to ensure equitable access to emerging networking facilities in Thailand.

The following requirements were identified from participants to the Workshop, respondents to the questionnaire and those persons interviewed by the consultants:

Information Needs

Answers to the following questions on networking in Thailand would address some of the key information needs of IDRC partners and others:

- Who are the service providers;
- Where can I find information on them;
- Who can get access;
- In what form will access be provided;
- How much does it cost;
- Is training available;
- Is there local support;
- What can I use the network for;
- What information is available;
- Are there regulations I must observe;
- What is available in Thai language.

Expanding use of Internet

With regard to Internet access users (existing and potential) expressed the following uses:

- Research;
- Searching international databases;
- Placing local databases onto Internet;
- Establishing the national network.

Defining and protecting user's rights

- Forming user's forum at local level;
- Setting up of a non-profit national organisation of users to initiate dialogue with government and other service providers;
- Deregulating telecom monopolies and ensuring equitable access to all.

Increasing co-operation among key players

- Forming an umbrella organisation of key players in informatics;
- Setting up network of excellence & clearing houses.

9.6 FUTURE DEVELOPMENTS IDENTIFIED

The majority of data communications developments are focused on Internet services. One of the most high profile of initiatives is "An Internet Project for 100,000 users in Thailand - AUnet".

During August 1993 the Board of Trustees of Assumption University passed a resolution to expand AUnet to provide full Internet service to all Catholic-related educational institutions in Thailand which includes about 300 institutions with the population of over 300,000 students. It is expected that the number of Internet users will be over 100,000 within 2 years. Majority of students (98%) in these institutions are not Catholic. The main objective of these schools and universities is to provide education for the majority of the Thai population.

A non-profit AUnet shall be operated exclusively for the educational, charitable and scientific purposes.

More recently, the prospect of a commercial Internet host in Thailand has sparked debate in the country. Many smaller operators, such as BBSs are threatened by private companies that stand to monopolise Internet and other data communications services. It is considered that such efforts would eventually leave Thailand with a vastly improved communications infrastructure, but not immediately.

9.7 RECOMMENDATIONS

Thailand has made impressive progress in terms of expanding data communications infrastructure. The deregulation of telecommunications infrastructure will accelerate this process bringing in private sector capital investment. Yet the experience of existing users attempting to use these facilities have unearthed some basic shortcomings of both the telecommunications policies and the way in which they are implemented.

The following recommendations attempt to address some of these issues:

Capacity building of users by supporting processes & mechanism to ensure

- Adequate information about networking infrastructure;
- Equitable access for citizens;
- Participation of users / input in policies affecting communication infrastructure;
- That local culture and language patterns get adequate consideration in national information policies;
- That when current infrastructure is commercialised user's interest get high priority;

Support activities and initiatives of NGOs and other interested to ensure:

- Promotion of sustainable models for networking;
- Access to networking infrastructure by socially disadvantaged communities;
- Building national communication infrastructure (which preserves lessons learnt by community networking activities and creates possibilities for creative role by service providers to various communities).

During the coming years Thailand's communications infrastructure will expand rapidly. It is believed that western style free market forces will create formidable challenges to the country's regulatory policies. The Internet will not escape the commercialisation of its facilities as numerous vested interests endeavour to secure access to it. As large scale investment into the Internet from the Thai private sector is immanent the nature of the network, its content and access policies is likely to be very different to that of the rest of the world.

These developments may not necessarily guarantee equitable access for a large cross-section of the society. In fact, some consider that people could be further marginalised with content targeted only to those that can afford to pay for it.

In the light of these possible scenarios the following recommendations attempt to address the short-comings in the Thailand's communications future. These recommendations focus on projects and agencies alike with a commitment to equitable sustainable development.

Equitable Access and User's Rights

To aid in the shaping of future developments projects involving users in these processes would be essential. Particularly addressing telecommunications policies where the future infrastructure can meet the needs of broad cross sections of society, including the business community, academic and research institutes.

Promoting Sustainable Models

Use of appropriate technology and local resources are essential to the goals of sustainable development. Bulletin Board Systems (largely run on DOS based systems)

have played a key role in creating awareness about electronic networking. They were instrumental in increasing the use of Thai characters for e-mail, and hence contributing to research and developments in communication hardware and software dealing with Thai characters.

The lessons and experiences of these BBS operators in the use of low cost technologies will need to be integrated into the development of telecommunications infrastructure. Their experiences reflect successful models of community networking.

Networking and Socially Disadvantaged Communities

NGOs and social movement groups in Thailand have been actively trying to integrate use of information technologies in their work. Lack of adequate support from local agencies, difficulties in accessing the Internet (arising out of existing regulatory policies) and lack of staff capable of responding to their technical and information needs are some of the factors inhibiting their use of electronic networking.

Their information needs and desire to use networking for building strong community based national networks of socially disadvantage sections of society deserves special attention. Thailand, which by economic standards is no longer considered a developing country, has yet to create a mechanism to allow all sections of society to benefit from its development. Activities enabling this community to expand their use of networking facilities can contribute to an understanding of how different sections of society use and respond to new ideas and information.

9.7.1 MODELS

Exploring a Possibility of Supporting Information Clearing House Project

An information clearing house on data communications would be a membership (drawn from those using various networks) based activity. It would assist in the articulation of users aspirations and hence act as de-facto user's forum. It would provide policy input by organising dialogue amongst users, information providers and networking service providers. It would also organise seminars and research activities enabling users to benefit from regional networking experiences.

Expanding Network Access for Socially disadvantage Groups

NGOs and social justice groups have been experimenting with various models to expand networking access using low cost technologies. Their aims have been to build self-sustaining facilities. Exploring possibilities to support existing or emerging initiatives is essential to preserve and enrich them.

9.7.2 PARTNERS

The following lists potential partners for projects recommended above.

Exploring a Possibility of Supporting Information Clearing House Project:

- UNESCO - Principal Regional Office for Asia and Pacific (Educational Management : Information and Research);
- Centres for Academic Resources - Chulalongkorn University;
- Institute of Asian Studies - Chulalongkorn University;

- Southeast Asian Ministers of Education Secretariats;
- Thailand Fido BBS Community Representatives;
- Nation & Bangkok Post (representative dealing with Information technology sections);
- Representatives from Private sector.

Expanding Network Access for Socially disadvantage Groups:

- Existing Members of CCAN;
- Representatives of South East Asian Women Information Network;
- Friends of Women Foundation.

9.7.3 FURTHER RESEARCH RECOMMENDED

The following areas require further research:

- Potentials and constraints of using Thai language in data communications;
- Impact of electronic networking on communities in rural Thailand;
- Potential for data communications in rural Thailand;
- Implications of commercialisation of electronic networking;
- Regulations governing telecommunications policies and implications of deregulation on access for ordinary citizens.

10.0 COUNTRY REPORT - VIETNAM

10.1 SCHEDULE

HO CHI MINH CITY
Workshop - Centre for Science and Technology
Information 29 April - 3 May
2 May
Scheduled Interviews 2 May

Organisations Interviewed

Contact

Directorial Board Dr Nguyen Trong
Centre for Science and Technology Information Deputy Director of CESTI

HANOI
Workshop - National Centre of Science and
Technology Information & Documentation 3 May - 7 May
4 May
Scheduled Interviews 5 May - 6 May

Organisations Interviewed

Contact

NACESTID
Hoang Duong Tung
Deputy Chief, International
Co-operation Division

Institute of Information Technology
Prof. Bach Hung Khang
Director

Mr Tran Ba Thai
Head of Networking Dept.

Informatics Centre, MOSTE
Dr Tran Minh Tien
Director of Informatics Centre

Information Centre
State Planning Committee
Dr Dinh Quy Xuan
Director, Information Centre

In Ho Chi Minh City, 20 people were introduced to IDRC's Asia Telecommunity Programme. Interviews were conducted with 6 representatives of CESTI on the afternoon of the Workshop. No further interviews were scheduled.

In Hanoi, a total of 25 people were introduced to the Programme and 5 people representing 4 organisations were interviewed. All in all, 55 individuals were met with during the Study Tour in Vietnam.

<u>CITY</u>	<u>Participants</u>	<u>Organisations</u>	<u>Representatives</u>
Ho Chi Minh City	14	1	6
Hanoi	20	4	5

Table 16. *Study Tour visit breakdown*

Of the participants to the Hanoi Workshop, 4 had exposure to computers and a further 6 had either access to e-mail or had exposure to it. Discussions ranged from uses of remote sensing satellite services to video-phone access and related tools.

Expectations of what the Internet were high and somewhat ill-informed. A common request was for access to private company information to assess the nature of foreign companies now entering the Vietnamese economy. The Internet does not as yet provide access to such information conduits.

10.2 OVERVIEW

Vietnam is still in a low level of development. The influence of the market based economy has been decisive in determining the everyday pattern of Vietnamese behaviour. Five years ago people were still thinking about where to find rice, where to get food for lunch. Now they spend their time thinking about where they can find money. As one Vietnamese academic stated, “market economies can be troublesome. But at least many people are now talking about informatics. This is promising.”

With the opening up of market opportunities for foreign investment Vietnam is rapidly undergoing severe changes. Many key ministries and institutions are suffering from internal pressures to change, adopt or dismantle. The information gathering, processing and dissemination techniques, institutional management and relationships, financial planning and decision-making processes of the Socialist State prior to the new free market era are no longer suitable.

The need for rapid restructuring in Vietnam’s information capabilities for appropriate decision-making at various Ministerial levels, including the leadership, was recognised in 1993 when a national committee on Information Technologies commissioned IT 2000.

IT 2000 is the end result of a consultancy performed by the American company, UNYSIS. It cites the need for various IT projects including networks for financial administration, science technology and environment, planning and administration. IT 2000 has become the benchmark for many initiatives now proposed by several Vietnamese ministries and institutions.

The consultants interviewed representatives from the National Centre of Scientific and Technological Information and Documentation (NACESTID), the Institute for Information Technology (IOTT), the State Planning Committee’s Information Centre (SPC), the Informatics Centre of the Ministry of Science, Technology and Environment (MOSTE), and the Centre for Environment Research, Education and Development (CERED). Each expressed needs for immediate access to international information resources as well as national infrastructure to support communication tools, information collation, dissemination and within these organisations and their counterparts in the provinces and other major in-country centres.

The needs outlined in IT 2000, and expressed by the above institutions, have long been recognised by these and other Institutions. They are now benefiting from their foresight by having adopted to the new demands (i.e. collaborations with foreign companies) and will be well placed to become suitable partners in the establishment of Vietnam’s IT programme. But others are only now expressing the need for change and in doing so are attempting to “go it alone”. By this, they are seeking to establish themselves as key players in IT with little, or no perceived collaboration with existing initiatives.

From further discussions and cross interviews it was clear that many of the institutions visited were aware of each others initiatives but were creating a picture for the consultants of their perceived exclusive role in IT. Granted, their roles may provide

specific expertise in certain fields but should each institution be given resources to realise their vision we will see vast duplication of resources.

To complicate matters further there is a significant dilemma in north-south relationships within Vietnam. Tentative liaison, collaboration and information sharing with partner institutions are just some of the key areas where north-south differences are played out. And soon central Vietnam will enter the national plan to which some have suggested will add to the tension.

The challenge then for IDRC will be to recognise the dramatic institutional changes, economic influences and cultural impediments to sensitively aid in the unification of ministerial, institutional and north-central-south goals for a common IT platform serving the interests of Vietnam as a whole.

Vietnam supports an embryonic NGO community. Up to 150 organisations, mostly foreign based, operate in an environment where recognition of NGO roles is fairly minimal.

The number of local NGOs is expected to grow, in particular organisations able to participate in the development process. This sector of the existing NGO community is contributing extensive documentation on a variety of Vietnam issues (environment, agriculture, sustainable development). Generally they have a high command of English and their need for national and international communications and networking is well defined and urgent. They represent an emerging group of IT users keen to expand their use of computers into networking activities.

This report focuses on recommendations based on the emerging institutions and organisations building networking conduits both in-country and internationally, facilities which focus on opportunities within IT for state management and socio-economic development in Vietnam.

10.3 TELECOMMUNICATIONS CONDITIONS

Ho Chi Minh City support approximately 40,000 telephones. Hanoi has even less. The quality of these lines, for local, regional, inter-city and international calls are very good. Foreign telecommunications facilities have been installed to aid in the overall communications infrastructure development.

Though stable for voice calls, modem calls can be hampered where multiplexing is used. In this case it would be advisable to use modems with full MNP (error correcting).

An alternative to direct modem to modem calls would be VIETPAC, the local packet switching carrier. This provides a cost effective option for both national and international networking.

Tariffs for international calls are expensive. For the first three minutes, it is USD 18 to the USA, USD 15 to Western Europe and USD 12 to Australia.

10.3.3 FACILITIES/SERVICES

VIETPAC

VIETPAC was originally founded by Australian Telecom's packet switching carrier, AUSTPAC, in association with the Vietnam Post & Telecommunications authority. VIETPAC charges for both volume of data transferred across the line as well as connect time. This service can be accessed from the major urban centres in Vietnam, including Ho Chi Minh City and Hanoi.

Vietnam Academic Research and Education Network (VARENET)

VARENET is the first Internet host in Vietnam. It is administered by the Institute of Information Technology (IOIT), Hanoi. At present, VARENET polls the Australian National University once an hour, 7 days a week for the transfer of e-mail to and from Vietnam and the Internet. A full Internet TCP/IP link is planned, but only when resources can be recouped locally.

The following outlines VARENET's history:

- Mid 1992 experimental dial-up connection with Karlsruhe University, Germany;
- Late 1992 commenced experimental dial-up connection with Australian National University (ANU);
- 1993 semi-manual e-mail exchange with Internet with only one account, <hanoi@coombs.anu.edu.au>;
- From April 1994 UUCP link across VIETPAC X28, polling once an hour, to ANU with address <username@host.ac.vn>;
- Planned full connectivity to Internet.

VARENET in-country hosts:

Host name	Description
hanoi	IOIT Internet gateway
hu	Hanoi University
nistfass	National Institute for Science & Technology Forecasting & Strategy Study (MOSTE)
ism	Institute for Science Management
cres	Centre for Natural Resources & Environmental Studies
ssc	Information Centre for Social Science (Hanoi University)
badinh	Prime Ministers office of Vietnam
thevinh	Institute of Mathematics

nhatrang	Central Vietnam
nghiado	Directorate of NCNST
quantic	Ho Chi Minh City
anpit	Agency for National Program on IT (MOSTE)

VARENET uses WAFFLE for UUCP links within Vietnam. Organisations are able to run their own nodes. The IOIT have modified WAFFLE to accommodate the Vietnamese language as well as other useful features. Mr Tran Ba Thai, Head of the Networking Department of IIOT, stated: "However, the use of WAFFLE is very limited, because of the lack of telephone lines to the IOIT offices, and in practice much of the e-mail and file delivery in Hanoi is accomplished by motor-bike."

Though Hanoi based, access to VARENET's services is possible by dialling direct or via VIETPAC. A Ho Chi Minh City host was launched early August. Installation will occur early October, 1994.

10.3.2 REGULATORY ENVIRONMENT

There are no known inhibitions to the use of modems and data communications in general. The Vietnam Post and Telecommunications authority is moving to enable private sector provision of communications services.

10.3.4 LOCAL INITIATIVES / PROJECTS

NetNam

With the establishment of VARENET it has been possible to establish an independent network, NetNam, servicing the Vietnamese and international NGO community. NetNam anticipates establishing a service along the lines of an APC network member with a view to applying for APC membership when their service is operational and active.

The following services will be developed and expanded by NetNam:

A. TCP/IP-addressed electronic mail with frequent daily and eventually permanent connection with the Internet;

B. Forums:

1. news; open or under subscription rates, depending on the provider;
2. public discussion forums;
3. private discussion forums, on request from groups of users;

C. Databases

1. public access read only;
2. public access for both read and write (such as directories);
3. subscription-based private access, depending on the provider/manager of the database;

NetNam will provide full support to users in the following ways:

- Installation of equipment and software at the user's facilities;
- Training of users on both electronic networking and on the use of communications software;
- Provision and updating of manuals and on-line help menus in Vietnamese and English, and eventually in other languages, depending on demand and resources;
- Active promotion of the system among potential subscribers.

NetNam is developing their service in consultation with prospective user groups. These include:

- Vietnamese NGOs;
- International NGOs operating in Vietnam;
- Other potential users active in NGO-related work, such as consultants; journalists and press organisations; government offices; researchers, students and other private users.

Funding for NetNam has been sought from CIDA and CIDSE, a European NGO based

in Vietnam. In a recent proposal to CIDSE half of the requested budget (USD 36, 000) for the establishment of the NGO server, was granted. But only on the basis that the other half of the funding is procured.

The NetNam management group is presently comprised of volunteers from VARENET staff and the NGO community.

Centre for Science & Technology Information (CESTI), Ho Chi Minh City

In its present role CESTI has identified the following three key developments:

1. CESTI has been approached by CIDA to establish an experimental Internet host in Ho Chi Minh City. This would consist of a pilot UUCP link with a Canadian based University and the provision of 6 Sun work-stations for various domestic users, training, and technical installation. Assistance from BELL and Northern Telecom would accompany the CIDA funding. At the time of the Study Tour this proposal was still in the pre-project stage.
2. Ho Chi Minh City institutions are aware of Hanoi based, VARENET. At the time of the Study Tour Ho Chi Minh City were unable to access this service. The high costs of utilising VIETPAC were cited as a major prohibitive factor in accessing VARENET.
3. From one of IDRC's projects, the "Decision Support Management Information System", CESTI has established a direct dial link with NACESTID in Hanoi (see below for more information). CESTI anticipates expanding this service for interested institutions in Ho Chi Minh City, the provinces and throughout country.

Many organisations have expressed interest in accessing the Internet. CESTI is encouraging them to at least access the CESTI databases as a start. Access to international resources is required but knowledge of what is available, and awareness of the Internet in general is poor. Expectations of what could be provided are high, though in reality much of what is required is not available in the Internet.

National Centre of Science & Technology Information & Documentation (NACESTID), Hanoi

NACESTID was founded in 1990 under the Ministry for Science, Technology and Environment. NACESTID's objectives are:

1. Establish and strengthen the National Information system for Science and Technology. Formulate and implement national S & T information policy.
2. Serve as the focal point of the exploitation of S & T information resources for national development.
3. Develop and facilitate information resources sharing and access to available indigenous and overseas databases by application of new information and communications technology.
4. Produce and disseminate S & T information products and services through print, audio-visual, electronic and reprographic media to flexible and efficiently meet information needs of decision-makers, R & D workers, entrepreneurs, etc.
5. Organise and undertake R & D projects as well as formulate and implement

training programs in the fields of information science and librarianship.

NACESTID is the national focal point of the IDRC-assisted project, "Decision-Support Management Information System for Economic Development.

NACESTID provides independent dial up access to some of its databases. Users dial NACESTID, log into their LAN and access the CDS/ISIS databases. NACESTID developed a Vietnamese language user interface for CDS / ISIS. The interface is still at an experimental stage requiring improved networking software to secure to facility.

