NETWORKING IN LATIN AMERICA AND THE CARIBBEAN - RECENT ADVANCES OF THE OAS /RedHUCyT PROJECT

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RESUMEN

En este artículo, al autor presenta una breve reseña histórica del desarrollo de las redes automatizadas en América Latina y el Caribe.

En la primera parte, señala la importancia de estas redes para el desarrollo económico político, social y cultural de los países latinoamericanos y caribeños y hace un breve recuento de los países que cuentan con más de 1000 computadores con acesso pleno a Internet. Posteriormente, hace una descripción del Proyecto RedHUCyT de la OEA, cuya misión es apoyar a los países de América Latina y el Caribe a realizar las primeras conexiones a Internet.

INTRODUCTION

The importance of the telecommunications and information infrastructure for the political, economic, social and cultural development of the Americas, was recognized by the Presidents and Heads of governments of the region, during the Summit of the Americas. The governments of the region approved a Plan of Action to encourage the expansion of the telecommunications and information infrastructure sectors, ensuring that the benefits of these technologies will be available to all members of our societies.

The telecommunications and information infrastructure is essential for the universities and the scientific and technological research sector of the Americas. Through this technology, vital information can be exchanged among professors, researchers and specialists from different universities. This infrastructure also provides access to diverse interactive services, including: electronic mail exchange, libraries, supercomputers, computer resources from remote locations, and data banks. It also allows cooperative participation in experiments and simulations that can be conducted jointly by remote control and access to teleconferences.

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Computer networking in Latin America and the Caribbean has had an impressive growth during the past two years. According to recent statistics from the Internet Society (ISOC), some of these regional networks have had the highest rates of growth worldwide. About half the new full Internet connections in the region were established during the period 1994-1995. Up to January 1996, the latest statistics report from Network Wizards (http://www.nw.com) shows -to provide some examples of countries in the region with more than 1000 hosts- 20,113 interconnected hosts in Brazil, 13,787 hosts in Mexico, 9,027 in Chile, 5,312 in Argentina, 2,262 in Colombia, 1495 in Costa Rica, and 1,165 in Venezuela. In Latin America, Argentina, Chile and Costa Rica have the largest number of connections in relation to their population, a number similar, in fact, to many European countries.

In Latin America, the first two countries to connect to Internet were Brazil and Mexico. Using the Morelos satellite, Mexico established a connection to the National Center for Atmospheric Research (NCAR) in Boulder, Colorado, allowing the researchers at the National University of Mexico (UNAM) and the Technological Institute of Monterrey, Mexico, to reach the network. At present, telecommunications facilities include satellite and fiber optic links to the United States. Information about the Mexican network is available through their web sites and there currently are more than 200 web hosts distributed all over Mexico. A good reference is CONACYT, http://info.main.conacyt.mx/.

Brazil is fast expanding its networks and there is a planned backbone with Points of Presence (POP) to the Internet in each State. These POPS will be entirely financed by the government and will have a 2Mbps bandwidth. They will also expand connectivity to the US, to 2Mbps. This project has very high priority from the Ministry of Science and Technology.

As mentioned, development of the Internet in Latin America and the Caribbean is recent. The Peruvian network, Red Científica Peruana (RCP), a consortium of hundreds of institutions, became connected to the Internet in 1994, and is experiencing very rapid growth. They expect to have more than 30,000 users by the end of this year and they also expect to increase the current 128Kbps satellite bandwidth to 512Kbps. Their web site is very popular: http://www.rcp.net.pe and contains information about Peru and more generally about Latin America. Also, Ecuador, through the efforts of ECUANET and Banco del Pacifico, and Venezuela, with strong support from the National Science and Technology Council, have important presence on the Internet. ECUANET and the UNIRED of Chile jointly developed a Latin American "Whois".

In Central America, Nicaragua and Panama connect to the Internet through microwave links to Costa Rica that expanded its satellite bandwidth to 128Kbps. Nicaragua also established a satellite link for commercial services. Guatemala was recently connected and eight universities have access to full Internet services. Costa Rica, together with Ecuador, Honduras, Peru, and RETINA from Argentina and Colombia, connect to Homestead, Florida using

the PanAmSat satellite, interconnecting through a router managed by Sprint and sponsored by the National Science Foundation (NSF) who pays the management port fees.

In the Caribbean, Jamaica was connected to the Internet through a 64Kbps satellite link. In addition, there are many UUCP (dial-up) nodes providing e-mail and file transfer for most of the Caribbean countries, under the sponsorship of the CUNet project and other organizations.

Most recently connected countries are Bolivia, Honduras, Guatemala, El Salvador. Paraguay is expected to be on the Internet very soon.

