Contract Number: IST-2001-35412
Project Title: CAESAR

D1
Review of Developments in Latin America

Contractual Date: 30 June 2002
Actual Date: 26 June 2002
Work Package: WP1
Nature of Deliverable: R - Report
Dissemination Level: Pub –Public Document

Author: Cathrin Stöver, DANTE

ABSTRACT

This document reviews the situation of the national research networks or related
organisations in Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Ecuador, El
Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay and
Venezuela.

CONTENTS

EXECUTIVE SUMMARY

The CAESAR project studies the feasibility of a direct interconnection of Latin American research networks with the pan-European research network GÉANT.

Today, a regional research infrastructure in Latin America interconnecting the existing national research networks is missing. In order to organise an interconnection between Latin America and Europe from region to region and in a cost-effective way, a regional Latin American research infrastructure should be created. In parallel, the organisational setup will have to be developed. Plans to interlink the research networks of Central and South America reach back to 1996, but have so far not been realised. In the last two years the North American AMPATH project has improved connectivity for the region by offering free connectivity to the Abilene PoP at Florida University in Miami.

The Latin American countries have the great advantage of being able to speak the same language (except for Brazil) and of sharing a similar history and cultural background. However, the state of their economic development and alongside to that the state of their research and development differ widely. The group is led by the comparably rich countries Brazil and Mexico, but also some of the poorest countries in the world, like Guatemala or Nicaragua, can be found in Latin America.

The reader of this study will find that this heterogeneity is reflected in the state of the development of the national research networks. Throughout the project, we have been trying to group the countries. At first into three groups, but now, as the information becomes clearer, we have decided to cluster the Latin American networks into five different groups.

The countries in Group A, Argentina, Brazil, Chile and Mexico, are the most likely countries to be able to form a regional network. All four countries have well established national and international connectivity.

From the organisational point of view, the networks clustered in Group B (Bolivia, Costa Rica, Uruguay and Venezuela) and C (Cuba, Panama and Paraguay), should also be able to join the regional network alongside Group A. It is possible, however, that Group C, due to the fact that they are not single consolidated national research networks could face higher national obstacles to connect to GÉANT via a regional network.

It can be foreseen that eventually also the countries in Group D (Ecuador, El Salvador and Peru) would find ways to connect to the regional backbone and maybe even in parallel build their national research infrastructure. It could also be that the opportunity to connect to GÉANT via a regional backbone would create a momentum that would facilitate the creation of the national research network in these countries.

As for the near future (within the next three years) we can foresee difficulties connecting the countries in Group E (Colombia, Guatemala, Honduras and Nicaragua) to the regional Latin American network in order to connect to GÉANT.

The follow-up from the successful CAESAR workshop in Toledo which was held in June 2002, will help to bring about a clearer picture on the possible solutions for intra-regional connectivity within Latin America, as well as for an interconnection of the two regions. The Final report of the CAESAR project will take these findings into consideration and will make final recommendations.

1. INTRODUCTION

The telecommunications revolution of the past two decades has created a world which is becoming smaller by the day. Modern research no longer needs to be undertaken in small and isolated communities. To be successful research communities with similar interests need to cooperate globally. The communications to facilitate this are a reality now.

One of the major objectives of the pan-European research network GÉANT is to facilitate global research cooperation by encouraging connectivity between European researchers and researchers in other world regions. Between the European research networks and similar activities in North America and Asia Pacific this objective has been achieved. Building on this experience, the European research community is now wishing to connect to other world regions, in particular Latin America.

2.   THE CAESAR PROJECT

CAESAR (Connecting All European and South American Researchers) is a European Commission funded feasibility study to evaluate the possibility of a direct interconnection between the pan-European research network GÉANT and similar activities in Latin America. The creation and development of national research networks in Latin America and their increasing interest in international cooperative research means that it is important to investigate the possibilities of such a direct interconnection. The historical links between Europe and Latin America re-enforce the desirability of this goal.

CAESAR is fully funded by the EC's DG Information Society. In December 2001, the EC launched the @LIS programme to build an Alliance for the Information Society with Latin America. Like @LIS, the CAESAR study involves cooperation with eighteen Latin American countries including Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay and Venezuela. The project lasts six months, beginning in March 2002.

2.1   The Partners in CAESAR

The CAESAR study is jointly carried out by FCCN, RedIRIS and DANTE. FCCN is the Portuguese national research network which interconnects the research institutions, national laboratories, universities and higher education facilities within Portugal. RedIRIS is the Spanish national research network which currently interconnects more than 250 research institutions and universities in Spain. DANTE, the Coordinating Partner of the CAESAR project, is a UK based not-for-profit organisation which was mandated by the European national research networks to organise, build and manage international networking services in their behalf.