As of June 1994 NACESTID has gained access to VARENET. VARENET staff installed the necessary communications software and trained some NACESTID personnel in the use of the Network.

Remote Access to Databases

Two remote access servers, funded by IDRC, link specific information resources of the CESTI, in Ho Chi Minh City, and NACESTID, Hanoi, together. It is possible to gain access to these servers from other sites but in most, if not all cases, users gather the information required by visiting either one of the two sites in person. At the time of the Study Tour polls between the two organisations were infrequent.

The Dandg, Cantho and Kiengiang Universities are experimenting with similar links. These sites would become nodes providing these universities with access to local databases. CESTI plans for five sites in Ho Chi Minh City.

Informatics Centre - Ministry of Science, Technology and Environment (MOSTE), Hanoi

MOSTE is basically in the business of building decision-making support systems. They have identified such services as a major requirement for data communications use. In short, they are interested in building content-based facilities for remote access via modem.

Internally, MOSTE is utilises a Novell network platform linking 25 PCs on their LAN. E-mail tools used on the LAN were developed in-house, supporting the Vietnamese language.

MOSTE is a formidable organisation serving a variety of IT research needs supporting the work of various institutions and Ministries. The following diagram illustrates their sphere of influence within the Vietnam's IT development programme (IT 2000).

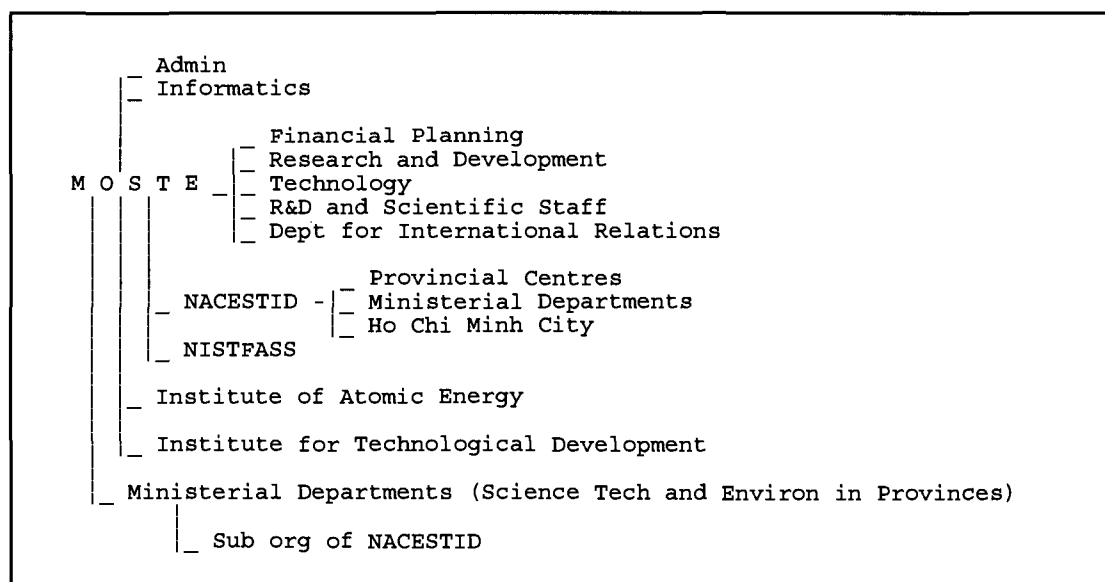


Fig. 6 MOSTE organisational outreach

MOSTE is keen to link the above "umbrella" Ministries to common databases for decision-making purposes.

10.4 LEVEL OF IDENTIFIED EXPERTISE

Expertise in IT and data communications in general is exceptionally high. All though, technical persons interviewed in Ho Chi Minh City had not been exposed to networking beyond LANs.

Use of local expertise in most areas of computing is desired by Vietnamese institutions and ministries, and there seems to be enough people around to fill required positions.

10.5 LOCAL REQUIREMENTS IDENTIFIED

The following is a summary of requirements identified at both the Ho Chi Minh City and Hanoi Workshops:

- Funding. Lack of it is constraining network development in some sectors;
- Access to local, in-country and international e-mail services;
- Remote access to various databases located in Ministries throughout the country;
- Access to international research facilities (scientific and economic);
- A standard be implemented to interconnect all possible networks;
- Enhancing general awareness for networking amongst the academic and research community;
- Increasing awareness of the Internet, the implications of its use and limitations of its information resources for sustainable economic development;
- To develop Vietnamese information resources combining remote sensing and GIS technologies;
- To provide training on remote sensing and GIS for developing better environmental protection schemes for the coastal region;
- To develop databases of information gathered from remote sensing and GIS in a format that can be shared internationally;
- Databases in a common format for access from various Ministries. *

* Note that all previous databases are designed on Socialist models, not capitalist. United Nations International Development Organisation is sponsoring MOSTE to develop a changeover formula for these databases.

Centre for Science & Technology Information (CESTI), Ho Chi Minh City

CESTI requires greater exposure to networking and the Internet in general. They sighted the following specific requirements:

1. Training for their technical staff in data communications/Internet, extending their range of expertise.
2. Funding for the establishment of domestic gateways and nodes where necessary.
3. The establishment of a UUCP link between Ho Chi Minh City and Singapore or Hong Kong. Long-term upgrade to TCP/IP or SLIP when user demand on the link increases.

National Centre of Science & Technology Information & Documentation (NACESTID), Hanoi

NACESTID would require upgrades to their IT facilities to maximise opportunities for increased usage and broad access to them. To this end NACESTID requires support for a feasibility study on networking/data communications. The study would investigate the possibilities and constraints of its use to the organisation and Vietnamese economic development.

Ministry of Science Technology and Environment (MOSTE), Hanoi

MOSTE's Remote Sensing and GIS experts expressed the need for extensive collation of data on environmental information to assist in regional development.

MOSTE is aware that Vietnam thus far has little information either available or useful to those accessing data from the Internet. On that basis, they feel that the basis of any network development in Vietnam must be content.

They sighted the following specific requirements:

1. To study and collate information for on-line access on three natural phenomenon occurring in the Red River area.
 - a) Erosion
 - b) Irradiation
 - c) Coastal dynamic changes
2. To facilitate information gathering remote sensing and GIS equipment is required.
3. To develop Vietnamese resources in data communications combining GIS and
4. remote sensing equipment. This would also entail training users from the provinces and specialists in the field.

5. To create at end of the project a preliminary database on the Red River area.
6. To provide information being collated via an IDRC funded project in the Red River area on a platform for regional and international network access.
7. To provide tourists with the information gathered from the above projects.
8. Access to expertise from other IDRC projects in the region. For instance, those working in education and those with library and bibliographic skills.

Institute of Information Technology, IOIT, Hanoi

Representatives from the IOIT stated that the pace and quality of data communications development in Vietnam is hampered by lack of funding. To add, they recognised that uncoordinated networking development could place a strain on initiatives well resourced with hardware and expertise, but starved of funding to establish administrative structures to sustain them.

IOIT representatives sighted the following specific requirements:

1. Any national network development must be in accordance with internationally recognised standards.
2. For IT 2000 to work it must include an R & D component. The present UNYSIS prepared document has no such component.
3. A standard technical framework to inter-connect present and future networks in Vietnam is absolutely necessary.
4. Further development on Vietnamese interfaces for data communications.
5. Standard for database conversion from off-line to on-line resource.

State Planning Committee (SPC), Hanoi

A number of Ministries presented strong cases for financial support to stream line effective data communications among various departments/ministries of Government. Many of them, such as the SPC and NACESTID, are encouraged by the recognition of such a facility in IT 2000.

It must be noted that the SPC presented their case vehemently. The SPC sees itself strategically placed in terms of providing information and policy support to various Ministries. It considers itself a direct advisor to the Prime Ministers department on matters of economic development. Several other Ministries made similar claims.

The SPC argued for support from IDRC to their project Proposal "Technical Assistance to the Establishment of Socio-Economic Information System for Economic Planning and Management in Vietnam".

NGO Requirements

The NGO community expressed keen interest in electronic networking. Some of them were already using VARENET. Support for an NGO specific network was high. During an informal Workshop with NGO representatives the value of a separate network, addressing the needs of the Vietnamese and international NGO community was recognised. Such a service was considered highly desirable.

10.6 FUTURE DEVELOPMENTS IDENTIFIED

UUCP or PPP Gateway from Vietnam to Singapore

A proposed UUCP or PPP gateway from either Hanoi or Ho Chi Minh City to Singapore, funded by CIDA, is immanent. Both the Ho Chi Minh City University and CESTI have been approached as possible sites.

CIDA plans to provide up to six Sun workstations to the host organisation to facilitate the management of the gateway, as well as data transfer between Vietnam and Canada.

TOOLNET, Vietnam

TOOLNET are offering their Fido model to potential hubs in Hanoi. These hubs are encouraged into polling arrangements on a trial basis whilst Tool markets then as their contacts/hubs in Asia. TOOLNET has developed a reputation in the region for promoting the existence of hub and network partners prior to the formulation of any formal contract.

NACSTID have been approached by TOOLNET, but they are yet to formalise an agreement. Even so, TOOLNET has announced that NACSTID are their Vietnamese partner, which is clearly incorrect.

Science and Technology Database

The following article outlines French government support to the establishment of information resources for broad academic and research access.

“The French Minister of Higher Education and Research announced in early May that the France would soon begin a joint project with Hanoi University to establish a science and technology database system broadly accessible to education institutions there. The system is aimed at improving scientific co-operation in environment, chemistry and law. France has pledged FF2.7 million (USD 467,000) to develop scientific research centre.” (*Vietnam Investment Review*, pg 24, 2-8 May 1994)

10.7 RECOMMENDATIONS

The following recommendations are aimed at further developing and strengthening the networking services of VARENET, Hanoi. Assistance to VARENET would roll over to NetNam which could itself be considered as a separate project.

1. Strengthening current experimental Internet gateway in Hanoi.

- Investigate possibilities for direct link to the Internet;
- Fund the implementation of administration of the Network;
- Fund the implementation of billing software;
- Employment and training of User Services staff;
- Drafting and publication of User Services documentation (i.e. Network and Training Manuals);
- Fund content-based services and implementation of tools such as Gopher, WAIS, etc.

2. Assist in the establishment of an NGO network for Vietnam, NetNam*.

- Funding assistance for the first year of operation for the following personnel:
 - a) National full-time technical manager
 - b) National full-time info/admin manager
 - c) Consultant engineer (3 months only)
- Training of NetNam staff and user base;
- Drafting and publication of Network and Training Manuals;
- Hardware requirements;
- Administrative requirements.

* Full details of this initiative are presented as a proposal in Appendix D.

3. Vietnam National Internet Programme Co-ordination Workshop

- To co-ordinate various data communications initiatives;
- To promote work being done by IOIT (VARENET);
- To identify potential regional nodes;
- To identify content providers;
- To bring together key players in IT and data communications to formulate strategy for national implementation of the Internet and content-driven networking services;
- Explore the possibility of forming a consortium of information and network service providers, other IT related organisations and users of these services.

4. Study of South Vietnam VARENET node resources

- Feasibility Study of the present South Vietnam node* to ascertain whether it has the potential to develop into a full data communications service provider.

* Note that during the course of the Study Tour in Vietnam a South Asia VARENET node had not yet appeared. The present node is a private company. Little more is known of them.

10.7.1 MODELS

Figure 7 illustrates VARENET in its present framework with the proposed NGO server, NetNam, indicating connectivity with the Internet and the Association for Progressive Communications Networks.

This diagram also suggests CESTI as a South Vietnam hub accessing the Network via the South Vietnam VARENET node in Ho Chi Minh City.

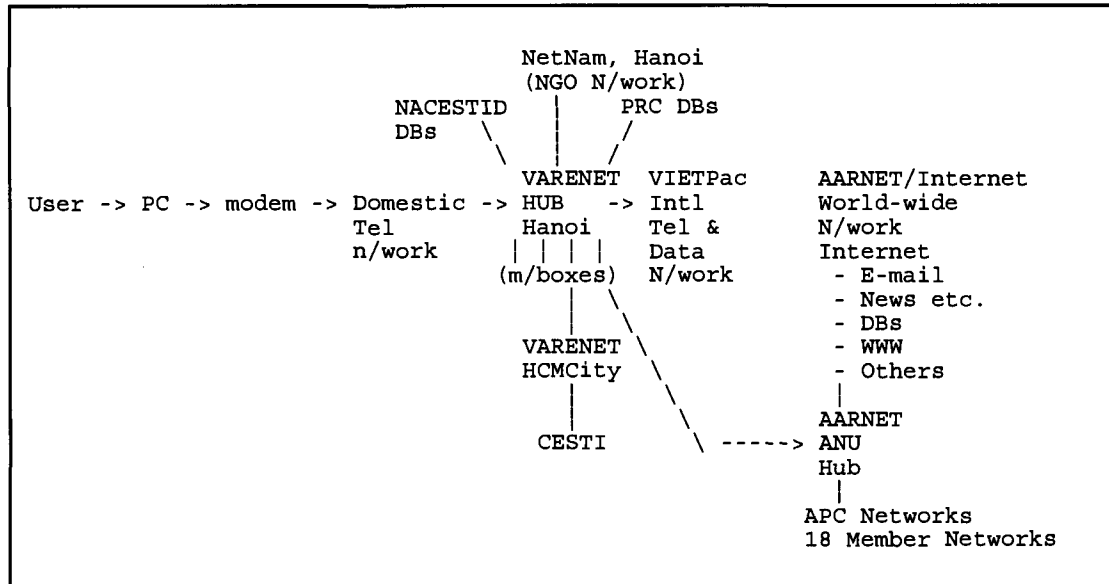


Fig. 7 Vietnam local and international connectivity via VARENET

10.7.2 PARTNERS

The following are clearly prepared as potential partners in the Asia Telecommunity Programme. Their needs and requirements are well formulated (see Section 10.5), and their expertise in the field of IT and data communications is well advanced for Vietnam.

Institute of Information Technology (IOIT) and VARENET, Hanoi

Host organisation for VARENET and partner in NetNam. Co-ordination of national networking infrastructure. With both local and foreign assistance the design and application of management, administration and user services structures.

IOIT is prepared to provide technical assistance as well as act as Indochina gateway to the Internet for networking initiatives in Laos and Cambodia. Such local expertise would assist in building regional IT support mechanisms where currently none exist.

National Centre of Scientific and Technological Information and Documentation (NACESTID), Hanoi

Co-ordination of content provision amongst Hanoi and Northern Vietnam based Ministries and Institutions.

Centre for Science & Technology Information (CESTI), Ho Chi Minh City

Co-ordination of content provision amongst Ho Chi Minh City and Southern Vietnam based Ministries and Institutions.

No organisations were identified for Central Vietnam, an emerging economy in this country.

10.7.3 FURTHER RESEARCH RECOMMENDED

1. Monitoring the development of projects emerging from IT 2000 would be necessary in ensuring compatibility with any IDRC funded data communications initiative.
2. Research in the implications of data communications/Internet on Vietnam's current pace of transition to market economy.
3. Investigating the possibility of using Singapore, Hong Kong or Bangkok as regional Internet gateways. Either one of these countries would in the long term provide much more economical solutions, if not political as well, than present international links.

LIST OF ACRONYMS

AARNET	Australian Academic Research Network
AIDP	Australian International Development Programme
AIRD	Asian Institute for Rural Development
AIT	Asian Institute of Technology
ANU	Australian National University
APC	Association for Progressive Communications
APNIC	Asia Pacific Network Information Centre
AVARD	Association of Voluntary Agencies for Rural Development
BANSDOC	Bangladesh National Scientific Documentation Centre
BARC	Bangladesh Agricultural Research Council
BBS	Bulletin Board System
BCIS	Biodiversity Conservation Information Systems
BCSIR	Bangladesh Council for Scientific and Industrial Research
BHEL	Bharat Heavy Electricals
CAD	Computer Aided Design
CANET	China Academic Network
CAS	Chinese Academy of Science
CASNET	Chinese Academy of Sciences Network
CAT	Communication Authority of Thailand
CCA	Canadian Co-operative Association
CCAN	Computer Communication Access for NGOs
CCC	Co-operation Committee for Cambodia
CCF	Common Communication Format
CCMB	Centre for Cellular Molecular Biology
CDL	Community Development Library
CDRI	Cambodia Development Resource Institute
CEN	China Environment News
CERED	Centre for Environment Research, Education and Development
CERID	Research Centre for Educational Innovation and Development
CERNET	Chinese Education Research Network
CESTI	Centre for Science & Technology Information
CIDA	Canadian International Development Agency
CINTEC	Computer & Information Technology Council
CLRI	Central Leather Research Institute
CMTI	Central Machine Tool Institute
CNC	Computer Network Centre
CNPAC	China National Public Data Network
CORD	Centre on Rural Documentation
CRN	China Research Network
CSA	Centre for Social Action
CSIR	Council of Scientific and Industrial Research
CWDS	Centre for Women's Development Studies
DA	Development Alternatives
DAINET	Development Alternative Information Network
DELNET	Delhi Library Network
DOT	Department of Telecommunications
DTP	Desk Top Publishing
EDI	Electronic Data Interchange
EMC	E-mail Centre
EMRC	Education Media Research Centre
ERNET	Education Research Network
FRI	Fisheries Research Institute

FOOD	Foundation of Occupational Development
FTP	File Transfer Protocol
GIS	Geographic Information Systems
GPSS	Gateway Packed Switching Service
HYLIBNET	Hyderabad Library Network
ICA	Institute of Computer Application
ICAR	Council of Agricultural Research
ICDDR	International Centre For Diarrhoeal Disease Research Bangladesh
ICES	International Centre for Ethnic Studies
ICRA	Institute for Cultural Research & Action
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IES	Indian Environmental Society
IDD	International Direct Dial
IGC	Institute for Global Communications
IGCMC	Indira Gandhi Conservation Monitoring Centre
IHEP	Institute of High Energy Physics
IIC	India International Centre
IIM	Indian Institute of Management
IISc	Indian Institute of Science
IIT	Indian Institute of Technology
IndCEE	Indonesian Centre for Energy and the Environment
INFID	International Forum for Indonesian Development
INFLIBNET	Information and Library Network
INSDOC	Indian National Science Documentation Centre
IOTT	Institute for Information Technology
IPR	Institute for Plasma Research
IRCDS	Integrated Rural Community Development Society
IRM	Institute of Rural Management
ISEC	Indian Institute of Social Economical Change
ISI	Indian Social Institute
ISST	Institute of Social Studies Trust
ISTIYP	Institute of Scientific and Technical Info. of Yunnan Province
IT	Information Technology
ITRC	Information Technology Resource Centre
IUCN	World Conservation Union
JAAS	Jiangsu Academy of Agricultural Sciences
JPASS	Jiangsu Provincial Academy of Social Sciences
KSSDI	Karnataka State Sericultural Development Institute
LAN	Local Area Network
MAN	Metropolitan Area Network
MHS	Message-Handling System
MIDS	Madras Institute of Development Studies
MOS	Mercantile Office Systems
MOSTE	Ministry of Science, Technology and Environment
MSSRF	M.M.Swaminathan Research Foundation
NACESTID	National Centre of Scientific and Technological Information and Documentation
NARESA	Natural Resources Energy and Science Authority
NCC	National Computer Centre
NCFC	National Computing and Networking Facility of China
NCI	North China Institute of Computer Technology
NECTEC	The National Centre for Computer Technology
NGO	Non-government Organisation