There are already several commercial providers in the region. Many national telecommunications companies (PTT) have also started to offer Internet services. This type of commercial service is also available in Caribbean countries such as Antigua and Barbuda, Belize, Bahamas, Barbados, Dominican Republic, St. Lucia and Trinidad and Tobago.

In addition, many technical workshops, training and coordination meetings, including the First Inter-American Networking Workshop held in Rio de Janeiro, and subsequent yearly regional forums, have taken place in the region. These allow network administrators strong interaction and help the solution of common problems by optimizing human and material resources to benefit the region. The Fifth Latin American and Caribbean Networking Forum, hosted by the Peruvian Scientific Network (RCP) and co-sponsored by the OAS and other organizations, will be held in Lima, Peru, in April 1996.

THE OAS HEMISPHERE-WIDE INTER-UNIVERSITY SCIENTIFIC AND TECHNOLOGICAL INFORMATION NETWORK - RedHUCyT

The Organization of American States (OAS) has been very active in these developments through the Hemisphere-Wide Inter-University Scientific and Technological Information Network (RedHUCyT) project.

During December 9-11, 1994, the Summit of the Americas was held in Miami, Florida. Thirty-four heads of States gathered in this city and signed a Plan of Action that specifically included a chapter for Telecommunications and Information Infrastructure. The Governments assume several key responsibilities, among them encouraging major universities, libraries, hospitals and government agencies to have access to these networks, building on the work of the OAS RedHUCyT project.

In 1991, the General Assembly of the OAS approved the RedHUCyT project and allocated financial resources as seed money to start the project. The governments of the Unites States and other member countries provided additional funds.

RedHUCyT's main objective is to connect the member countries to Internet, integrating an electronic network for the exchange of scientific and technological information among professors, researchers, and specialists at different universities in the member states.

RedHUCyT's approach to the development of electronic networks in the member States is to help local initiatives for either the inception, or expansion of networks in their countries. The project provides high-tech equipment, technical support, specialized training, and sponsors technical workshops and seminars in the region to prepare technical projects, improve skills, share technical knowledge, and train network managers.

RedHUCyT activities and achievements

1)   Seminars and Workshops

RedHUCyT has sponsored and co-organized several seminars and workshops in Latin America and the Caribbean to promote knowledge and experience of electronic communication networks. Among them, the First and Second Caribbean Academic and Scientific Network Workshops, four Inter-American Networking Workshops, three Latin American Schools on Networks, and REUNA'94, a major workshop organized by the National University Network in Chile for end users, with more than 400 participants.

2)   The Caribbean Academic, Scientific and Technological Network - CUNet

The OAS, CRACIN, and the University of Puerto Rico (UPR) held the First Caribbean Academic and Scientific Network Workshop in September 1991, and the Second Workshop in March 1992, in Puerto Rico.

The participants in these seminar-workshops represented most of the English-speaking countries of the Caribbean Basin and the Dominican Republic. Their main objective was to promote and facilitate participation by the Caribbean countries in worldwide academic and scientific networks. At the first workshop, in September 1991, a project to establish an electronic information network linking the universities of the Caribbean, known as the Caribbean University Network (CUNet) project, was formally launched.

The CUNet project has been designed to establish an academic, scientific, technological, and research network for the Caribbean region. It was conceived as a project for cooperation among institutions of the countries in the region.

CUNet's participants include public and private institutions playing leading roles in the establishment of national networks in their own countries which also foster international communications for academic, scientific, technological, and research purposes. There are more than 20 nodes in the subregion, connecting several users within the CUNet framework.

Currently, many Caribbean countries are connected to the Internet through commercial service providers, mainly the national telecommunications companies (PTT), including Antigua and Barbuda, the Bahamas, Barbados, Belize, Dominican Republic, St. Lucia and Trinidad and Tobago.

3)   Jamaican Electronic Network (JAMNet)

Within the CUNet project, funds and technical assistance were provided for the implementation of the Jamaican Electronic Network (JAMNet), allowing Jamaica to be connected to the Internet through a 64Kbps satellite link between Kingston and the United States. The connection was set during September 1994. JAMNet interconnects The University of the West Indies-Mona (UWI), the College of Arts, Science, and Technology (CAST) and many other institutions that have dial-up links to UWI or CAST.

Within RedHUCyT activities, similar projects for Barbados, Belize, St. Lucia, and Trinidad & Tobago are in the implementation stage. In addition, The OAS, through the Department of Education, provided important funding to expand the local area networks (LAN) of the Barbados Community College in Barbados, and the Sir Arthur Lewis College, in Saint Lucia. These, and other institutions will soon be connected to the Internet with technical support and equipment provided by RedHUCyT.