2.2   CAESAR Objectives

The CAESAR study targets four objectives. Firstly, and the content of this Project Deliverable, CAESAR analyses the current situation and developments in research networking in Latin America. For this, the project has contacted the presidents and directors of the eighteen national research organisations in the region asking them to complete a two-paged questionnaire. This questionnaire explores the state of development of the national research network, the underlying funding arrangements and, of course, the technology, topology and geographic scope of the network. The exact wording of the questionnaire which was originally drafted in English and then mailed to the Latin American partners in Spanish and Portuguese versions can be found in Annex 1 of this document.
CAESAR also studies the demand for an improved connection between GÉANT and the Latin American research networks. This demand analysis includes an analysis of the current

traffic flows between the two regions, as well as a thorough study of current and potential user requirements. The project has singled out user groups across Europe that are working in co-operative projects with one or more countries in Latin America. A second questionnaire will help analyse the user demand and enable CAESAR to define the connectivity requirements between the European research community and Latin America.

Thirdly, CAESAR has addressed potential suppliers to survey the options for connectivity with Latin America. In this respect, CAESAR has established contact with 23 operators asking them for an outline of their services between Europe and Latin America and within the Latin American region. A key issue for the interconnection is to have a single point of presence within Latin American from which all research networks in the region can be reached.

The fourth objective of CAESAR was to organise a workshop which would bring together the representatives of the Latin American and European research networks, interested European national politicians and the European Commission to debate the project, its objectives and future plans. This workshop took place at the University of Castilla-La Mancha, Toledo, Spain on 13 and 14 June 2002.

3.   THE METHODOLOGY

Immediately after the start of the CAESAR project in March 2002, the CAESAR project partners developed a questionnaire which was to be sent to the Latin American research networks and similar organisations. The questionnaire was originally developed in English but then translated to Spanish and Portuguese to facilitate the completion by the Latin American partners. The exact wording of the three versions of the questionnaire can be found in Annex 1 of this document.

The questionnaire was posted to the majority of the Latin American research networking organisations in the w/c 11 March 2002. There were, however, problems obtaining contact details and also in contacting several organisations. In the case of some of the Latin American countries, especially in those countries were research networks do not (yet) exist, it took weeks to identify the right person and even when that person was finally identified, the questionnaire was not in all cases completed and returned.

By the deadline of returning the questionnaire, we had received answers from the following 13 organisations in Latin America:

RETINA (Argentina)
BOLnet (Bolivia)
RNP (Brazil)
REUNA (Chile)
RedUniv (Cuba)
FUNDACYT (Ecuador)
CONACYT (El Salvador)
CUDI (Mexico)
PANNET (Panama)
CNC (Paraguay)
CONCYTEC (Peru)
RAU (Uruguay)
REACCIUN (Venezuela)

From Guatemala we received a description of the situation of research networking in the country, but as there was currently no research network and not even an initiative towards one, the questionnaire was not completed. We were also able to establish contacts with Honduras, but although the return of the questionnaire was originally indicated, it was not returned.

Although we had good contact details for the research networking organisation in Colombia and Costa Rica, we were unable to establish a fruitful contact that would have led to the return of the questionnaire. This is particularly significant and lamentable for Costa Rica as CRNet is one of the more advanced networks in the region. It is therefore very unfortunate that our efforts were not responded. As a spin-off from the Toledo conference, we were able to establish contact with an interested professor at the University of Cauca in Colombia.

As for Nicaragua, we have to state that we were unable to locate a person responsible and to establish any kind of contact. In Nicaragua the RAIN network existed, but today, there is no longer a website available. An email sent to an address of a contact in Nicaragua supplied by the director of PANNET in Panama returned address unknown.

In those countries where contact was established and the questionnaire completed and returned it was followed up with questions when detail of the setup of the organisation or network was unclear. It has to be stated that over the months very valuable relations were built between CAESAR and the Latin American partners. This also showed during the

- 4 -

CAESAR workshop in Toledo which was attended by 16 representatives from 12 Latin American research networking organisations.

Due to the above mentioned circumstances, this report gives a good overview of the status and developments in 14 Latin American countries (13 that returned the questionnaire and Guatemala). For the remaining 4 countries the information is not complete, as it was not directly derived from the source but is a result of desk research from Europe.

4.   LATIN AMERICAN RESEARCH NETWORKS

4.1   Status and Developments in Argentina

4.1.1   General Overview

Inhabitants	36.12 Mio
Gross National Product (GNP)	298.1 billion US$
Per capita GNP	8,258 US$
Per capita investment in IT	96 US$
Internet Users	3.88 Mio [1]
Internet Users is percentage of the population	10.38 [1]

Source: population.com, bfai, Nielsen Net Ratings. All data 1998, except [1] 07/2001

4.1.2   RETINA - The Argentinean National Research Network

4.1.2.1 The Organisation

RETINA (Red Teleinformática Académica), the national research network of Argentina is a not-for-profit organisation, established under the umbrella of a non-governmental organisation called Asociacion Ciencia Hoy. RETINA was created in 1990 with the financial support of the Fundacion Antorchas. Today the costs of running the network are covered by the fees paid by the institutions connected to it as well as by financial support that RETINA continues to receive from the Fundacion Antorchas for new network developments. Next to RETINA the public national universities have a network of interconnections which is nowadays run by RETINA (formerly known as RIU).