NIC	Network Information Centre
NICNET	Network Information Centre Network
NICTAS	National Information Centre for Textiles & Allied Subjects
NID	National Institute of Design
NIF	National Information Facility
NIRD	National Institute of Rural Development
NIRDA	National Integrated Rural Development Agency
NISTADS	National Institute of Science
NTC	National Telecom Corporation
PADEK	Partnership for Development in Kampuchea
PCSD	Philippine Council for Sustainable Development
PRC	People's Republic of China
PRL	Physical Research Laboratory
PSDN	Packet Switched Data Network
PSDN	Philippine Sustainable Development Network
PSN	Packet Switching Network
PTA	Posts and Telecommunication Administration
PUNET	Peking University Network
RABMN	Remote Area Business Message Network
RCCG	Resource Centre For Community Groups
RONAST	Royal Nepal Academy of Science and Technology
SAIC	SAARC Agricultural Information Centre
SAN	Sustainable Agriculture Network
SATCRIS	Semi-Arid Tropical Crops Information Service
SAHRDC	South Asia Human Rights Documentation Centre
SDN	Sustainable Development Networks
SEWA	Self-Employed Women's Association
SIF	Spatial Information Facility
SIRNET	Scientific & Industrial Network
SKDP	Sistem Komunikasi Data Paket
SLAC	Stanford Linear Accelerator Centre
SLIDA	Sri Lanka Institute of Development Administration
SLNET	Sri Lanka Network
SMTP	Simple Mail Transfer Protocol
SPC	State Planning Committee's Information Centre
SSTC	The State Science and Technology Commission
STD	Subscriber Trunk Dialling
TAP	TOOLNET Access Point
TCP/IP	Transfer Control Protocol / Internet Protocol
TERI	Tata Energy Research Institute
TUNET	The Tsinghua University Network
TWN	Third World Network
UGC	University Grants Commission
UI	University of Indonesia
UNDP	United Nations Development Project
UNV	United Nations Volunteers
UNWCW	United Nations World Conference on Women
UPS	Uninterruptable Power Supply
UUCP	Unix-to-Unix Copy Program
VARENET	Vietnam Academic Research and Education Network
VHAI	Voluntary Health Association of India
VMSRF	Vittal Malya Scientific Research Foundation
VSAT	Very Small Aperture Terminal
VSNL	Videsh Sanchar Nigam Limited
WAN	Wide Area Network
WOV	The War-On-Virus
WWF	World Wildlife Fund

XSS

ST. Xavier's Social Service Society

GLOSSARY OF TERMS

The definitions used in this glossary pertain to computer networking and terms used in this report.

AARNET

Australian Academic Research Network, or AARNet, is a vast network of academic institutions providing access to the global Internet.

account

Every user requires an "account" on the Network. This refers to the account under which all of Network services are charged. An account holder would receive a "login" and "password" to access the Network with.

address

Like a postal address, a "network address" is used to locate another user for the purpose of directing mail.

archiving compression

Data can be compressed to save space on disk or to save time taken to upload or download it. If the data is to be examined again, it must be decompressed to its original form using the appropriate decompression method.

arc compression

arc compression is a compression method (see compression) that originally came from UNIX based computers and is now widely used on IBM and Macintosh computers.

Association for Progressive Communications (APC)

Association for Progressive Communications. Formed in 1987 to promote international communications among organisations and individuals working in the peace, environmental, conflict resolution, health and public interest communities world-wide.

ASCII

In the transmission of text information, a Network uses "ASCII", the American Standard Code for Information Interchange. Most personal computers use ASCII as well, although word processing programs often require special commands in order to save or load ASCII files. ASCII text has no special characters for formatting such as underlined or bold characters, font changes, etc. Network files of ASCII text can be viewed on the screen (as opposed to binary files, which cannot be).

bps (baud rate)

The baud rate of a modem refers to the maximum rate of transfer of which it is capable. Dividing the baud rate by 10 gives a rough estimate of the number of characters (individual letters or digits) which it can transfer. Thus, a 2400 baud modem is capable of transferring around 240 characters per second, maximum. Two modems can only connect if they can operate at the same baud rate.

binary

A file containing one or more strings of data bits which are not printable characters. Some binary files may be computer programs or other forms of data that contain no text characters at all. Binary files cannot be displayed on your

screen, but can be downloaded for use with appropriate applications on your computer.

bit

The smallest unit of data used in a computer. 7 or 8 bits are typically used to represent a single character of text. Binary files are not divided into groups of characters; the Network treats them as long strings of bits.

bps

Bits Per Second (BPS) refers to the speed of data transfer of modems. It should be noted that Bits Per Second and Baud are not the same, yet the two terms are generally interchanged in 'normal' conversation.

break

A "break" is a signal sent from a users terminal to the network, which causes interruption of an activity. Most terminal emulation programs provide a key sequence allowing the user to send a break signal.

bulletin board system (BBS)

A "bulletin board system" (or BBS;) is a stand-alone computer which can be dialled and accessed by numerous users simultaneously depending on the number of available lines.

byte

A string of 8 bits.

Carrier

The tones a modem sends when it is not sending data.

Character

Any symbol (usually alphabetic, numeric, or punctuation) that can be entered into your computer or the Network.

Command

An instruction you give to the Network to carry out a specific action.

communications

Pertaining to (a) the software that allows you to communicate with a network; (b) the messages or postings you create or read on-line.

compression

Files may be "compressed" before uploading. By compressing a file, its size, and the time to download it, is reduced dramatically. There are numerous programs available which will compress your files. The most popular being ZIP for IBM, and Compact-Pro or Stuff-It for Macintosh. Files can also be compressed into "self-extracting archives", which enables recipients to "decompress" without the same compression program.

conference

An "electronic conference" provides a many-to-many communication medium, as opposed to the person-to-person nature of electronic mail. All conferences have a particular subject or purpose, and the topics and responses they contain might provide items of news, ideas, questions, or other information in almost any form. Some special-purpose conferences may have restricted access, allowing some users to write messages, some only to read, and some neither.

control character

There are some hidden characters, such as page breaks and option keys, which may not show within your word processor, but do appear when you upload the file containing them. They may even cause problems on-line, as is the case of page breaks. Some word processors have a feature which will “strip control characters” before you save as Text Only in preparation to upload.

cyberspace

A term used in varying ways to describe the place where electronic communications occur. The word “cyberspace” has become synonymous with “networks”, or other interactive information transfer methods e.g. virtual reality. Another term often used to describe a similar concept is “matrix”. The users of cyberspace belong to a “cyberculture”.

database

Information that can be stored, sorted and searched in a variety of ways.

data bit

The smallest element of data used in a computer. 7 or 8 bits are typically used to represent a single character of text. Binary files are not divided into character groups; the Network treats them as long strings of bits.

default

A software function or operation which occurs automatically unless the user specifies something else.

dial-up

A connection to a computer made by calling the computer up on a telephone.

download

“Downloading” refers to the information received from the Network and transferred to a personal computer.

editor

A Network program that allows you to correct or change your message on-line.

E-mail - Electronic mail

The transfer of messages between you and other users in the APC Network, or by means of gateways to or from users on other networks. E-mail is similar to an ordinary letter; you supply the address of the recipient(s) and the text of the message. It is different in that delivery takes place in minutes or hours rather than days. E-mail provides private communications, whereas electronic conferencing provides public (or in some cases restricted group) communications.

Error correction

Communication between the modems to ensure that the data sent by one end are the same as those received by the other, even in the presence of noise on the line. Typically this is done by adding checksums to the data. If the received data don't match their checksum the receiving modem asks for them to be sent again.

Ethernet

Often referred to as a “local area network”, Ethernet enables computers to determine the way in which they need to communicate to each other.

external modems

Most modems are of the “external” type. Unlike internal modems, they are separate from the computer but are linked to it by a data cable. Modems used with Apple Macintosh personal computers are always external.

Fax (facsimile)

A machine that allows transmission of a visual image over phone lines to another fax machine. Originally, you needed a fax machine to send to another fax machine. Today you can send text-only files (not graphics or binary files) to any fax machine through the Network. In some cases a fax can be received from a fax machine through the Network.

FidoNet

A network of hosts and hubs active through out the world. It is a popular form of networking in developing countries where its various software packages can often overcome line noise problems and cost. Most Fido software requires a certain degree of expertise to install and maintain, though Window’s based tools for Fido are beginning to appear.

file

A named group of characters or data bits in your computer or on the Network. Files in a computer are similar to file folders in a filing cabinet.

Finger

A facility providing details of users on sites throughout the Internet. The finger service is supported by many, but not all, Internet sites.

font

The name used to describe a family of characters with distinctive shapes. Examples are Palatino, Helvetica, and Courier.

FTP

A file transfer protocol that defines how to transfer files from one computer to another.

gateway

A computer system that transfers data between normally incompatible applications or networks.

generic

A terminal type setting. If the terminal type is set to “generic”, with an interactive session on a Network the current screen’s text scrolls up to make room for a new screen each time you move from one screen page to the next. Text is never erased.

Gopher

A menu-based system for exploring Internet resources.

GreenNet

A computer network based in the United Kingdom providing access to the APC to users throughout the country as well as some countries In Europe. GreenNet operated GNFido, a gateway for networks in Africa, South Asia and some South East Asia countries. GreenNet is a founding member of the APC.

handshaking

A preliminary procedure performed by modems, terminals, and computers to verify that communication has been correctly established.

hardcopy

A printout of a computer file; a printed version of anything.

hardware

Physical electronic devices such as computers, printers, keyboards, modems, or cables. As opposed to software, which is computer programs.

Hayes modems

Most modems in use today are “Hayes compatible” modems. Network users do not normally have to worry about the specific details of “Hayes compatibility”.

internal modems

These modems are installed within the computer, with the only external cable being a phone line into the computer.

Internet

Internet is a large and very popular world-wide computer network begun by the Defence Department in the 60's. Internet connects educational institutions, corporations, organisations, and military and government installations around the globe. Various independent organisations offer access to the Internet to the general public for a nominal fee. Many Internet users partake in reading and contributing to [Usenet], FTP-ing text files and programs, and “telneting” to other Internet sites. Due to its ease of access and relatively low cost, and its size (the largest computer network in the world), connectivity, and infinite amount of information, many network users prefer the Internet over others.

InterNIC

The combined name for the providers of registration, information, and database services to the Internet.

ISDN

Integrated Services Digital Network; a digital telephone service.

kermit

A file-transfer protocol, available for a wide variety of machines. It contains provisions for transferring text and binary files over 7- and 8-bit connections.

Leased line

A permanently connected private telephone line between two locations.

Login

A user “logs in” to a Network by typing their username, and then their secret password.

log off

To disconnect from the Network. Sometimes referred to as “log out”.

Login-ID

Same as “account name” or “User-ID”. This is entered at a “Login:” prompt.

mail

In the world of computer networking, “mail” refers to electronic mail, or e-mail. It may be used as a verb or noun. However, it is more common to say “I’ll e-mail it to you”, rather than “mail” which may be confused with “snail-mail”; referring to the regular postal network via land, sea, or air travel.

menu

A list of Network functions.

message

The term "message" refers to any message carried on the network, including conference topics and responses, and "letters" sent by electronic mail.

Messenger

An Offline Reader (OLR) created specifically for the APC Networks. An OLR enables you to send and receive e-mail and conference material without you having to interact directly with the Network. You can read new messages and conference entries, write responses or e-mail and have Messenger upload it all for you.

MNP

A set of modem protocols which provide error correction (MNP 2 to 4) and data compression (MNP5).

modem

A device used to connect a computer through the telephone system, to another computer or network of computers. A modem is similar to a telephone in that it can dial a number, answer a call, and hang up; but the "conversations" it carries are strictly computer-to-computer data language. Modems have different maximum speeds, which are indicated by their baud or bps rate. The word "modem" is derived from "MODulator/DEModulator".

Network

A two or more computers interconnected by telephone lines, coaxial cables, satellite links, radio, etc.

Pactok

A network for community groups and non-government organisations in the region of the Pacific Islands and Southeast Asia. It employs "store and forward" software amongst users and hubs in most major centres. A gateway at Pegasus Networks provides networks e-mail and conferences to and from the APC to Pactok subscribers.

Parallel

Sending several bits at a time, usually 8, each over a separate wire. Some modems have a parallel connection from DTE to DCE.

Pegasus Networks

An Australia based national on-line service provider. Pegasus is a founding member of the Association for Progressive Communications.

offline

A user is said to be "offline", when they are not actually connected to a Network.

OLR - offline reader

See "Messenger" above.

on-line

A user is said to be "on-line" when they are connected to a Network.

packet switching

A packet switching system or network enables computer data to be transmitted

cheaply and efficiently from state to state or country to country. Computer data is broken into individual packets, sent separately through the packet switching network, reassembled and forwarded to its destination. Packet switching networks are available in most countries and are often referred to as X25 networks.

parity

The “parity” setting of a terminal (or terminal emulation program) refers to the type of error correction system which is used.

Password

A “password” is a secret code given to each user, which gives them access to the Network. Users can (and should) change their password often, to ensure the security of their Network accounts.

post

The act of placing a message onto a Network. The noun “posting” is sometimes used to refer to a conference message.

PROCOMM

PROCOMM is a “terminal emulation” program designed for personal computers which are “IBM compatible”.

service provider

An organisation that provides connections to a Network.

shareware

This is one way of distributing software via networks, or on disk. The program’s author usually requests a nominal fee be paid if the program is found to be useful. Alternatively, “freeware” requires no additional fee to be paid.

softcopy

An electronic version of a file, usually in computer memory and/or on disk; as opposed to “hardcopy”, the paper printout.

software

Computer programs; word-processing programs (like WordPerfect or Microsoft Word), spreadsheet programs (like Lotus or Excel), or database programs (like dBase III+, Foxbase, or File Maker) are all software.

Support

Support staff are often provided to assist Network subscribers. Support staff are crucial to keeping subscribers on-line and using the Network efficiently.

Synchronous

Used of a serial connection where bytes are sent in a continuous stream. Some sort of protocol is needed to flag the case where no bytes are available to be sent.

Telex

Telex was, and in many places still is, the first form of “electronic mail”. A telex machine uses telephone lines to call another telex machine and exchange messages using slow speed data transmission. It used to be you had to have a telex machine (or access to one) in order to send a message to another telex machine. Today, you can use the Network to exchange telex messages electronically between your computer and any telex machine.

Telnet

A facility allowing connection to sites and services throughout the Internet. There are thousands of public-access sites and services available on the Internet.

terminal

A "terminal" is a device which is connected to a computer network and which acts as a point for entry or retrieval of information. Personal computers can be made to act as network terminals, by running terminal emulation programs (such as PROCOMM or ZTerm). Most such programs allow a user to upload information from the PC to the network, and to download information from the Network to the PC.

text

A string of characters. A text file should contain only characters (as opposed to codes or commands).

TOOLNET

A Netherlands based network operated by the TOOL Foundation. It uses Fido networking models to link its network "hubs" (known as TAPS) to the main host computer in the Netherlands, All TAPS must poll the Netherlands. As yet there are no regional polling arrangements for TAPS.

uploading

To transfer a binary or ASCII file from your computer to the Network.

username

Your Pegasus "username" identifies you on the Pegasus network, and is normally made up of your surname and first initial, or your organisation name. Your username serves as your address for electronic mail, but will need "peg:" in front of it if mail is coming from other APC ;networks. With your secret password, your username provides access to your personal account on Pegasus.

User ID

Same as "account name" or "login ID"; the word you type at a "Login:" prompt.
Y

USENET

An information cooperative linking around 16,000 computer sites and about 1 million people. Usenet provides a series of news groups analogous to Network conferences.

UUCP (Unix-to-Unix copy)

This is the name of a Unix command, but it is now also used to refer to the protocols used by it to transfer files between Unix machines. There are a number of such protocols, and the two machines choose between the ones supported by each.

vt100

A terminal type setting; with this setting the Network assumes you are using a vt100 terminal or a computer program that acts like one.

V.32

The modem connection standard allowing data transfer speeds of up to 9600 bits per second.

V.32bis

The modem connection standard allowing data transfer speeds of up to 14,400 bits per second.

V.42

A modem error correction standard, made up of two other correction standards: LAP-M and MNP4.

V.42 bis

A modem data compression standard, similar to the MNP5 standard.

virtual community

Communities that exist and continue to grow in the exchanges that occur within computer communications networks. These communities are not defined by race, colour or creed. They are borderless and occur without the factor of proximity.

word-processor

A word-processor is a program used to enter or edit text information in personal computers. When using Pegasus, a word-processor is often used to create a file before it is uploaded to the network; and may also be used to process text after it has been downloaded to the PC.

ZTerm

ZTerm is a terminal emulation program for Macintosh personal computers.

APPENDIX A -- WORKSHOP PARTICIPANT INVITEES

BANGLADESH

DHAKA

Dr Atiq Rehman
Bangladesh Centre for Advanced Studies
620 Road 10 A (new) Dhanmondi
GPO Box 3971
Dhaka 1209
Bangladesh
Tel: 315793/310538/815829

Dr M K Mujeri
CIRDAP
Chameli House
17 Topkhana Road
G P O Box 2883
Dhaka 2000
Bangladesh
Tel: 8802-238751/244776 / 864624
Fax: 8802-833321

Dr K M Elahi
Professor
Department of Geography
Jahangirnagar University
Savar, Dhaka 1324, Bangladesh
Tel: 8802-400185 / 402186 / 418311
Fax: 8802-863862

Policy Research for Development Alternatives - UBINIG
5/3, Barabo Mahanpur, Ring Road, Shaymoli
Dhaka-1207, Bangladesh

- a. Farhad / Farida & Hakim
Dhaka
- b. MUKTI RANI PAL /
UBINIG - Bodorkhali Project
Food Office, Bodarkhali,
Cox's Bazar, Bangladesh
- c. SHAMSUN NAHAR
UBINIG - Tangail Project
Shamoli, Dhaka, Bangladesh
- d. SHIMA DAS Shimu
SHAHNAZ MUNNI
UBINIG
Shaymoli, Dhaka, Bangladesh
- e. TASNEEM NAHAR (Shoma)
Bangladesh
UBINIG

Shaymoli, Dhaka, Bangladesh

e. BEAUTY AKHTER
Bangladesh
UBINIG - Moheshkhali Project
Dhaka, BANGLADESH.