4)   Mexico and Central America

In Central America, during 1992, resources were allocated for broadening the existing communications channel of the University of Costa Rica and the Costa Rican National Research Network (CRNet), which has a large number of affiliated Costa Rican education and research institutions and several users. CRNet is connected to the Internet through a 128Kbps satellite link to the NSFNet node in Florida.

Afterwards, links were developed between the University of Costa Rica and the National Engineering University (UNI) in Managua, Nicaragua, as well as with other Nicaraguan universities and research institutes. RedHUCyT provided equipment, technical assistance, and communication expenses for the implementation of the Nicaraguan Academic Network (RAIN). The equipment was installed in the facilities of the Nicaraguan Telecommunications Institute (TELCOR) during March 1994. On the other hand, the connection of Panama to the Internet was established in June 1994, also through CRNet. At the

present time, several major universities are connected including, the Technological University of Panama (UTP), the University of Panama (UP), the University of Santa Maria la Antigua and Universidad Latina. Both RAIN and the Panamanian Academic Network (PANNet) are connected to Costa Rica through microwave links.

The National Network of Honduras (HONDUNet) was implemented in June 1995. HONDUNet has its own satellite uplink, through PanAmSat, to the NSF node at Homestead, Florida. A variety of government and academic institutions participate in the first stage, which involves the interconnection of the Autonomous University of Honduras (UNAH), the Central American Technological University (UNITEC), El Zamorano, the Honduran Science and Technology Council (COHCIT), and other institutions. Important technical assistance was provided by international consultants from Costa Rica.

Significant funds were provided by the government of Guatemala and by RedHUCyT for the implementation of the MAYANet project, which facilitates the connection of Guatemala to the Internet. MAYANet facilitates the development of scientific and technological research and the exchange of specialized information for several institutions, including: the National Council for Science and Technology (CONCYT); the Universities of San Carlos, del Valle, Rafael Landivar, Mariano Galvez, and Francisco Marroquin; the Central American Institute for Industrial Research and Technology (ICAITI) and the Institute of Nutrition for Central America and Panama (INCAP). Guatemala was connected to the Internet in December 1995 and a second phase is on its way involving the implementation of a metropolitan backbone with several Points of Presence (POP), and the expansion of Local Area Networks (LAN) in each institution, in benefit of the academic, scientific and technological sectors.

Currently, the National Network of El Salvador (SVNet) is in its implementation stage, facilitating access to the Internet to many institutions, including: the National Council for Science and Technology (CONACYT) and the Universities of El Salvador, Don Bosco, and Jose Simeon Canas.

A major project was approved by the Central American Bank for Economic Integration (BCIE), the Costa Rican Ministry of Science and Technology and the Costa Rican National Research Network (CRNet). The agreement consolidates an ambitious project to interconnect the academic networks in Central America, using the current infrastructure developed within the framework of the OAS/RedHUCyT project, following the recommendations of the Plan of Action that emanated from the Summit of the Americas. In particular, RedHUCyT will finance the incorporation to the project of Panama which is not a recipient of BCIE funds. This new infrastructure will facilitate innovative projects for the use of teleconferences and interactive video within the Central American academic, technological, industrial and commercial sectors, among others, promoting the development of these sectors.

In Mexico, support was offered for the future expansion of the national backbone, chiefly with respect to the acquisition of basic equipment such as routers. Financing was granted earlier for the purchase of a satellite antenna and telecommunications equipment to connect the National Science and Technology Council (CONACYT) to the National Center for Atmospheric Research (NCAR) in Colorado, US. This equipment is being overhauled at present.

5) MERCOSUR Countries and Chile

The OAS has been supporting a project presented by the Secretariat for Science and Technology (SECyT) whose main objective is to optimize the operation and efficiency of the Science and Technology Network (RECYT).

At present, RECYT has several nodes located throughout the country which are estimated to serve several thousands users. After SECyT's connection to Internet through TELINTAR, the national PTT Internet provider, the Argentinian Network has had an explosive growth. Another project to support RETINA, which connects to the Internet through a separate satellite link via PanAmSat to Homestead, Florida, was also supported by RedHUCyT and consisted in the acquisition of routers.

In Paraguay, a major project is being implemented for the connection to the Internet of the National and the Catholic Universities, some government institutions, and other organizations. The OAS is providing a ground station for satellite communications as well as high-tech communications equipment to create the first point of presence of the Internet in the country. The connection is now fully operational.