Mr Ruben Gomes,
Caritas Bangladesh,
2, Outer Circular Road, Shantibagh,
Dhaka - 17, BANGLADESH.
(Post: GPO Box 994, Dhaka 1000, BANGLADESH.)
Tel 010 880 2 835405-9
Tlx 642940 ADAB BJ (For Caritas Bangladesh)
Fax 010 880 2 834 993

JAHANARA ZAMAN
Bangladesh
Comilla Proshika,
Road no. 8A, House no. 66, Dhanmondi R/A,
Dhaka 1205, Bangladesh
Phone: 323088, 811235

LILY A GOMES
Bangladesh
Natural Family Planning Centre (NFP)
1/C/1/E Pallashi Mirpur, Bangladesh
Phone: 803217

MEHERUNNESSA ISLAM
Bangladesh
Women for Women & Resistance Network
53/B Laboratory Road, Dhaka, Bangladesh
Phone : 406971

Rashida Kanchwala
NGO Forum for Drinking Water Supply & Sanitation
4/6 Block-E, Lalmatia
Dhaka
Phone: (880-2) 811749
Fax: (880-2) 813095 (Attn: NGO Forum)

Dr. Mohiuddin Faroque
Bangladesh Environmental Law Association
House #47, Road #5
Dhanmondi R/A, Dhaka 1205
Tel: 880-2-816225 / 315321
Fax: 880-2-881239

Mr Md Harun-Ir-Rashid
Director
Community Development Library (CDL)
House 39 Road 14A
Dhanmondi RA
Dhaka 1209
Bangladesh

Tel: 313604

Prof Rahman Sobhan Hossain
Chairman
Bangladesh Institute of Development Studies (BIDs)
E-17 Agargaon
Sher-e-Bangla Nagar
P O Box 3854
Dhaka 7
Bangladesh
Tel: 256187 / 257360-2 / 257364

Dr Khawaja Shamsul Huda
Director
Association of Development Agencies in Bangladesh (ADAB)
1/3, Block-F
Lalmatia Dhaka 1207
Bangladesh
Tel: 313-318
Tlx: 642940 ADAB BJ
Cab: INCULATE

Dr Motlubor Rahman
Executive Vice-Chairman
SAARC Agricultural Information Centre (SAIC)
Bangladesh Agricultural Research Council (BARC)
Farm Gate, New Airport Road
Dhaka 1215
Bangladesh
Tel: 326858
Tlx: 64240 HID BJ

Dr Abdul Gafur Dewan
Deputy Librarian and Librarian-in-Charge
Bangladesh Agricultural University
Myensingh 2202
Bangladesh
Tel: 5695-97/51A

Mr S M Mannan
Chairman
Bangladesh Association of Librarians, Information
Scientists and Documentalists (BALID)
c/o Community Development Library
House No. 39, Road No. 14/A
Dhanmondi, Dhaka, Bangladesh
Tel: 313604

Mr M Wahiduzzaman
Director
Library & Training Aids
Bangladesh Public Administration Training Centre (PATC)
Savar
Dhaka
Tel: 418102-5 (PABX)

Mr Imamuddin Ahmed Choudhury

Secretary
Bangladesh Social Science Research Council
Block No. 4
Sher-e-Bangla Nagar
Dhaka 7
Bangladesh
Tel: 318071 & 318726

Mr Mollah Shahidul Haque
General Manager (MIS)
Bangladesh Small and Cottage Industries Corporation
137-138 Motijheel Commercial Area
Dhaka 1000
Bangladesh
Tel: 233-202

Prof M Asadur Rahman
Director
Fisheries Research Institute
Freshwater Aquaculture
Research Station
Mymensingh 2201
Bangladesh
Tel: (091) 4221 / (091) 4410

Dr A W Chowdhuri
Deputy Secretary
Ministry of Finance
Sher-e-Bangla Ngar
Dhaka 15
Bangladesh
Tel: 314615 / 311302

Dr M Mahfuzul Haq
Division Chief
Economics and Chairman, Library Committee
Planning Commission
Sher-e-Bangla Nagar
Dhaka 15
Bangladesh
Tel: 314112 / 315011-18

Dr Nasir Uddin
Director
Voluntary Health Services Society (VHSS)
273/274 Baitul Aman Housing Society, Adabar
Shyamoli, Road No 1
Dhaka Bangladesh
Tel: 326755 / 319462

CAMBODIA

There was no workshop scheduled in Cambodia.

CHINA

BEIJING

Mr Jiayi Cheng
Program Officer
State Science and Technology Commission
Department of International Cooperation
15 B, Fuxing Road
Beijing, China
Tel: 861 851 5544
Fax: 861 851 5048

Ford Foundation
Stephen J. McGurk
Program Officer
6 Ritan Lu
International Club
Jianguomenwai
Beijing 10020
Tel: (861) 532-6668
Fax: (861) 532-5495
E-mail: ford-beijing@cgnet.com

Prof Qiu Daxiong
Director
Institute for Techno-economic and Energy Systems Analysis
Energy Sciences Building
Tsinghua University
Beijing 100084
Fax: (861) 2562768

Prof Zhao Xianying
Secretary - General
Chinese Academy of Sciences
MAB
52 Sanlihe
Beijing 100864
Tel: (861) 3297418
Fax 8011095

Prof Chu Shupeng
Director
Laboratory of Resource and Environment
Information Systems (LREIS)
Building 917, Datun Road
Beijing
China
Tel: 446551 Ext 468

Prof Tan Kerang
Institute of National Studies (INS)
Chinese Academy of Social Sciences (CASS)

27 Baishiqiao Road
Beijing
The People's Republic of China
Tel: 8022288 - 2335
Tlx 22061 CASS CN

Mr Ma Lin Ying
Deputy Director
For Americas and Oceania
Department of Intenational Cooperation
State Science and Technology Commission (SSTC)
15 B Fu Xing Road
Beijing
China 100862
Tel: (861) 8515544-1317
Fax: (861) 8515048

Mr Jiang Xiangdong
Senior Engineer & Engineer in charge
Scien-Tech Information Centre (STIC)
Ministry of Machinery & Electronics Industry
22 Baiwanzhuang
Beijing 100037
China
Tel: 8317766 X674
Tlx : 222557 STOP CN
Fax : 8310633

Zhu Zhao Hua
Deputy Director of Research Institute of Forestry
Chinese Academy of Forestry
Beijing 100091
China
Tel: 258 2211-672

Mr Liu Zhaodong
Director
Institute of Scientific and Technical Information of China (ISTIC)
15 Fuxinglu, P O Box 3827
Beijing 100038
The People's Republic of China
Tel: 8514020
Tlx 200079 ISTIC CN
Fax: 8514025

Prof Liu Zhicheng
Vice-President
Chinese Academy of Agricultural Sciences (CAAS)
30 Bai Shi Qiao Road
West Suburbs
Beijing

The People's Republic of China
Tel: 890851
Tlx: 222720 CAAS CN
Fax: 8315336 / 8316545

Ms Chen Kai
Vice-Director
Institute of Remote Sensing Technology and Applications
Peking University
Beijing
China
Tel: 28.2471-3782
Tlx: PKUNI CN 22239

Dr Zhou Hongren
Deputy Director, SEIC
Commissioner,
The State Planning Commission
State Economic Information Centre (SEIC)
58 San-Li-He Road, Muxidi
Beijing
The People's Republic of China
Tel: 868701 Ext 208
Tlx: 22064 CCSPC CN

Ms Zhang Xiaoqing
Editor and Coordinator
China Environment News
15(A) Xiao Xinglongjie
Chongwen District
Beijing 100 062, People's Republic of China
Tel: 701 3783 / Fax: 701 3772

Prof Yang Kai
Deputy Director General
National Bureau of Surveying & Mapping
Baiwanzhuang Beijing
China 100830
Tlx: 222743 NBSM CN / Fax: 86-01-8311564

Mr Jiang Xinian
Beijing Solar Energy Research Institute
3 Hua Yuan Road
Haiden, Beijing
China 100083
Tel/Fax: 2012880

NANJING

Deng JianJun
Assistant Research Fellow
Secretary of Foreign Affairs Office
Jiangsu Provincial Academy of Social Sciences
No. 12 North Hu-Ju Road
Nanjing
China
Tel: 637995, 635398

Xu Fu Ji
Professor/President
Jiangsu Academy of Social Sciences
No. 12 North Hu-Ju Road
Nanjing
China 210013
Tel: 637995/633913 (R)

Gu Ji-Rui
Deputy Director
Institute of Economics
Jiangsu Provincial Academy of Social Science
#12 Hu-Ju North Road
Nanjing, Jiangsu, China
Tel: 312276

Jiang Zhao Nian
Associate Research Fellow
Academy of Social Sciences of Jiangsu Province, Scientific Research Office
#12 Hu-Ju North Road
Nanjing, China
Tel: 637995/635624

Yan Ying Long
Associate Professor
ECONOMIC RESEARCH INSTITUTE
Jiangsu Provincial Academy of Social Sciences
No. 12 North Hu-Ju Road
Nanjing
China
Tel: 635276

Zhou Guan San
Director of Foreign Affairs Office
JIANGSU ACADEMY OF SOCIAL SCIENCES
No. 12 North Hu Ju Road
Nanjing
China 210013
Tel: 637995 25 / 712530 (R)

KUNMING

Dr Xu Jianchu
Kunming Institute of Botany
Dept of Ethnobotany
Heilongtan, Kunming, Yunnan 650204
PRC
Fax: (86) 871 5150227

Vice-President's Office:
Prof Xu Kemin
Vice President, Yunnan University
52 Cuihu Road
Kunming, Yunnan 650091
PR China
Fax : (86) (871) 5153832

Prof Jiang Hanqiao, Director
Mr Chen Jie, Lecturer
Institute of Ecology and Geobotany (IEG)
Yunnan University
52 N Cuihu Road
Kunming
Fax: (86) (871) 5153832

INDIA

BANGALORE

Dr P R Krishnaswamy
Director
Vittal Mallya Scientific Research
Foundation (VMSRF)
P.B. No. 406
K.R. Road
Bangalore - 560 004
India
Tel: 91-80-628643 / 628644
Tlx: 0845-2467 VMRF IN
Fax: 91-80-6612806

Dr P.M. Ganapathy
Director
Indian Plywood Industries Research & Training
Institute (IPIRTI)
P.B. No. 2273
Tumkur Road
Bangalore 560 022
India
Tel: 91-80-8394341 (Direct)
Fax: 91-80-8396361
Tlx: 0845-5066 IPRI IN

Centre for Social Action
No. 849 Ramdev Gardens
Kacharakanahalli
Bangalore
Karnataka - 560 084

ACTIONAID
3 Rest House Road
Bangalore - 560 001
Karnataka

ICRA
902 Indiranagar I Stage
Bangalore
Karnataka - 560 038
Atten: P.Basavraj / Rupert M Rosario
Ph:543370

Equations
96 II Main 'M' colony
Indiranagar Stage - I
Bangalore
Karnataka - 560 035

The Director
ISI
24 Benson Road

Bangalore
Karnataka - 560 046

Mathews Philip.
Executive Director
ICDSS
No. 1, III Cross
Vivekananda Nagar
Bangalore
Karnataka - 560 033

Mr Alex Tuscano.
PRAXIS
1038 Kacharkhanahalli Extn.
Thomas Town Post
Bangalore
Karnataka - 560 084

Babu Mathew
National Law School of India Univ.
Central College Compound
Bangalore 560001
Ph:211749

Professor A Neelameghan
70/3 4th Main Road
16th Cross Road
Malleswaram West
Bangalore 560066
India
Tel: 91-812-341657
Fax: 91-812-344598

Mr Chikkamallaiah
Librarian
Indian Institute of Management
Bannerghatta Road
Bangalore 560 076
India
Tel: 641902
Tlx 0845-2472

Dr S Ramaseshan
Director
Indian Institute of Science
Bangalore 560 012
India
Tel: 30628/34411

Mr M E Visveswaran
Director
Central Machine Tools Institute (CMTI)
Tumkur Road
Bangalore
India 560022

Tel 38281
Cab: CEMTOOL

Mr M N Sharif
Director
Regional Centre for Technology Transfer of the
Economic and Social Commission for Asia and Pacific (RCTT)
Manickvelu Mansion
49 Palace Road
Bangalore 560 052
India
Tel: 76931 (3 lines)
Tlx 0845 719 RCTT IN
Cab: ESPRECENT

HYDERABAD

Dr Vinodini Reddy
Director
National Institute of Nutrition
Indian Council of Medical Research
Jamai-Osmania P O
Hyderabad 500 007
India
Tel: 868909
Tlx 0425-7022

Centre for Youth & Integrated Developoment
P O Box 30
Baseli Sahi
Puri Dist
ORISSA - 752 001
India

Mr G V V S D S Prasad
V S R D
14 Shilpa Eramangel
Somajiguda
Hyderabad
Andhra Pradesh 500 482
India

Mr A K Das Gupta
Librarian
Administrative Staff College of India
Bella Vista
Hyderabad
India 500475
Tel: 33312
Tlx: 0425-6390 ASCI IN
Fax: 21-2954

Dr D B Eswara Reddy
University Librarian
Andhra Pradesh Agricultural University
Hyderabad 500 030
India
Tel: 48319/48014

Mr B Bowonder
Centre for Energy Environment and Technology (CEET)
Administrative Staff College of India
Bella Vista
Hyderabad 500475
India

Mr N Laxman Rao
Lecturer

Department of Library & Information Science
Osmania University
Hyderabad 500 007
India

Dr N K Gopalakrishnan
Chief Library and Documentation Centre
Institute of Public Enterprise
Osmania University Campus
Hyderabad - 500 007
India
Tel: 71145 / 71937 / 71938
Tlx: 4257064 IPE IN
Cab: INSPRISE

Mr K A Raju
Director
National Institute of Rural Development
Rajendranagar
Hyderabad 500 030
India
Tel: 245001-4
Tlx: 0425-6510
Fax: 91-0842-245277

Mr S Adiga
Technical Secretary to Directory
National Remote Sensing Agency (NRSA)
No. 4 Sardar Patel Road
Post Box No. 1519
Secunderabad - 500 037
Balanagar, Hyderabad
Andhra Pradesh
India
Tel: 279572-76
Tlx: 0425-6522
Fax: 842-278664 / 278648

Dr Shri S G Raghu
Principal Director
Small Industry Extension Trading Institute (SIET)
Yousufguda
Hyderabad 500045
India
Tel: 33544-5-6-7 / 220316-7-8-9
Cab: SIETINSTITUTE, HYDERBAD

MADRAS

C.P.R. Environmental Education Centre
IA Eldams Road
Madras
Tamil Nadu - 600 018
India

Prof K.R. Janrdhanan.
KSSP
KSSP BHAVAN
GURUVAYUR ROAD
TRICHUR
KERALA - 680 004

National Director
AICUF
125 Sterling Road
Nungumbakkam
Madras
Tamil Nadu - 600 034

Dr Jayakar Babu.
Director
Community Service Centre
17, Balfour Road
Kilpauk
Madras
Tamil Nadu - 600 010

Legal Education & Aid Society
15, Ramalinganagar,
Kottivakkam
Old Mahabalipuram Rd, Thiruvanmiyur
Madras
TAMILNADU - 600 041

PEACE TRUST
Off. Police Housing Colony
Trichy Road
N.G.O. Colony, P.O.
Dindigul
Tamilnadu - 624 009

Dr G Thyagarajan
Director
Central Leather Research Institute (CLRI)
Adayar
Madras 600020
India
Tel: 412616/51 / 412553
Cab: LESERCH
Tlx: MS 514

Dr C.R. Bijoy .
Sri Rama Krishna Hospital
Doctor's quarters

395, Avaram Palayam Road
Coimbatore
Tamil Nadu - 641 004

Mr Susai Raj.
N.E.L.
15, Desmpattai Road
Gingee Taluk
Tamil Nadu - 604 202

K. Arvind / Loyola Joseph
Foundation of Occupational Development (FOOD)
6,2nd St., Sowrashtra Nagar
Choolaimedu, Madras-94

Dr Y Nayudamma
President
Committee on Science and Technology in
Developing Countries (COSTED)
c/o Indian Institute of Technology
Madras
India 600 036
Tel: 414543 / 414046 / 419466

Dr Abbas Ibrahim
Chairman
Ranganathan Institute of Library and
Information Science for Applied Research
119 Thirumalai Nagar,
Perungudi
Madras 600 096
India
Tel: 91-44-413258
Fax: 91-44-2350305
Tlx: 41-21060 PCO IN

Prof P V Indiresan
Director
Indian Institute of Technology
Madras 600 036
India
Tel: 414342 / 415694 / 414516
Tlx: 41 7362 IITM IN

NEW DELHI

Mr Rajad Nandi
Senior Director
Confederation of Indian Industry
23-26 Institutional Area
Lodi Road
New Delhi 110003,
India
Tel: 4629994
Fax: 4633168/4626149
Tlx: 031 - 66655/65401 AIEI IN

Dr Ashok Jain
Director
National Institute of Science,
Technology and Development Studies
Dr K S Krishnan Marg
New Delhi 110012
India
Tel: 5743227 / 5714064
Fax: 5754640

Dr S Chandrashekhar
Bio-Tech Consortium India Limited
G-6, 3rd Floor
N.D.S.E. Pt. I
New Delhi - 110049
India
Tel: 4629378/618487
Fax: 4632670

Mr N.K. Sharma
Managing Director
National Research Development
Cooperation
20-22 Zamroodpur Community Centre
Kailash Colony Extension
New Delhi 110048
India
Tel: 6432121
Fax: 6449401
Tlx: 71358

Mr S P Ahuja
Hony. Director
Centre for Research, Planning & Action
16 Dakshneshwar
10 Hailey Road
New Delhi - 110001
India
Tel: 3326955/3329816
Fax: 91-11-3329216

Prof K V Sane
Professor Chemistry
Department of Chemistry

University of Delhi
New Delhi 110007
India
Tel: 7257416
Fax: 7257161

Mr Ashok Khosla
President
Development Alternatives
B-32 Institutional Area
New Mehrauli Road
Haus Khas
New Delhi 110016
India
Tel: 665370 / 657938
Fax: 91-11-6866031

Dr J K Nigam
Director
Shriram Institute for Industrial Research
19 University Road
Post Box 2122
New Delhi 110007
India
Tel: 7257267 / 7257860
Fax: 91-11-7257676

Prof P N Mathur
Coordinator
International Federation for Women
in Agricultural
119 Krishi Anusandhan Bhavan
Pusa Gate
New Delhi 110012
India
Tel: 5731279 / 5731277

Dr R K Pachauri
Director
Tata Energy Research Institute (TERI)
9 Jor Bagh
New Delhi 110003
India
Tel: 91-11-462-7651 / 4621490
Fax: 91-11-462-1770

Dr Rajesh Tandon
Participatory Research In Asia
42 Tughlakabad Institutional Area
New Delhi 110 062
India
Tel: 91-11-6451908 / 6439559

Dr Samar Singh
Secretary General

World Wide Fund for Nature-India
P O Box 3058
172-B Lodi Estate
New Delhi 110 003
India
Tel: 91-11-4616532/4693744/4627586
Fax: 91-11-4626837

Dr S P Pal
Director
NCAER
Parisila Bhawan
11 Indraprastha Estate
New Delhi 110 002
India
Tel: 91-11-3317860-68
Fax:91-11-3327164

Dr V L Chopra
Director-General ICAR
Krishi Bhawan
Dr Rajendra Prasad Road
New Delhi 110 001
India
Tel: 91-11-388911

Mr Ashish Kothari
Indian Institute of Public Administration
Indraprastha Estate
Ring Road
New Delhi - 110 002
India
Tel 91-11-3317311 / 3317309

Drs G Kadikodi
Institute of Economic Growth
University Enclave
New Delhi 110 007
India
Tel: 91-11-7257365 / 7257424

Dr Alok Mukhopadhyay
Executive Director
Voluntary Health Association of India
Tong Swasthya Bhawan
Behind Qutab Hotel
40 Institutional Area
New Delhi 110 016
India
Tel: 91-11-668071 / 668072 / 665018
Fax: 91-11-6853708

Dr Jill Carr-Harris
South-South Solidarity
P-4 Green Park Extension
New Delhi 110 016
India

Tel: 91-11-669370
Fax: 91-11-6866720

Dr Desh Bandhu
Indian Environmental Society
U-112 (3rd Floor)
Vidhata House
ViaKas House
Vikas Marg
New Delhi 110 092
India
Tel: 91-11-2223311

Mr G K Bhat
Director
TARU for Development
5-D Vijay Mandal Enc
New Delhi 110 016
India
Tel: 91-11-3012982

Prof Ramaswamy Iyer
Research Professor
Centre for Policy Research
Dharma Marg
Chanskyapuri
New Delhi 110 021
India
Tel: 91-11-3015273

The Director
Indian Social Institute
10, Lodi Road, Institutional Area
New Delhi - 110003
Ph: 91-11-462-2379 / 461-1745
Email: isi@unv.ernet.in

Fr Yvon Ambroise,
Caritas India, CBCI Centre,
Ashok Place, New Delhi,
110 001, INDIA.
Tel 91 11 343390
Tlx 3161366 CARI IN
Fax 91 11 371 5146

IMRANA QADEER
Jawaharlal Nehru University
Centre of Social Medicine & Community Health,
School of Social Sciences, JNU
New Delhi 110067, India
Phone: 91-11-667676/363

DR. MIRA SHIVA
People's Health Network
A-60 Haus Khas, New Delhi-110 016, India

Phone: 665003

OXFAM India Trust
E-15, Hauz Khas Market
New Delhi - 110 016

Development Alternatives
B 32, Institutional Area
Tara Crescent
New Meharuli road
New Delhi - 110 016

CISRS, Joint Women's Programme
14 Jangpura B
Mathura Road
New Delhi - 110 014

LOKAYAN
Exchange Buildings
13 Alipur Road
(Sham Nath Marg)
New Delhi - 110 054

Mr Joseph Gathia.
Centre of Concern for Child Labour
247, Akashdarshan Apartments
Mayur Vihar - I
New Delhi - 110 091

Women's Studies Development Centre
Delhi University
Delhi
New Delhi - 110 007

CWDS
25 Bhai Vir Singh Marg
Gole Market
New Delhi - 110 001

Dr Vandana Shiva.
TWN
A-60 Hauz Khas
2nd Floor
New Delhi

Ms Madhu Kishwar.
MANUSHI
C/202 Lajpat Nagar I
New Delhi - 110 024

A V A R D
5, Institutional Area
Deen Dayal Upadhyay Marg
NEW DELHI - 110 002

INDIAN LAW INSTITUTE
Bhagwan Das Raod
NEW DELHI - 110 001

India Institute of Mass Communication
Saheed Jeet Singh Marg
JNU New Campus
NEW DELHI - 110 067

CSE
F-6, Kailash Colony
807, Vishal Bhawan, 95
Nehru Place
New Delhi - 110 019

Mr. H.K. Kaul .
Director
Delhi Library Network
India International Centre
40 Max Mueller Marg
New Delhi - 110 003

Ms. Meena Chellam.
Canadian Co-operative Association
N.C.U.I. Building
No.3, Siri Institutional Area
Khel Gaon Marg
New Delhi - 110 016

South Asia Human Rights Documentation Centre
Atten: Ravi Nair
c/o Leo Fernandez
ISI
10, Lodi road, Institutional Area
New Delhi - 110003

INDONESIA

JAKARTA

Soendora Triono
Bureau Chief for Marine, Aerospace, Science and Technology
National Development Planning Agency
Jl Taman Surapati 2
Jakarta Pusat
Indonesia
Tel: 021 3905649/336207ext351

Jusuf Wanandi
Executive Director
Centre for Strategic and International Studies
Jl Tanah Abang III/23-27
Jakarta 10160
Indonesia
Tel: 356532/357238
Tlx: 45164 CSIS IA

Ms Moertini Atmowidjojo
Head, Bureau of Scientific and Technological Cooperation
Lembaga Ilmu Pengetahuan Indonesia
Widya Graha Building
Jl Jenderal Gatot Subroto
Jakarta Selatan
Indonesia
Tel: 511542 / 511834 (Direct)
Fax : 5207226

Drs Alwinur
Project Co-ordinator INFIS
Organization & Methods Unit
Directorate General of Fisheries (DGF)
Jalan Harsono Rm No 3
Ragunan Pasar Minggu
Jakarta 12550
Jakarta, Indonesia
Tel: 7804226/7804227
Fax : 7803196

Mr Blasius Sudarsono
Acting Head,
Pusat Dokumentasi dan Informasi Ilmiah (PDII)
Jalan Jenderal Gatot Subroto 10
Jakarta 12190
or P O Box 4298
Jakarta 12042
Indonesia
Tel: 5733465, 5733467
Tlx: 62875 PDII Ia
Fax: 5733467

Mr Gerry Glazier
EMDI Project Leader

Environmental Management Development in Indonesia
Kantor Mentri Negara
Kependudukan dan Lingkungan Hidup
Jl Medan Merdeka Barat 15
Jakarta Pusat 10110
Indonesia
Tel: 6221-3807566
Fax: 6221-586181

Ir H D Puspongoro
Dy Chairman Technology Devt
Agency for Development & Application of Technology
(B P P Technology - BPPT)
Ministry of Research & Technology
Menara Patra, 15th Floor
Jalan M H Thamrin 8
Jakarta, Indonesia
Tel: 323935, 3042402
Tlx: 45321 BPPT IA / 44331 ATP JKT

Prof Drs Kardono Darmoyuwono
Deputy Chairman
Badan Koordinasi Survey Dan Pemetaan Nasional (Bakosurtanal)
Jl. Dr. Wahidin 1, No. 11
Jakarta Pusat
Indonesia
Tel: 359766/364474 (Pranoto)

Ms Gloria L Enriquez / Project Leader
Dpy Director for Program
S.E.Asian Regional Centre for
Tropical Biology (SEAMEO-BIOTROP)
Jalan Raya Tajur, Km 6
or P O Box 116
Bogor, Indonesia
Tel: (251) 323848
Tlx : 48299 BIOTROP IA
Fax : (251) 326851

Dr Seiji Shindo
Director
The ESCAP-CGPRT Centre
Jalan Merdeka 145
Bogor 16111
Indonesia
Tel: 251-328399, 326290
Tlx: 48369 AARD IA
Fax: 251-325251

NEPAL

KATHMANDU

Mr Ashish Gurung,
Caritas Nepal, PO Box 2723,
Kathmandu, NEPAL.
Tel: + 977 1 5 27272
+ 977 1 5 24841
Fax: + 977 1 5 24841

Nepal Community Support Group (NECOS)
P.O.Box 3724, Khatmandu, Nepal
Fax: +977-1-225277
Tel: +977-1-217881

Society for Legal and Environment Analysis and Development
Research [LEADERS]

Depty. Mayor of Khatmandu

Nepal Forum of Environmental Journalists(NEFEJ)
P. O. Box 5143, Thapathali, Kathmandu, Nepal
Phone: 977-1-227691
Fax: 977-1-226820 / 977-1-227691
Email: stardust 977-1-227681
Atten: Mohan Mainali (Executive Director) / Mr. Batu Krishna Uprety

Nepal National Coordination Committee in preparation for
the United Nations World Conference on Human Rights (NECOM)
NECOM Secretariat
c/o INHURED International
PO Box 2125
Kathmandu, Nepal

Action Aid, Nepal

Tribhuvan University, Kathmandu

UNDP - Nepal

Peter Moulton (email: pmoulton@nepal.igc.apc.org)
P.O.Box 11752
Eugene, OR 97440, USA

Mr. Govind P. Adhikari
Executive Director
Social Welfare Council
Lainchur, Kathmandu
Tel: +977 1 418846
Fax: +977 1 410279

Dr. Binayak Bhadra
Member, National Planning Commission
Singh Durbar, Kathmandu
Tel: +977 1 226345

Fax: +977 1 226500
Res: +977 1 526338

Mr. K.L. Gupta
Senior Executive Engineer
Nepal Telecommunications Corp.
Kathmandu
Tel: +977 1 220787
Res: +977 1 418888

Nabindra Raj Joshi
Deputy Mayor
Municipality of Kathmandu
Tel: +977 1 228492
Fax: +977 1 229221
Res: +977 1 221038

Dr. Shree Govind Shah
Environmental Planning Coordinator
IUCN
Kathmandu
Tel: +977 1 526391
Tel: +977 1 527781
Fax: +977 1 521506
Res: +977 1 526903

INSEC
P.O. Box No. 2726
Kathmandu, Nepal
Shivahari Dahal
Tel: +977-1-270-770
Fax: +977-1-266-820

Prof S R Chalise
International Centre for Integrated Mountain Development
(ICIMOD)
P O Box 3226 (Jawalakhel, Lalipur)
Kathmandu, Nepal
Tel: 525313
Fax: 9771-524509

Dr Ratna Man Pradhan
Executive Director
Tribhuvan University
Research Centre for Education Innovation and Development
Tripureshwor
Kathmandu, Nepal
P O Box 2181
Tel: 9771-215647
Fax: 9771-226639

Mr Khilendra N. Rana
Executive Director
Institute for Sustainable Development
Lalitput
P O Box 4006
Kathmandu

Nepal
Tel: 523657/522531
Tlx: 2467 ISD NP
Fax: 9771-526467

Dr Meena Acharya
Executive Director
IIDS
P O Box 2254
Kathmandu
Nepal
Tel: 474718/472405
Fax: 9771-470831
Tlx: 2318 NAX NP

Dr Pradeepmani Dixit
TU-IDRC Farm Forestry Project
Tribhuvan University
Coronation Garden
Kirtipur
Kathmandu
Nepal
Tel: (O) 977-57-20453
(R) 977-1-412054
Fax: 911-1-226820

Dr D N Manandhar
Director of Research
Nepal Agricultural Research Council
Khumaltar, Lalitpur
Kathmandu
Nepal
Tel: 9771-523041, 525704, 525708

Dr Dip Raj Sharma
Executive Director
Agricultural Projects Services Centre (APROSC)
Agricultural Documentation Centre
P O Box 1440
Ramshahpath, Panchayat Plaza
Kathmandu, Nepal
India
Tel: 2-15095 (Direc) / 2-15971 / 2-15067 / 2-15095
Tlx: 2305 NP

Mrs Shanti Mishra
Narayan Mandir
Ka 1-108 Kuleswar Balkhu
Kathmandu
Nepal
India

Mr Suresh K Regmi
System Engineer
National Computer Centre

Computer Bhawan
Singh Durbar
Kathmandu
Nepal
P B No. 1573
Tel: 2-15580 / 2-15234

Dr Ratna Shumsher J B Rana
Chairman
National Council for Science & Technology (NCST)
c/o Tribhuvan University
P O Box 797
Kathmandu
Nepal
Tel: 14303, 13277 Ext 138

Nr Gauri Nath Rimal
Additional Secretary
National Planning Commission
Singha Darbar
Kathmandu
Nepal

Mr Krishna B Malla
Manager
National Remote Sensing Centre
P O Box 3103
Kathmandu
Nepal
India
Tel: 215928
Tlx: NP 291

Dr Suresh K Pudasaini
General Manager
Nepal Telecommunications Corporation (NTC)
Singh Durbar
Kathmandu
Nepal
India
Tel: 221664 / 215444

Dr Jagdish Ghimire
Co-ordinator
NGO Federation-NEPAL
P O Box 916
Bishal Nagar
Kathmandu
Nepal
India
Tel: 411308
Fax: (9771) 412822 / 226285

Mr B Pradhan
Joint Secretary

Ministry of Finance
Bagh Durbar
Kathmandu, Nepal
India
Tel: 12280 / 14607

Dr Sant B Gurung
Executive Director
Centre for Economic Development and Administration (CEDA)
Tribhubvan University
P O Box 797
Kirtipur
Kathmandu, Nepal
India
Tel: 213325 / 213851
Cab: CEDA

The Director
Centre for Nepal & Asian Studies
P O Box 3757
Tribhuvan University
Kirtipur
Kathmandu, Nepal
India

Mr S Singh
Director
Research Centre for Science & Technology (RECAST)
c/o Tribhuvan University
P O Box 797
Kathamadu, Nepal
Tel: 14303, 13277
Cab: SCIENTECH, KTM

PHILIPPINES

MANILA

Felipe B Alfonso
President
Asian Institute of Management(AIM)
123 Paseo de Roxas, MCC P O Box 898
Makati, Metro Manila
Philippines
Tel: 87 4011-19/8160683(Direct)
Fax: 63 2 8179240
Tlx: 63778 AIMPN

Mrs Lilia Ramos
Executive Officer
Approtech Asia
Asian Alliance of Appropriate Technology
Practitioners, Inc.
G/F PSDC Magallanes, cor. Real Sts
Intramuros, Manila
Philippines
Tel: 632 5300786
Fax: 632 5300786/8189720

Augusto de Leon
CRC Fellow
Centre for Research and Communication
Pearl Drive, Ortigas Complex
Pasig
Metro Manila
Philippines
Tel: 673 7781-86

Mario B Lamberte
Vice President
Philippines Institute for Development Studies (PIDS)
NEDA sa Makati Bldg, 106 Amorsolo St
Legaspi Village, Makati 1200,
Metro Manila, Philippines
Tel: 632 810 6261
Fax: 632 8161091

Dr Cesar M Mercado
Monitoring & Evaluation Specialists & Course Co-ordinator
UNDP-Development Training and Communication Planning
5th Floor, Bonifacio Building
University of Life Campus
Meralco Avenue, Pasig
Metro Manila, Philippines
Tel: 632-6311271 - 1274
Fax: 632-631-1275

Mr Antonio B Quizon
Executive Director
Asian NGO Colition for Agrarian Reform and

Rural Development, Ltd
ANGOC Regional Secretariat
14-A 11th Jamboree St.
Kamuning, Quezon City
Philippines
Tel: 632-8163033
Fax: 632-9215122

Dr Klaus Lampe
Director-General
International Rice Research Institute (IRRI)
P O Box 933
1099 Manila
Philippines
Tel: 632-884869, 888351 to 53
Fax: 632-8178470

Ms Cristi Marie C Nozawa
Executive Director
The Haribon Foundation for the Conservation
of Natural Resources
340 Villamor Street
San Juan, Metro Manila
Philippines
Tel: 784179
Fax: 704316

The Haribon Foundation for the Conservation
of Natural Resources
340 Villamor Street
San Juan, Metro Manila
Philippines
Tel: 784179
Fax: 704316

Mr Tomas P Africa
Administrator
National Statistics Office
2132 Ramon Magsaysay Blvd
Manila
Philippines
Tel: (632) 610794
Fax: (632) 610794 / 610809

Horacio R Morales
President
Philippine Rural Reconstruction Movement
Kayumanggi Press Bldg
940 Quezon Ave, Quezon City
Philippines
Tel: 997919/985563/985576
Fax: 632 997919

Mr Alexander Yap
Director
Congressional Planning and Budget Office (CPBO)
House of Representatives

Batasan Complex North Wing
Room 615
Quezon City
Metro Manila
Philippines
Tel/Fax: 9316519

Edna Labra
Program Coordinator
Philippines Social Science Council, Inc
Philippines Social Science Centre
Don Mariano Marcos Avenue
UP Diliman, Quezon City
Philippines
Tel: 922 9621

Emanuel de Dios
Economics Department
University of the Philippines
Diliman, Quezon City
Philippines
Tel: 989686

Dr Minda C Sutaria
Director
SEAMEO-INNOTECH
Commonwealth Avenue
U.P., Diliman
Quezon City
Philippines
Tel: 98-2591
Fax: 632-96-21-24

Rene Salazah
Seeds and Biotechnology Programme
SEARICE
34 Fensal Condominium
130 Kalayaan Ave
Quezon City
Philippines

Dr Edgardo D Gomez
Director & Prof of Marine Biology
Marine Science Institute , College of Science
University of the Philippines
Diliman, Quezon City 1101, Philippines
Tel: 976061, 989742, 982693

Mr Leonardo Quitos
Officer-in-charge
The National Economic & Development Authority (NEDA)
NEDA Regional Office
San Fernando, La Union
Philippines
Tel: 8180466 c/o ICLARM
Tlx: 64794 ICLARM PN c/o ICLARM
Fax: 632-8163183 c/o ICLARM

Dr Cleodualdo B Perez
Executive Director
Philippine Council for Agriculture Forestry and
Natural Resources Research and Development
P O Box 425
Los Banos, Laguna
Philippines
Tel: 50014, 50015 , 50017, 50020
Fax: 63-94-50016
Tlx: 40860 PARRS PM

Dr Conrado S Navarro
Project Director
International Institute for Rural Reconstruction (IIRR)
Silang, Cavite
Philippines 2720
Tel: (969) 9451
Fax: (632) 522 2494

Dr Cecil M Rayes
Project Director
Policy & Development Foundation Inc
2nd Floor, Philippine Cotton Corp Bldg
Shaw Blvd
Cor. Amber Avenue
Pasig, 1600 Metro Manila
Philippines
Tel: 632-6312107, 8106261
Fax: 632-63212109

Prof Yu Minh Chin
Director
Information Technology Centre
Centre for Research and Communication
Pearl Drive, Ortigas Complex
Pasig
Metro Manila
Philippines
Tel: 673-7781-86
Tlx: 65524 CRCRP PN

Dr Manuel A Lopez
Dean
College of Computer
De La Salle University
Philippines

Dr Jose L Guerrero
Director
Science and Technology Information Institute
Department of Science and Technology
Bicutan, Taguig
Metro Manila
P O Box 2131 Manila
7510 NAIA Pasay

Philippines

Mr Raul N Nilo
Director
National Computer Centre
Camp Aguinaldo
Quezon City
Philippines

Mr Roberto Verzola
E-mail Centre
Quezon City
Philippines
E-mail: rverzola@phil.gn.apc.org