In Uruguay, basic equipment was provided for the Technological Laboratory of Uruguay (LATU) to facilitate its connection through the University of the Republic. Meanwhile, meetings with representatives of academic networks in Brazil are being held in order to evaluate alternatives for the expansion of their facilities. In Chile, a major seminar/workshop to train networking experts as well as end users was organized by the National University Network, REUNA, and sponsored by RedHUCyT, in September 1994. More than 400 experts participated. On the other hand, UNIRED, another important association of Chilean universities, including the Catholic University of Chile, provided technical support for the development of regional projects, specifically in Bolivia and Paraguay.

6) Andean Countries

A project in Ecuador was fulfilled to complement the efforts of the Ecuadorean Information Corporation (EcuaNet), a not-for-profit entity which offers connection to Internet as a free service to universities. EcuaNet's

communications infrastructure, which is provided without charge by the Banco del Pacifico, includes satellite antennas in Guayaquil, Quito, Ambato and Galapagos.

In Bolivia, the Bolivian Data Network (BOLNET) connection to the Internet, was implemented in July 1995. Several institutions are being connected, including the University of San Andres in La Paz, University of San Simon in Cochabamba, University Gabriel Rene Moreno in Santa Cruz, the National Council for Science and Technology (CONACYT) and the United Nations Program for Development in Bolivia (UNDP). This organization shares the cost of the satellite link to the US with BOLNet. Important technical assistance was provided by international consultants from Chile.

Peru, through the Peruvian Scientific Network (RCP), a consortium of many institutions, joined the Internet in March 1994. RedHUCyT provided a ground station for satellite communication, including the radio-frequency equipment, to support Peru's connection with Internet through a satellite link to the NSF node in Homestead, Florida. Recently, RedHUCyT financed, jointly with RCP, additional equipment to expand the network.

In a similar project with Venezuela, RedHUCyT funded a ground station for satellite communications. The antenna is currently at the facilities of the University of the Andes (ULA) in Merida, Venezuela, and will allow direct communication to the US Internet from ULA and the University of Zulia, in the near future. This will also serve as backup for the other Venezuelan universities under the REACCIUN project, sponsored by the Government.

In Colombia, a project for the connection of the University of Cauca in Popayan is under consideration.

7) **Latin American and Caribbean Scientific and Technological Information Web - INFOCyT**

A Pilot Program Workshop was organized by RedHUCyT for the introduction of scientific and technological data bases through Internet. It was held in Santiago, Chile, with the participation of networking and information systems experts from Argentina, Brazil, Costa Rica, Chile, Mexico, Peru, Uruguay and Venezuela.

The main objective of the workshop was to evaluate different alternatives to facilitate the access to scientific and technological regional information through Internet. The Peruvian Scientific Network is setting up a regional information system based on the World-Wide Web, with the continuous support of the national coordinators of the participating countries. This system is organized by subjects of interest to the scientific community such as researchers, scholarship opportunities in the region, collaborative agreements between countries, and many more. It simplifies the access to

regional data bases by using pointers provided by the national networks in each country of the region. Currently, this web site has the following address: http://www.rcp.net.pe/INFOCYT/infocyt.html.

FUTURE DEVELOPMENTS

At this time, most of the Latin American and the Caribbean countries are fully connected to the Internet and the remainder will be connected soon. During RedHUCyT's Phase I, the project allowed Internet connectivity to several countries for the first time and encouraged the development of technical personnel. Specifically, RedHUCyT has received many requests from the members' countries for additional support for the expansion of their national networks, the implementation of new nodes, and for technical assistance and training. In particular, during the next few months, RedHUCyT will provide equipment, technical assistance and training to Barbados, Belize, El Salvador, Paraguay, St. Lucia and Trinidad & Tobago, among others. For the second phase of RedHUCyT the following key issues including recommendations from the Summit of the Americas will be incorporated:

1. Solid improvement of international telecommunications: Fast growing new applications introduced in Internet require higher capacity of the communications links (bandwidth) to allow much more speed to fully benefit from these tools. RedHUCyT has already received many requests for support on this area.

2. Internet connectivity should be expanded within the countries and within the institutions. Although Internet nodes already exist in most Latin American and some Caribbean countries, the benefits of this service reach only a small proportion of national institutions and of the population. Therefore, a) it is necessary to create or expand national backbones to which many local institutions will connect and b) it is necessary to extend the local area networks within the current and new connected institutions to provide the service to many more individuals.

3. RedHUCyT's main objective has been to help the academic and research sector. For this Phase II, it is necessary for RedHUCyT to expand Internet connectivity to other sectors, such as: Government agencies -in particular those with specialized data- trade, promotion of democracy and human rights, environment, and others.