People's Access
Quezon City
Philippines

Vic Reyes
Philippine Sustainable Development Network
Room 210, NEDA sa Makati Bldg.
106 Amorsolo St
Legazpi Village
Makati, Metro Manila
Tel: (632) 85 06 11

SRI LANKA

COLOMBO

Dr Ponna Wignaraja
Participatory Institute for Development Alternatives
75 Kynsey Road
Colombo 8
Sri Lanka
Fax: 941-575649
Tel: 695625

Dr Rohana Ulluwishewa
Director
Sri Lanka Resource Centre for
Indigenous Knowledge
Department of Geography
Nugegoda
Sri Lanka
Fax:941-852604
Tel: 941-852028

Mr Aelian H Perera
Centre for Regional Development
Studies
37/3 Pedris Road
Colombo 3
Sri Lanka
Fax/Tel: 941-574879

Prof H P M Gunasena
Dean, Faculty of Agriculture
Office of the Dean
University of Peradeniya
Peradeniya
Sri Lanka
Tel: 948-88041/88239/99354/88375
Fax: 948-32572

Mr M H A Rizwan
Project Manager
Computer and Information Technology
Council of Sri Lanka
Suite 2-201 BMICH
Buddhaloka Mawatha, Colombo 7
Sri Lanka

Dr Fr Oswald B Firth,
SEDEC, 133 Kynsey Road,
Colombo 8, SRI LANKA
Tel: 941-691885 / 693989
Fax: 941-695136

Lalanath Des Silva / Rajvi Algama
Environmental Law Association
(Sri-Lanka members)

Environmental Foundation Ltd.
3 Campbell Terrace, Colombo 10
Sri Lanka
Fax: 941-697226
Tel: 941-446518

Dr Peter Gordon
Resource Center for Community
Groups (RCCG)
1 De Silva Rd
Kalubowela
Dehiwela
Sri Lanka
Fax: 811183

Dr Sunimal Fernando
IRED
64 Horton Place
Colombo 7
Sri Lanka
Tel: 695481
Fax: 580721

Dr Sunil Ratapirya
Institute for Occupational
Health and Safety
24/4 New Airport Rd
Morutuwa
Sri Lanka
Tel: 634867

Mr Jeevan Thiagarajah
Assistant Director
ICES
8 Kynsey Rd
Colombo 8
Sri Lanka
Tel: 698048 / 698085
Fax: 696618

Dr Mahiya Rafeek
World View International
8 Kinross Ave
Colombo 4
Sri Lanka
Tel: 583109/584667

Dr Jane Cooper
Canadian Cooperative Association
7/4 Station Rd
Colombo 4
Sri Lanka
Tel: 508871
Fax: 503811

Dr Don Bromwell
Sri Lanka Canada Development Fund (SLCDF)
5/3a Police Park Terr.
Colombo 5
Sri Lanka
Tel: 589739

Dr Stephen Ashby
World University Services Canada
53a Bullers Lane
Colombo 7
Sri Lanka
Tel/Fax: 586704

Mr T B Subasinghe
Director
Agrarian Research and Training Institute (ARTI)
P O Box 1522
114 Wijerama Mawatha
Colombo
Sri Lanka
Tel: 96981 / 96437 / 94620
Cab: AGRATI

Mr Naufel Abdul Rahman
Chairman
Industrial Development Board
615 Galle Road
Katubedde, Moratuwa
Sri Lanka
Tel: 0727002 Direct / 505326 / 505327 / 505450 / 505452
Tlx: 1248 MININD COLOMBO

Dr A T Ariyaratne
President
Lanka Jathika Sarvodaya Sangamaya (Inc)
Sarvodaya Central Office
98 Rawatawatte Road
Moratuwa
Sri Lanka
Tel: 507-159 / 505-255 / 507-194
Fax: 941-507084
Tlx: 22837 SARVA CE

Prof V K Samaranayake
Director
Institute of Computer Technology
University of Colombo
Sri Lanka
Tel: 698 008 / 695615

Mr R Weerakoon
Director of External Resources
Ministry of Finance & Planning
P O Box 277
Inland Revenue Building
15th Floor, Colombo 2

Sri Lanka
Tel: 541279 (Direct) / 24183

Prof Ravindra Fernando
Head, National Poisons Information Centre
National Poisons Information Centre
General Hospital, Colombo
P O Box 271, Colombo
Sri Lanka
Tel: 686143 / 691111
Fax: 699231 / 699512

Dr R P Jayewardene
Director-General
Sri Lanka Scientific and Technical Information Centre (SLSTIC)
Natural Resources, Energy & Science Authority (NRESA)
47/5 Maitland Place
Colombo 7, Sri Lanka
Tel: 686771-3 / 697697

Mr Lyn N T Mendis
No 6, 5th Cross Lane
Off Borupona Road, Ratmalana
Sri Lanka
Tel: 722537

N U Yapa
International Recruitment Consultant (ref. 306E)
International Irrigation Management Institute
P O Box 2075, Colombo
Sri Lanka

Mr P Milton Pius Bernando / Mr Jolly Somasundaram
Consultant
Sri Lanka Institute of Development Administration (SLIDA)
(Ministry of Public Administration)
28/10 Malalasekera Mawatha, Colombo
Sri Lanka
Tel: 582183 / 587672
Fax: 941-584406

THAILAND

BANGKOK

Dr Jingjai Hanchanlash
Co-ordinator
Vietnam Sustainable Economic Development
962 Krung Kasem Road, Bangkok 10100
Thailand
Tel: 281 4254
Fax: 281 8777

Dr Tongyingsiri Prasit
National Institute of Development Administration
Bangkapi, Bangkok 10240
Thailand
Tel: 66 2 377 7400-10, 377 9669-9
Fax: 375 0243

Mararungsari Sompop
National Institute of Development Administration
Bangkapi, Bangkok 10240
Thailand
Tel: 66 2 377 7400-10, 377 9669-9
Fax: 375 0243

Pongsapich Amara
Director, Social Research Institute
Chulaongkorn Univeristy
4th Flr, Institute Building 2
Soi Chulalongkorn 2
Phythai Road, Bangkok
Thailand
Tel: 279 5208

Theeravit Khien
Professor/Advisor
Institute of Asian Studies, Faculty of Political Science
Chulalongkorn University
Bangkok 10330
Thailand
Tel: 251 9956/5199
Fax: 662 255 1124

Sripaipan Chatri
Director
Science and Technology Development
Program/Thailand Development Research Institute Foundation
Rajapak Bldg, 163 Asoke Rd
Bangkok 10110, Thailand
Tel: 258 9012/17
Fax: 662 258 9046

Tiralap Anupap
Research Fellow
Science & Technology Development Program

Thailand Development Research Institute Foundation
Rajapak Bldg, 163 Asoke Rd
Bangkok 10110, Thailand
Tel: 258 9012/17
Fax: 662 258 9046
Tlx: 20666 Rajapak TH

Dr Jingjai Hanchanlash
Coordinator
VISED : Vietnam Sustainable Economic Development
6th Floor, DTEC Building
962 Krung Kasem road
Bangkok 10100
Thailand
Tel: 662-281-4254
Fax: 662-281-8777

Kaosa-Ard Mingsarn
Research Fellow
Science & Technology Development Program
Thailand Development Research Institute Foundation
Rajapak Bldg, 163 Asoke Rd
Bangkok 10110, Thailand
Tel: 258 9012/17
Fax: 662 258 9046
Tlx: 20666 Rajapak TH

Mr Mechai Viravaidya
Secretary-General
Population and Community Development Association (PDA)
8 Sukhumvit 12
Bangkok 10110
Thailand
Tel: 2560080-97
Fax: 2558804
Tlx: 82603 PDA TH

Mr Kitisak Sinthuvanich
Director
National Economic and Social Development Board (NESDB)
962 Krung Kasem Road
Bangkok 10100
Thailand
Tel: 662-2805990
Fax: 662-2801420
Tlx: 72391 ESB Th

Dr Somrudee Nicro
Thailand Environment Institute
210 Sukhumvit 64, Bangchak Refinery Bldg 4
Prakanong, Bangkok 10260
Thailand
Tel: (662) 331-0047
Fax: (662) 332-4873

CUSO
17 Paholyothin Golf Village
Paholyothin Road, Bangkhen
Bangkok 10900
Tel: (662) 5135347

Khun Witoon, Director
Project for Ecological Recovery
77 / 3 Soi Nomchit, Nares Rd. Bangrak
Bangkok 10500
Tel /Fax: (662) 2361462

Ms Daruna Somboonkun
Assoc Director
Library
Asian Institute of Technology (AIT)
GPO Box 2754, Bangkok 10501
Thailand
Tel: 662-5160110-29 / 5610130-44
Tlx: (086) 84276 AIT
Fax: (662) 5162126

Mr Wanchai Sirirattna
Director-General
Dept of Technical & Economic Cooperation (DTEC)
962 Krung Kasem Road, Bangkok 10100
Thailand
Tel: 2800980-4
Fax: 662-2801248

Dr Samarn Paichapong
International Board for Soil Research and Management
P O Box 9-109
Bangken, Bangkok 10900
Thailand
Tel: (662) 5797590 / 5794012 / 5797753
Fax: (662) 5611230

Ms Delia E Torrijos
Regional Adviser
UNESCO, Principal Regional Office for Asia and the Pacific
24/1 Sukhumvit Soi 59, Bangkok 10110
Thailand
Tel: 390-2564
Tlx: 20591 TH ROEAP
Fax: 662-3910866

Mrs Piboonsin Watanapongse
Director
Main Library
Kasetsart University
Bangkhen
Bangkok 10900
Thailand
Tel: 662-5790113 / 5702539
Fax: 662-5798781
Tlx: 21957 RECOFTC TH

Mr Suvit Vubulsresth
Director
Remote Sensing Division
National Research Council (NRC) of Thailand
196 Phahonyothin Road
Bangken, Bangkok 9
Thailand
Tel: 5791121-30
Tlx: 82213 NRCTRSD
National Research Council

Mrs Pranom Panya-ngam
Director
National Library of Thailand
Thavasukri
Samsen Road
Bangkok 10300
Tel: 2810263 / 2815999
Tlx: 84189 DEPFAR TH
Fax: 2821864

Mr H Arthur Vespry
Consultant : Library/Information Services
130 Soi Phra Nang, Rajvithi Road Soi 4
Bangkok 10400
Thailand
Tel: 662-2463434
Fax: 662-245-3991
E-mail: AVESPRY@attmail.com

Dr Ruben C Umaly
Director
SEAMEO Secretariat
920 Sukhumvit Road
Bangkok 10110
Thailand
Tel: 391-0144
Tlx: 22683 SEAMES TH
Fax: (662) 3812587

Dr Tan Chongsuphajaisiddhi
Dean
Faculty of Tropical Medicine
Southeast Asian Ministers of Education Secretariat
(SEAMES), SEAMEO
Darakarn Building, 4th Floor
920 Sukhumvit Road
Bangkok 10110
Thailand
Tel: 391-0144
Tlx: 22683 SEAMES TH
Fax: (662) 3812587

Pongsvas Svasti
Deputy Director

Thammasat University
Prachan Rd
Bangkok 10200
Tel: 223-4165

Dr Wattana Suksami
Dean, Faculty of Humanities
Chiangmai University
Chiangmai 50002
Thailand
Tel: 221699 Ext 3209
Tlx: 43553 UNICHIM TH
Fax: 6653-221595

VIETNAM

HANOI

Le Quy An
Vice-Minister
Ministry of Science, Technology and Environment
39 Tran Hung Dao
Hanoi
Vietnam
Tel: 263 387
Fax: 412287 UKKN VT

Prof Dr Bach Hung Khang
Director
Institute of Information Technology
Nghia Do, Tu Liem
Hanoi
Vietnam
Email: hanoi@coombs.anu.edu.au
Tel: 844-345405 / 844-344697
Fax: 844-345217

Eng. Tran Ba Thai
Networking and Technical Support
Institute of Informaiton Technology
Nghia Do, Tu Liem
Hanoi
Vietnam
Email: hanoi@coombs.anu.edu.au
Tel: 844-344697 / 844-345405
Fax: 844-345217

Le Dang Doanh
Vice President
Central Institute for Economic Management
(Now under State Planning Committee)
68 Phan Dinh Phung
Hanoi, Vietnam
Tel: 8442-58261 4497
Fax: 8442 56795

Vo Quy
Director/Dean, Faculty of Biology
Centre for Natural Resources Management and Environmental Studies
University of Hanoi
19 Le Thanh Tong Street
Hanoi
Vietnam
Tel: 53506/62932/63625(H)
Tlx: 4556 TNMT VT

Hoang Thi Lich
Vice Director
Centre for Women's Studies
6 Dinh Cong Trang Street

Hanoi
Vietnam
Tel: 63088/62921(H)

Prof Vu Tuan Anh
Director
Institute of Economics
National Center for Social Sciences of Vietnam
27 Tran Xuan Soan
Hanoi, Vietnam
Tel: 261632,33
Fax: 84 42 61632

Luu Bich Ho
Economist/Deputy Director
State Planning Committee
Institute for Long-term & Regional Planning
2 Hoang Van Thu
Hanoi, Vietnam
Fax: 84 42 52209

Dr Nguyen Thanh Ha
MA Research Fellow
Institute of Science Management
P O Box 610 Boho
Hanoi
Vietnam
26 Ly Thuong Kiet, Hanoi, Vietnam
Tel: 84 42 64162
Fax: 84 42 59786

Dr Vu Cao Dam
Director
Institute of Science Management
P O Box 610 Boho
Hanoi
Vietnam
26 Ly Thuong Kiet, Hanoi, Vietnam
Tel: 844 2642 85/2641 62/2651 01(H)
Fax: 844 26 41 60

Nguyen Ngoc Tran
Director
Vietnamese Mekong Delta Development Research Institute
39 Tran Hung Dao
Hanoi
Vietnam
Tel: 84 8 4252970 299381 fax HCM
84 4 257354 259211 fax Hanoi

Nguyen Thi Than
Chairwoman
Committee on Social Affairs
National Assembly
35 Ngo Quyen
Hanoi
Tel: 8442 65366

Fax: 8442 53763

Pham Ngoc Phong
General Director
State Bank of Vietnam, Institute for Bank Science
Chua Boc Street
Hanoi
Vietnam
Tel: 2 21487

Prof Vo Dinh Hao
Director
Financial Science Institute
Ministry of Finance
Hanoi
Vietnam
Fax: 8442-62266

Mr Nguyen Van Yeu
Vice-Chairman, The Law Committee
The National Assembly
35 Ngo Quyen
Hanoi
Vietnam
Tel: 258261
Fax: 253763

Vu Dinh Bach
Rector
National Economics University Hanoi
Giai Phong Road
Hai Ba Trung District
Hanoi
Vietnam
Tel: 2 63299/62106(H)

Nguyen Van Phuc
Vice Director
State Planning Committee
International Cooperation Department
2 Hoang Van Thu Street
Hanoi
Vietnam
Tel: 2 58241(4402)
Fax: 84 42 32494

Nguyen Van Hung
Program Director
Department of Foreign Affairs
Vietnam Union of Science and Technology Associations
53 Nguyen Du Street
Hanoi
Vietnam
Tel: 2 62911
Fax: 84 42 43466/59786

Nguyen Van Khanh
Director
National Centre for Science and Technology
Information and Documentation (NACESTID)
24 Ly Thuong Kiet
Hanoi, Vietnam
Tel: 8442-63123
Fax: 8442-8442-63127
Tlx: 412287 UKKN VT

Mr Thach Can
Assistant Director
Department for International Relation
Ministry of Science, Technology and Environment
39 Tran Hung Dao
Hanoi
Vietnam
Tel: 8442-63388
Tlx: 412287 UJN VT
Fax: 8442-59786

Center for Environment Research Education and Development (CERED)
Dr Nguyen Huu Ninh, Director
A01, K40 Giang Vo
Hanoi, Vietnam
Fax/Tel: (844) 345213

Dr Trinh Duy Luan,
Institute of Sociology, Dept of Urban Sociology
27 Tran Xuan Soan St.
Hanoi, Vietnam
Fax : (8442) 59071

Dr Tran Thi Van Anh
Centre for Women's Studies
27 Tran Xuan Soan St.
Hanoi, Vietnam
Fax : (8442) 59071

Prof Phan Dinh Dieu
Chairman, Programme Committee
Informatics Week 1994
36C Ly Nam De
Hanoi, Vietnam

Dr Nguyen Quy Son
General Secretary
VAIP
36C Ly Nam De
Hanoi , Vietnam
Tel: 8442-54219
Fax: 8442-56849

Hoang Nguyen
VAIP
36C Ly Nam De
Hanoi , Vietnam

Tel: 8442-54219
Fax: 8442-56849

Pham Xuan Nam
Vice President
National Centre for Social Sciences of Vietnam (NCSS)
36 Hang Chuoi St
Hanoi - SRV
Tel: 259059 / 259068
Fax: 84-259071

Dr Dinh Quy Xuan
Director
Information Centre
State Planning Committee
2 Hoang Van Thu
Hanoi
Vietnam
Fax: 8442-32494
Tel: 58261-3174

Dr Pham Van Cu
Geomorphologist
General Secretary
Remote Sensing Association of Vietnam (RSA)
39 Tran Hung Dao
Hanoi
Vietnam
Tel: 265542
Fax: 8442-56446

Prof Nguyen Trong Yem
Director
Institute of Geological Sciences
NCSR Vietnam
Forest Inventory and Planning Institute (FIPI)
Ministry of Forestry
P O Box 603 Hanoi
Tel: 2.44629 / 2.44160 / 2.43068
Tlx: 411525 NCSR-VT
Fax: 8442-52483

Nguyen Huy Chuong
Deputy Director
International Relations Department
The office of the Government
Hanoi
Vietnam
Tel: 8442-35478 , 35479 , 58241 Ext 4952
Fax: 8442-52682

HO CHI MINH CITY

Dr Nguyen Trong
President
HCMAIP
79 Truong Dinh, Q1
Ho Chi Minh City
Vietnam

Vo Tong Xuan
Professor of Agronomy/Vice Rector
University of Cantho
Haugiang, Vietnam
HCM City 91244
Tel: 35428/20237

Ho Chi Minh Liaison Office
3 Cong Truong Quoc Te
Ho Chi Minh City, Vietnam

Dr Tran Van Chau
Director
Center for Scientific and Technological Information (CESTI)
79 Truong Dinh St
Dist 1, Ho Chi Minh City
Vietnam
Tel: 84-8-297629 - 231711
Fax: 84-8-291957

Dr Nguyen Huu Thien
Director
General Dept for Standardization Metrology and Quality Control - Centre III
Ho Chi Minh City
Vietnam

Prof Dr Hoang Anh Tuan
Chairman
Committee for Science and Technology of Ho Chi Minh City
244 Dien Bien Phu Q.3, Ho Chi Minh City
Vietnam
Tel: 90888

Mr Tran Minh Chi
Deputy Director
Head, Division for Water Quality Monitoring and Pollution Control
56 Truong Quoc Dung
Phu Nhuan
Ho Chi Minh City
Vietnam
Tel: 446262 / 441145
Fax: 84-8-225011

Dr P T S Ton Si Kinh
Director
Institute of Economic Research
175 Hai Ba Trung Street
District 3, Ho Chi Minh City

Vietnam

APPENDIX B -- WORKSHOP & INTERVIEW AGENDAS

STUDY TOUR 94 WORKSHOP AGENDA

- Welcomes / Introductions
- Presentation of IDRCs Asian Telecommunity program
- Introduction to Networking
 - Networking Concepts
 - Benefits of Networking
 - Examples of Networking, email use, etc
- How Networking Works
 - Network Architecture
 - Technical Requirements
 - Administration - billing, user admin etc
 - User Support
 - Online demonstration
- Questions

BREAK for lunch

- Network Capacity Building
 - Organisational Requirments
 - Case Studies
 - CRIES/Nicaroa - Nicaragua
 - IBASE/Altnet - Brasil
 - Africa Networking - GreenNet
 - APC/Pegasus - Australia
- Questions / open platform
- Schedule individual meetings

INTERVIEW AGENDA

- Identify the organisation's:
 - existing knowledge/activity in network service provision;
 - infrastructure capability to establish/support a network service;
 - management ability to sustain a network service;
 - based contacts with potential client organisations and broader community;
 - policy on non-discrimination in terms of gender, race, political conviction;
 - communication needs; AND
 - interest in the Asian Telecommunity program and commitment to it.

APPENDIX C -- WORKSHOP QUESTIONNAIRE

IDRC ASIA TELECOMMUNITY - PRE-PROJECT EVALUATION

REGIONAL WORKSHOP QUESTIONNAIRE

Contact:

Organisation:

Address:

Ph:

Fax:

Telex:

Email:

Technical resource person (if any):

Does your organisation use computers?

If yes, how many?

What are they used for? (eg: Database, spreadsheet, word processing...)

_____, _____, _____,
_____, _____, _____,

Do you have a technical resource person maintaining your computers (y/n)?

What percentage of your total staff can use computers?

Does your organisation use (y/n):

- Phone
- Fax
- Telex
- Electronic Mail
- Other

What is your average telephone bill (please include currency):

- Phone
- Fax
- Telex
- Electronic Mail
- Other

If you use electronic mail please complete the questions on the reverse side of this questionnaire.

NOTE: Prior to leaving the workshop please provide the consultants with this completed questionnaire, contact details and any further background information to your organisation and its activities.

APPENDIX D -- CORRESPONDENCE RECEIVED

Academic and Research Networks in the Asia and Pacific Region: Overview of a Framework for Development.

by J. Sequeira
Programme Specialist
UNESCO - Bangkok

Scope of Paper

The following paper outlines the views of the author regarding the current situation and future developments of academic and research networks in the Asia-Pacific Region. Issues concerning the prospects of information, networking applications and related environments are underlined. A possible structure for the development to tackle these concerns in a regional framework is also introduced.

Introduction

New technologies that reinforce the ability to create, understand and disseminate information have always provoked important changes in all disciplines. In recent years academic and research networking has become a major international activity. Its goal is to establish effective communication channels, which will bring closer together individuals working in academic, educational and research institutions around the world.

We now have distributed, geographically spread networks, linking a wide variety of devices from the simple desk-top/ portable machine to very powerful computers. And these are all becoming less expensive, thus more accessible in each successive generation that emerges. We are witness of a fantastic breakthrough: the era of information accessible to all.

In developed societies, this has represented a major change in the environment of information. Even in developing countries, the day will come when telecom companies will make more profit by carrying data from chip to chip rather than carrying voice from telephone to telephone. But by that time they will have lost their current supremacy in telecommunications. Networks owned and developed by universities, banks and governments will provide better and more reliable services for carrying information across the world.

Current situation

Such widespread development and utilisation have created new socio-economic phenomena such as the information glut, with too much diversity and a relative reliability of the information (substance and update).

The basic feature of this frantic growth is the possibility of innovation provided by these networks. They were primarily evolved to serve the needs of others. The philosophy behind all this is the co-operative effort in networking developments, a concept increasingly shared by all participants - private carriers, universities, governments - at both national and international levels.

Perspectives of Asian countries

When we look at the Asian situation, we find a complex feature. The rapid and sustained economic growth of certain Asian economies contrasts with others, where poverty levels and illiterate figures rate amongst the highest in the world. Given the wide diversity of the region - culturally, geographically, historically - information structure, storage and exchange are far from being standardised, thus making it difficult to access.

We should therefore propose a regional framework for academic and research information

standardisation and exchange. The disparities of the region, on-going developments in this field, and the achievements of certain countries constitute the initial situation. At the same time, progress accomplished in other regions can prove very valuable in assessing Asia-Pacific needs and future strategies, particularly in the less favoured countries. In this regard, it is interesting to note that, although certain countries (e.g. Japan, Singapore, Australia...) have reached an excellent, internationally recognised level in this field, wide disparities appear when we observe other countries.

For the purposes of the study, we would consider dividing the region into three levels of interest:

- (a) countries with few or no developments in this field
- (b) countries where certain progress is being made
- (c) countries with a high level of development.

It goes without saying that these three levels correspond closely to the socio-economic situation of the countries concerned. Thus, given the rapid expansion of certain countries, this division is likely to evolve.

Regarding the FIRST level, it is important to mention the key role that international organisations can play and their scope for action as privileged partners to study, plan and co-ordinate on-going and future efforts; as federators to integrate these developments in a national development strategy; as interlocutors for the insertion of the country in a sub-regional or regional strategy; as reliable partners to channel resources from public and private donor agencies as well as expertise and know-how from outside the country.

The countries in the SECOND level present some degree of development. Basically they have some national links between universities but ignore other educational entities such as government institutions. This type of link concerns mainly electronic mail facilities. Three principal shortcomings can be observed: the lack of an overall policy of information standardisation and exchange with a view to obtaining national network coverage; the exclusion of certain entities; and the lack of an expansion policy aimed at reaching some kind of regional or sub-regional coverage. Furthermore, the few external channels of communication existing in certain countries are orientated more to networks outside the region, thus neglecting communication and information from neighbouring countries. Two main tasks should be considered: harmonising current developments in a practical structure and facilitating the insertion of the country in a regional context.

At the THIRD level of study, we may observe countries where excellent national coverage has been achieved as well as a certain degree of sub-regional coverage. However, these countries tend to privilege their external links with distant networks thus again neglecting the potential benefits of regional information exchange. Nowadays, this trend seems to diminish more in favour of networking to other Asian countries, but remains however a fact of today.

One of the main tasks is to help bridge the gap between this level and the other two, by channelling the necessary expertise and know-how to the lower levels. By proposing a regional approach, global efforts would be co-ordinated within a common framework of development both nationally and regionally.

Overview of potentialities and side benefits

- The uses of this technology to facilitate learning: interactivity between educational scientists, teachers, students...
- The ability to provide the user with multiple possibilities to access/extract the required information
- The possibility of accessing information that can be presented from many different perspectives
- The concept of a regional library: resources now beyond individual means will be potentially accessible by anyone
- The concept of the regional electronic encyclopaedia accessible to all kinds of users
- The concept of added-value information: users will become progressively responsible for the data provided.

In a first stage, countries would be helped to exchange/distribute their available information with/to other countries both inside and outside the region. The growing possibilities of communication, added to the rapid evolution in technology will increase the added value of this information, thus setting the basis for a real information market, totally managed and administered by the owner institutions. Thus, the economic aspects for setting up a regional configuration are not negligible.

- The link between local industry and academic sectors (universities, research institutes).

Information glut and development

The proliferation of networking initiatives in the Asian region -- many of them uncoordinated -- linked to the increasing volumes of information, has provoked the phenomenon of information glut. Information is available but there is too much of it and it has not been verified and filtered; nor is it always very reliable in terms of relevance and usefulness.

This has caused situations whereby already scarce resources in developing countries have been invested (human resources, training...) in erroneous, incomplete or out-of-date technical schemes, resulting in:

- poor quality and content of information
- out-of-date scientific information
- incomplete technical issues
- biased selection of scientific, technical and economic options

This phenomenon of information glut is not unique to Asian countries, but affects negatively much more developing countries who do not have the means to correct rapidly errors or to follow the pace of technology. In this case, we can even speak of an increasing technological gap because of this situation.

One possibility to be envisaged is the creation of a "backbone" of excellence centres or clearinghouses which would assist users in accessing the information they require. It could also filter and repack and disseminate information for users in the region. These centres would more than the traditional network operation centres (NOCs). Their role would be to provide the necessary expertise so that all technical and scientific information channelled through them would possess a minimum degree of usefulness and reliability.

The figure on the next page illustrates this option. Distance learning and library services are among the main software/computer applications which could be provided through these clearinghouses, in order to attract to these focal points users and carriers, public or private, national or regional.

Conclusion

In the above pages, a synoptic summary of a regional framework has been presented. Much remains to be done in networking developments in Asian countries. Perhaps more important than switchboards, protocols, applications and academia, it is to convince administrators and policy-makers that these technical developments are essential in their national strategies for development.

Indonesia Network Recommendation

(prepared by Onno W Purbo <YC1DAV@itbgtw.itb.ac.id> 10 May 1994)

RECOMMENDATIONS

Indonesia Network Recommendation

(prepared by Onno W Purbo <YC1DAV@itbgtw.itb.ac.id> 10 May 1994)

Human resource development for building the network

- Human resource is the most critical issue in building the network. Many people in Indonesia aware / talk about the importance of a computer network, however, when it comes to operate / install the actual network - we can count the number of persons who capable to actually do it correctly. This has been the major burden for us (the network activists) in building our network.

- Unfortunately, currently, there is no significant commitment from higher level government to perform these tasks.

- We can divide the human resource development into several levels of expertise:

+ Operators / maintainers of the network. This requires an in-country program / workshop / hands-on approximately 1-2 weeks period. The required number of operators / maintainers for the network is quite large, considering the possible number of universities, NGO, research institutions which would join the network. We would say an approximate number of 200-300 persons across the country (spread across 27 provinces) would be required.

+ Another crucial issue related to the assemble such a large number of human resources requires a heavy collaboration among various institutions involved. To initiate such level of collaboration, organizing several national seminars / conferences would be required.

+ Highly skilled technicians with Bachelor back-ground. We would like to proposed an overseas internship program in the overseas research institutions / industries. Such program will help us to sustain the network development at the current speed or even at higher speed. We already have contact person at Bell-Northern Research (BNR) who will likely to help us in establishing such program. Her name & address is:

Silvana Wasitova
Member of Scientific Staff
Information Technology Division
Bell Northern Research Ltd.
P.O.Box 3511, Station C
Ottawa, Ontario
CANADA K1Y 4H7
Tel: [613] 765-4684
FAX: [613] 763-2626
E-mail: silvana@bnr.ca

The internship will be approximately 2-3 months at BNR (or other Canadian industries / universities). The number of highly skilled technicians would be approximately 20 persons spread among IPTEK-NET, Institute of Technology Bandung ITB, University of Indonesia UI, The Indonesian Institute of Sciences, Institute of Technology National ITENAS, Institute of Technology Surabarsons spread among University of Indonesia UI and Institute of Technology Bandung ITB.

Information System / Network for Eastern Indonesia Development

- Eastern Indonesia development program would be a significant issue in the Indonesia devare / limited in the Eastern provinces. Thus, in addition to a major man-power development for the eastern Indonesia, some helps to put strategic information / telecommunication infra-structure would be required to speed-up the development.

- There are quite a number of activities including the NGO's in helping build the Eastern Indonesia. One of the main program is the CIDA funded Eastern University Development program, organized by:

Dr. Chriss Dagg
Project Director
Eastern University Development Project
Simon Fraser University (SFU)
Burnaby, British Columbia
CANADA V5A 1S6
Tel: [604] 291-3949
FAX: [604] 291-4967

Strategic Issues to help the NGOs in Indonesia for international collaborations

- In addition to the proposed human resource development as proposed in the first item, the NGO in Indonesia requires more access to overseas network to establish an international collaboration. There are several alternatives, such as:

+ Expanding the current IPTEK-NET services to Non- Government Organization (NGO)s which can be categorized as non-commercial entities. However, this requires some adjutment with the current term of reference of IPTEK- NET which seems to be focused on educational and research institutions.

+ Collaboration with the oldest network provider in Indonesia, PUSILKOM-UI with its well known indogtw.csc.ui.ac.id as the major international gateway.

+ Establishing NGO's own international gateway using the \$25/hour SprintNet Packet Switching Network.

Some of the major plans in the Indonesian Computer Network

These plans can be categorized as:

- Up-grade of the technological aspects of the phyiscal layer packet radio network.

- Up-grade of the application layer of the network.

Some of the plan related to the technological aspects are:

- Up-grading our regional packet radio network into 9600bps. This should be done in 1994.

- Up-grading our regional packet radio network into 56-64Kbps, this should be done in 1995-1996.

PROPOSAL FOR JOINING ELECTRONIC NETWORKING IN ASIA

Prepared by Jiangsu Provincial Academy of Social Sciences
No. 12 North Hu Ju Road, Nanjing
People's Republic of China

A. Elemental Needs

“Sustainable Economic Development Research Group (S China)” is a social science project dealing with economic development problem. As so far, this project is the largest scale that IDRC granted in social sciences in China. The project participators are 22 economic institutes coming from 10 provinces and 2 cities in south China. 50 sub-projects have been approved and about 30 sub-projects will be approved in this year. The project is going to be undertaking for 5 years (1993-1997).

Our elemental need to join the network are two aspects: one is project coordination and management need, such as international communication with Singapore, Vancouver, Hong Kong, Malaysia and domestic communication with academies in 10 provinces and 2 cities. The present communication approaches are post, telephone, cable facsimile. The monthly average times of the international communication is 5 (the top times is 10) and domestic communication is 8. The project management for the 80 sub-projects deal with computer Database, funds and documents. Another is research needs, such as the collection of information, literature and data. We are very interesting in joining the “Electronic Networking in Asia”. We hope that it will be set up early and we can join it as a User or Message Transfer.

B. Present Conditions

The coordination office of the project has two computers, one is 386sx PC, another is PC-AT. One coordinator assistant duty on the computer operation and can keep them in order. There is a DDD phone to contact the 11 provinces and cities in South China. There is a IDD phone in the coordination office and another one will be set up this year. In other hands, 11 provinces and cities have been supplied with a 386 DX/40 Pc computer equipment granted by IDRC. 22 researchers have been trained from May 5 to 18 for computer operations and econometrics. Prof Kenneth J. White from UBC of Canada was invited by IDRC to give the lectures to them. Therefore, the academics of Jiangsu province and other 11 provinces and cities (i.e. Zhejiang, Anhui, Jiangxi, Hubei, Hunan, Guangxi, Sichuan, Yunnan, Ghizhou, Wuhan, Chongqing) have the condition to join in the electronic network.

C. Preliminary Plan

We plan to join in the electronic network in two stages. Firstly, the coordination office of the project connect with the “Electronic Network in Asia”; secondly, the coordination office will be linked with other provincial and city academies.

There are two ways for us to take part in the “Electronic Network in Asia”:

a. If it is proper, the coordination office directly connects, through a IDD line, with one of the IDRC's computers. In this case, the fixed expenditure, about \$200 USD, will be least because only a modem and a communication software must be purchased.

b. The coordination office is going to be linked with “Electronic Network in Asia” through joining E-mail network built recently by Jiangsu Provincial Post and Telecommunication Bureau. As we know, the elementary fee is 6280 Yuan RMB, equal to \$1000 CAD, hire fee is 2040 Yuan RMB, equal to \$320 CAD, for one year.

Here is the budget:

Item	a	b	explanation
------	---	---	-------------

fixed expenditure	200	1200	
elementary		1000	
equipment	120	120	
software	80	80	
hire fee		960	320CAD/year for 3 years
communication	5820	5820	1940CAD/ year for 3 years
			IDD:840CAD/Y+DDD:1100CAD/Y
train fee	2000	2000	a trip to the Asia W/shop
Total	\$8020 CAD	\$9980 CAD	

Note: The exchange rate is 100 C\$= 629.87 Yuan RMB on 20 May 1994. The budget is only for coordination office.

Building an Information Highway for China's Environmental Protection

Prepared by China Environment News
15A Xiaoxinglongjie Chongwen District
Beijing 100062
People's Republic of China
Fax: 861 701 3772

Foreword:

We are now in the age of information, when the information industry has been regarded as the fourth industrial revolution. Information is playing an increasingly important role not only in economic activities, but also in every aspect of people's life.

China is the most populous country in the world, and one of the biggest countries as well as one of the fastest growing economies in the world. Naturally, China's environmental problems may also be the concerns of the international community. The Chinese government has been attached great importance to environmental protection. It began to establish environmental protection departments at various governmental levels in 1973. In 1978 China designated environmental protection as the State's basic policy. In 1984 the Chinese government established the world's only State-level newspaper on environmental protection - China Environment News.

However, as public affair, environmental protection requires not only the government's attention and concern by the society, but also a big amount of human, financial and material resources and high technologies. Building an "information highway" by the end of the century has become a world-wide development challenge. As a developing country, China at present does not have enough comprehensive national power to immediately build a state-level, multi-purpose comprehensive "information highway". For some priority industries, however, it is necessary to build a relatively independent specialized "information highway" in order to keep abreast with social and economic development as well as the international development trend. Therefore, China Environment News wishes to receive generous support from the international community and build an "Information Highway of China's Environmental Protection".

A. Background of China Environment News

China Environment News was established in January 1984 sponsored by the Environmental Protection Commission under the State Council. At present it publishes Chinese and English editions of Environment News, Environmental Work Bulletin, Green Leaves (literary magazine) and Yearbook of China Environment.

Since its establishment, China Environment News has been making active efforts in publicizing environmental protection, promoting the national environmental awareness through the introduction of the latest events of environmental protection all over the world to China, and China's environmental protection cause to the rest of the world. In 1986 it received silver medal from the United Nations and in 1988 it was awarded the Global 500 laureate by the United Nations Environment Program.

The Chinese Government has invested about 40 million yuan (US\$ 5 million) in the newspaper over the past 10 years. Beginning in 1991 it adopted the laser type photo setting in place of typographic printing. In 1993 its editorial departments began to use computers. Now there are 25 terminals in the editorial departments.

CEN has four issues a week (Tuesday, Thursday, Saturday and Sunday), with a circulation of 430,000. Its main readership are large- and medium size enterprises (65%), governmental departments at various levels (12%), scientific institutes (5%), schools and others (18%). It has 210 editors and reporters, 70 of whom are in Beijing and 140 in local bureaus. There are 73 local correspondent bureaus stationed in:

Heilongjiang Province, Harbin, Jilin Province, Changchun, Huichun, Liaoning Province, Shenyang, Dalian, Siping, Fuxin, Luoyang, Shandong Province, Jinan, Qingdao, Zibo, Weifang, Weihai, Tai'an, Shanxi Province, Taiyuan, Datong, Inner Mongolia Autonomous Region, Hohhot, Baotou, Ningxia Autonomous Region, Yingchuan, Gansu Province, Lanzhou, Xinjiang Uygur Autonomous Region, Urumqi, Hunan Province, Changsha, Huaihua, Hubei Province, Wuhan, Guangdong Province, Guangzhou, Shenzhen, Zhuhai, Guangxi Zhuang Autonomous Region, Nanning, Jiangsu Province, Nanjing, Suzhou, Wuxi, Xuzhou, Zhejiang Province, Hangzhou, Ningbo, Fujian Province, Fuzhou, Xiamen, Jiangxi Province, Nanchang, Shaanxi Province, Xi'an, Sichuan Province, Chengdu, Chongqing, Yunnan Province, Kunming, Guizhou Province, Tibet Autonomous Region, Tianjin and Shanghai.

At present, means of communication between local correspondents and the newsroom in Beijing is very poor. Stories are written by hand, and articles and photos are delivered mainly by mail, or telephone or fax in some advanced localities, which seriously affects timeliness of stories. Therefore, it is necessary to build a professional "information highway" if this condition is to be changed.

B. Tentative idea about information highway project

1. Guiding principle: Building a specialized information highway is aimed at modernizing means of communication in environmental protection profession, environmental news, and utilization of environmental information.

Exchange of specialized environmental protection information is an important means in the cause of environmental protection. Domestically, it is not only the exchange of experience, but also the exchange of scientific and technological information. Internally, it is an effective way by which foreign countries can learn about China, and the environmental protection departments in China learn about foreign countries. Computerization of environmental information communication has long been a dream for the Chinese environmental protection sector.

2. Function: main functions of the information highway are, computerization of news writing and editing, collection of environmental policies, laws and regulations, documents, science and technology information, store of historical data, opening of information network and exchange of information.

By computerization of news writing and editing, the network will enable correspondents to write stories and send them to the headquarters in Beijing through computer, and edited and typeset by editors and sent to the printing house through computer. In addition, 15% of the network's terminals can send photos directly for typesetting.

Processing data requires that the network have a big capacity so as to be able to store various kinds of public environmental information about China and the world, as well as make the information consultable, that is, it is easy for clients to operate when seeking information, but also relatively confidential to non-clients.

3. Brief design: Set up a network center in Beijing, equipped mainly with a small computer system, a telephone communication system, a radiophoto system, an alternate power system, and a picture processing system.

The center is to be linked to clients through DDD telephone network.

Every client is equipped with a 386 terminal with a hardware disk, a 24 point printer, and rents a DDD telephone line.

Main technical requirements are, the central station is able to simultaneously disseminate information to clients, and multi-clients (no fewer than eight clients) can simultaneously send information to or seek information from the central station through computer.

C. Feasibility

1. Policy Feasibility. Information industry is a newly emerged industry the Chinese government has given great support over the past few years. AS far as we know, there have been several nationwide computer networks in China, and they are developing rapidly. As the aim of the reforms and opening to the outside world during the last 15 years is to let China learn about the world and the world about China, and the environmental protection is one of the basic national policies, it is feasible in policy to establish an information highway.

2. Advantages of the sponsor. China Environment News is the country's only information network in environmental protection which covers all parts of China, and the only State level newspaper specialized in environmental protection, and has close contact with about 100 environmental newspapers in China and international organizations.

3. Technical problems. China Environment News Inc. under China Environment News is a comprehensive economic body which provides financial support to the newspaper. Its Benjamin Electronics Company is a high-tech company specializing in computer development. Although at present the company is unable to accomplish the proposed project alone, it can exercise supervision on this project, as well as the maintenance, renovation of the equipment after the network is set up.

4. Sources of information. Sources of information mainly come from: news from China Environment News; information from news agencies in China and abroad, news from about 100 environmental newspapers in China; data from China Environmental Monitoring Information Network and National Environmental Protection Information Network (sponsored by CEN); and specialized information from international institutions and publications.

D. Project budget

1. The central station needs 500 square meters of computer room and management rooms, with a total investment of 8,000 Renminbi yuan x 500 square meters = 4 million yuan; (&)
2. computer rooms of 85 working terminals, each no smaller than 12 square meters;
- 3.110 air conditioners x 6,500 yuan = 725,000;
4. Renting 10 telephone lines for the central station costs a total of 100,000 yuan (not including annual rent);
5. Rent for 73 telephone lines of terminal stations is 500,000 yuan (not including annual rent); (&)
6. The central station's uses DEC 7000 computer system, which costs 3 million yuan at China's market;
7. Software: system's software, advanced checking software, long-distance communication software, about 3.2 million yuan;
8. 120 terminal machines and communication facilities cost about 2.4 million yuan. Type of machine is ASTB386 or DEC386;
9. 30 ABC, AST386 portable computers, about 450,000;
10. 80 24-point printers, about 520,000 yuan, 4 portable scanners, about 60,000 yuan, a large-screen scanner, about 170,000 yuan. The total cost is about 730,000 yuan;
11. Other subsistent facilities, about 150,000 yuan;
12. Cost of engineering is 3.66 million yuan.

This investment of this project is estimated to be about 21.975 million yuan, or US \$2.6 million. The items marked with '&' mark will be invested by China Environment News, which cost about 7.65 million yuan. The other 14.605 million yuan (US \$1.65 million) is to be funded by international sources.

We plan to build the information highway project in three phases. The feasibility study outlined above is the first phase, whose general aim is to build the first-grade network in China; the second phase is to connect the network with international network; and the third phase is to connect the network with the specialized networks of the governmental departments, and finally build a second-grade specialized network at various levels including the county level.

China Environment News.

STATE PLANNING COMMITTEE

PROJECT PROPOSAL

TECHNICAL ASSISTANCE TO THE ESTABLISHMENT OF

SOCIO-ECONOMIC INFORMATION SYSTEM FOR ECONOMIC PLANNING AND MANAGEMENT IN VIETNAM

Prepared by the State Planning Committee
Information Centre
2 Hoang Van Thu
Hanoi, Vietnam
Tel: 84 42 258261
Fax: 84 42 32494

I. PROJECT OBJECTIVE

The general and long-term objective of the "Establishment of socio-economic information system" project aims at assisting Vietnam to achieve stable and systematic results in its process of transition from a centrally planned economy into a market-orientated economy. The project will concentrate on establishment, perfection and modernisation of information system within the State Planning Committee (SPC), a key Government agency, responsible of formulating socio-economic development strategy, master plans as well as five-year and annual plans; at the same time the project will help undertake economic forecasts thus serving timely and with high quality activities of the SPC and the entire planning sector currently being under renovation.

Immediate Objectives:

- To upgrade capabilities of SPC in collecting, processing information for economic analysis and forecasts by means of technology transfer and training a professional staff and equipping planners with general necessary knowledge as well.
- To renovate and readjust the existing information system; to improve the process of formulating plan and monitoring its implementation correspondingly to new planning and management mechanism; to reorganise information flows in and out of SPC; to elaborate a mechanism of collecting information and regulations of information management at various levels.
- To strengthen the SPC with technical equipment and installation and information processing software; to increase its capabilities of performing economic calculation, analyses and forecasts. To establish a LAN that connects various departments within SPC with each other in a unified information bloc which will be connected step by step with various central agencies, localities in the whole country and in future easily integrated into international information networks thus enabling access to information sources necessary for strategy formulation, development planning, economic mechanism and policy elaboration, foreign assistance co-ordination and projects appraisal and bidding...

II. PROJECT DESCRIPTION

2.1 Actual situation and justification for the project

As a general economic agency of the Government, the SPC is a key institution responsible before the Government for strategy study, regimes and policies decision, socio-economic planning, allocation of resources in the country formulation of investment programmes, appraisal and bidding examination of projects etc. To play better its role as advisor for the Government in socio-economic development, the SPC has to process a great and diversified information volume. Along with the transition to market mechanism, the information demand becomes more diversified and its collecting and processing more complicated.

Unfortunately, although nearly established forty years ago, the planning sector has not so far an information system enough strong for meeting the demand required for its activities. The information relationship between the central and local levels are too weak. Right at the SPC, head office of the whole planning sector, there has not yet been a clear and systematic statute on collecting and processing information which considerably hinders decision makers from issuing timely and accurate policies. The

application of modern information technology and modelling techniques in economic analysis and forecast is merely in their initial separated steps which hampers the result and scope of economic planning and policy making. As a consequence, it is needed to soon establish an information system by information technology combined with adequately strong and systematic activities economic analysis and forecasting.

2.2. Content and activities of the Project

2.2.1. Upgrading the capabilities of the SPC

- To invite foreign experts to collaborate in studying the existing information system, suggesting measures to modernise it, transferring appropriate technologies; test and put in operation sub-systems and the entire system complying with the transition of economic planning and management mechanism.

- To organise training courses in fundamental knowledge of modern information technology, in methods of information processing and socio-economic development forecasting; at the same time, to send SPC staffs to do practice, survey, learn experiences on socio-economic information system establishment and economic development analysis and forecasting.

2.2.2. Renovating work process and organisation

- To study information process from its collection, storage, processing to disseminating within the planning sector, and to examine the relation of exchanging, providing information among agencies, line ministries and localities in the whole country.

On the basis of these studies, the demand on and possibilities of improvement as well as efficient measures would be suggested and determined.

- To generate administratively lawful statutes and regulations on collection and management of information in SPC and the planning sector.

- To design an information system by new technology including sub-systems as follow:

- * Sub-system on forecasts serving strategy and development planning formulation.
- * Sub-system on investment including PIP formulation, project appraisal, bidding examination.
- * Sub-system on external economic relations, including import-export activities, foreign assistance and other international relations.
- * Sub-system on finance, bank, price, including budget revenues and expenditure management, debt management.
- * Special sub-system of information, serving leadership etc.

2.2.3. Strengthening in technical facilities

- To complement with necessary facilities, soon generate and put a LAN in operation with SPC, and at the same time to concentrate on establishing databases of common use in the entire office.

- To connect step by step a network for data transmission with some important central agencies (such as the Office of Government, MOF, State Bank.....) and localities in the whole country.

- To train a professional staff capable of operating, exploiting and administering a newly created system.

2.3. Expected results

- A LAN will be generated, connecting various departments within SPC and linked with some important central agencies and localities, capable to be integrated into international information network.

- The information process and operation mechanism as well as its processing in SPC and the planning sector will be improved, appropriate to the process of planning renovation, economic management and modern information technology. An institution-aligation on information activities will be initially applied.

- A number of methods, models and advanced application softwares will be applied in processing information, performing economic analyse and forecasts. A number of large sized databases, of great demand and practical use will be applied in strategy study, economic structure and mechanism readjustment, investment programmes elaboration, project appraisal and biding examination....

- A professional contingent of staff will be trained, and planners in the entire sector will be equipped with fundamental knowledge enabling them to effectively master and to use modern technical facilities.

2.4 Budget

2.4.1. The total sum, estimated at USD 5 millions, will be distributed as follows:

- a) Foreign experts: (25 m/m) 500,000
- b) Conducting investigation, survey and technical design 750,000
- c) Acquisition of equipment and its installation, readjustment, system set-up 1,500,000
- d) Personnel training at home and abroad 500,000
- e) Development and transfer of software, collection of information for databases establishment 1,000,000
- f) Expenses in operation and maintenance of the system on the first two years 700,000
- g) Printing documents and other expenses 50,000

Total (not including contribution from Vietnam side) 5,000,000

2.4.2. For the 1st phase 1,500,000

2.5. Other Issues

This project is financed by IDRC for SPC to achieve its objective of effectively managing the Vietnam national economy under the transition from centrally planned economy into market mechanism, The Project will serve both domestic and foreign investors in the decision to invest in Vietnam.

The project has no negative influence on environment and inhabitants.

Draft Proposal for a NGO Server in Viet Nam

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Proposed jointly by:

- Mr. Tran Ba Thai
Head of Networking Dept,
Institute of Information Technology
Nghiado, Tuliem, Hanoi, Vietnam
Tel: +(84) 4 346907
Fax: +(84) 4 345217
Email: thai@hanoi.ac.vn

- Mr. Francois Fortier
Information Management Adviser,
World Food Program - Vietnam,
2B Vanphuc, Hanoi, Vietnam
Tel: +(84) 4 263896
Fax: +(84) 4 232072
Email: fortier@wfp.ac.vn

I. Description

The Institute of Information Technology of Viet Nam has recently inaugurated an academic network permitting electronic-mail addressing to and from the Internet. The Institute is soon to develop a TCP/IP link, thus permitting a full connection to the rest of the Internet.

In this context, it now becomes possible to establish a micro-telematic network specially servicing the Vietnamese and international non-governmental organizations community. Similarly to tens of other hosts now well established all over the world, a dedicated NGO server in Vietnam would have much to offer in addressing the specific communication and information needs of the NGO community. It would primarily include rapid and low-cost e-mail and information exchange in forums and databases with both Vietnamese and foreign sources.

It is thus proposed to establish a working group and formal division within the Institute for the independent development, operation and management of the NGO server (tentatively named NetNam).

II. Service

The network will be developing and expanding the following services:

A. TCP/IP-addressed electronic mail with frequent daily and eventually permanent connection with the Internet;

B. Forums:

1. news; open or under subscription rates, depending on the provider;
2. public discussion forums;
3. private discussion forums, on request from groups of users;

C. Databases

1. public access read only;
2. public access for both read and write (such as directories);
3. subscription-based private access, depending on the provider/manager of the database;

III. Support

NetNam will provide full support to users in the following ways:

- A. Installation of equipment and software at the user's facilities;
- B. Training of users on both electronic networking and on the use of telematic software;
- C. Provision and updating of manuals and on-line help menus in Vietnamese and English, and eventually in other languages, depending on demand and resources;
- D. Active promotion of the system among potential subscribers.

IV. Proposed Implementation

A. Feasibility Study - May and June 1994

A preliminary consultation among potential users and providers of information (news and databases) will be conducted, principally in Hanoi. This should permit to estimate the actual demand and needs for the different services eventually proposed under NetNam. Organization to be contacted are:

1. Vietnamese NGOs
2. International NGOs operating in Vietnam
3. Other potential users active in NGO-related work, such as consultants; journalists and press organizations; government offices; researchers, students and other private users.

B. System Design and Installation - June to August 1994

As described in the appended Varnet document, the Institute is already offering e-mail on a Waffle (off-line) interface. The Institute is also currently developing, and should soon put into service, a permanent IP link that will permit full Internet operation.

On the basis of the system already in place, the NetNam management group will need to add dedicated equipment and secure funding for operation costs. Appendix I provides details of both capital investment and expected operation costs.

NetNam operation costs should be covered for 12 months by the initial funding, starting one month prior to system launching. It is expected that subscription payments from users will cover operation costs from the second or third year on. Rates will be charged according to volume of transmission and time of connection. This seems reasonable considering that only 100 users with an average contribution of \$20 per month will suffice to cover the expected operation costs of \$24,000. If external funding is nevertheless necessary for the second year, requests will be made accordingly.

The following sept in system design and installation will be to adapt the Waffle system interface for the specific e-mail, forums and databases to be provided by NetNam.

C. Fund Raising - As soon as possible

Funds both for the capital investment and the first year of operation could be requested from various donors. The following organizations might be particularly interested:

1. IDRC and CIDA (Canada)
2. Cooperazione Italiana (Italy)
3. Other bilateral ODA sources (to be discussed)
4. Multilateral sources (particularly UNDP and UNESCO)
5. Existing networks that generally have little cash resources but that might be willing to contribute technical information and software, particularly networks members of the Association for Progressive Communications (APC) and Agora Telematica in Rome.

D. Network Promotion - One month prior to launching

From one month prior to system launching onward, active promotion and subscriber recruitment among potential users will be initiated.

E. Launching

Tentatively, NetNam services should be launched for public use as of September 1994.

The technical implementation of the network should present no major difficulties. Raising necessary funds, if only due to administrative delays with eventual donors, might however retard the process.

Appendix I: Capital Investment and Operation Costs (US\$)

Item	Qty	Unit Cost	Total Cost
Dedicated UNIX Server: 486DX2-66, VSA Bus, 8mb RAM, SCSI 500mb HDD		3,500	3,500
MNP-10 high-speed modems		400	800
1000 VA UPS		600	600
1000 VA voltage regulator		150	150
Multiport interface card and software		600	600
SCO UNIX software		1000	1000
HP-4 printer		735	735
Installation of telephone lines		200	800
Sub-total for Capital Costs			----- 8,185
One full-time technical manager	12	400	4,800
One full-time information and administrative manager	12	300	3,600
Telecommunication costs	12	1,000	12,000
Facilities and utilities (provided by the Institute)	12	100	1,000
Administration	12	200	2,000
Sub-total for One-year Operation			----- 24,000
Contingency (10%)			3,219
TOTAL FUNDING REQUESTED			----- 35,404

APPENDIX E -- What is a Telecottage?

The 1991, a study funded by the Australian Department of Primary Industries and Energy, "Telecottages: The Potential for Rural Australia", describes a Telecottage as "a new type of interface between communities and the communication infrastructure". More specifically, it is a resource available to the entire community to aid in the introduction of new technologies, and training people up in its use to assist in localised economic development.

Imagine a high yeald Cambodian grower being encouraged to join quickly an emerging market based economy. He/she require access to information, a computer for keeping spreadsheets on their produce and various accounting needs, perhaps a fax machine and photocopier. All these tools are far too expensive an investment but they could go to a local Telecottage, receive training on how to use this equipment and related software.

Afterwards, they would book a visit to the Telecottage two or three times a week to keep their spreadsheets up to date, access databases on sustainable agriculture practises gaining access to research on impacts of market driven economies on developing countries, and perhaps correspond with growers in other parts of Cambodia and perhaps CGNET members from various parts of the world.

As local conditions and our grower's enterprise improves they may well be able to purchase a computer and modem for themselves. Their association with the Telecottage would not end there. They would then poll the it for e-mail and remote database access, and perhaps even provide training to others based on their experiences.

This scenario may be far fetched today but with planning, funding and the establishment of sustainably managed Telecottages growers and other Cambodian enterprises could be using them within a couple of years.

A Telecottage would comprise of the following components:

Computers

Computers would be available on a small fee basis for word processing, spreadsheets, database access, desktop publishing, GIS etc.

Communications

E-mail and other network services would be available to users on a small fee basis covering the cost of network charges. Users would be able to send and receive e-mail from the centres computers without having to wait till they could afford one themselves.

Databases

Information provided by the community, local government, etc. is made publicly available at the Telecottage.

Training

Computer and other IT training courses would be made available from the Telecottage to all members of the community. Training would:

- assist in the development of small, IT based local enterprises,
- develop IT skills for integration with existing enterprises

- skilling the unemployed,

Other resources

Fax, photocopying, desktop publishing, scanning etc.

Telecottages are active in Norway, Denmark, Finland, Wales, Scotland and Australia.

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