Today 56 institutions are connected to RETINA, of which 42 universities and higher education facilities, 8 research institutions, 5 governmental offices and public services, and one other institution. It is estimated that RETINA reaches 80% of the Argentinean research community.

4.1.2.2 The Network

The topology of the RETINA network is complex due to the heterogeneous demand for capacity and features by the connected institutions. The network topology is star-shaped with links between 256 Kbps in regions with a lesser developed infrastructure to 2 Mbps in the central part of Argentina and up to 34 Mbps within the city of Buenos Aires. The connections are mainly terrestrial and are provided by Telecom, Telefonica, Impsat, Comsat, Techtel and Metrored. The links are transparent with some point-to-point connections or ATM connections. The IP overlay of the network is managed by RETINA. Applications supported consist of Internet Services, such as Newsgroups, hosting, housing, mailing lists, but there are also videoconferencing (H.323 and H.320) and multicast facilities. RETINA also offers consultancy and network training for the network managers in the connected institutions. RETINA is connected to the commercial Argentinean NAP (Network Access Point) and has signed direct peering agreements with the most important commercial providers, such as Impsat, Telecom, Comsat and Global Crossing. The traffic load in the network is currently 15 Mbps external and 40 Mbps total (April 2002).
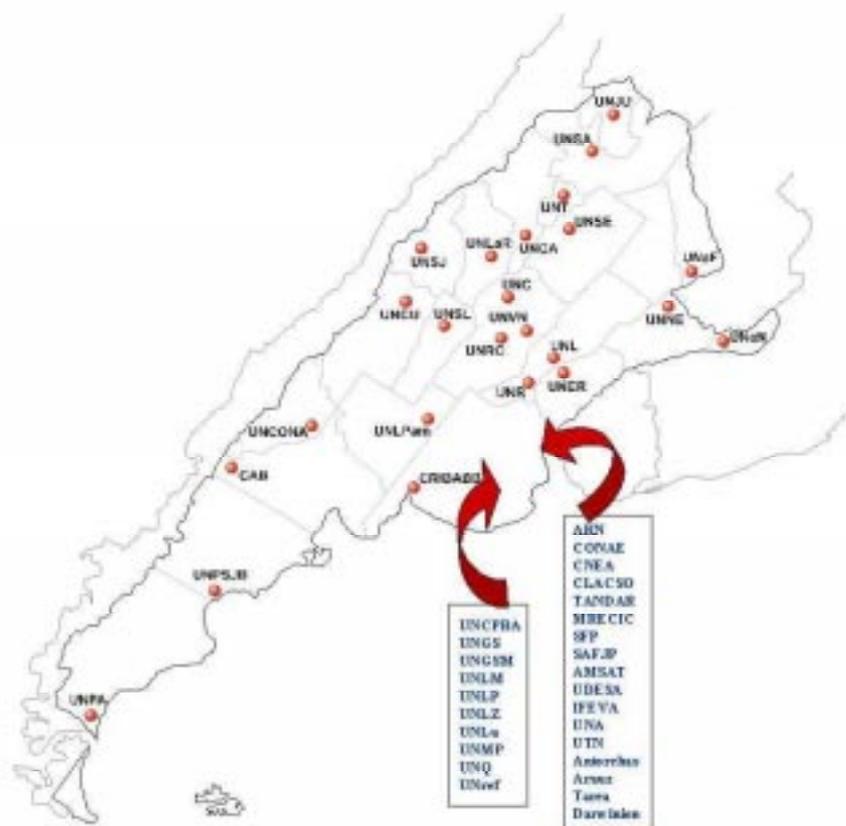
Fig.1: Map of Institutions connected to RETINA (April 2002)

RETINA disposes of two main international connections, namely a 10 Mbps link for the university network and a 49 Mbps link for the academic network. These connections are provided by Impsat and Telecom. RETINA has been a member of the North American AMPATH initiative since April 2001 and disposes of a 45 Mbps link to Abilene.

4.1.2.3 Future Plans

Within the next three years the RETINA management hopes to be able to follow the developments in advanced networking across the world. To achieve this objective, the plan is to upgrade the national connectivity substantially and to improve the quality of the connections. Furthermore there are plans to train technical personal to be able to improve the support of advanced applications running in the network.

Together with the national research networks of Chile, Brazil and Uruguay (REUNA, RNP and RAU respectively), RETINA is working towards regional connectivity within South America.

4.1.2.4 RETINA and CAESAR

RETINA expressed a special interest in connecting to the pan-European research network GÉANT to be able to provide an adequate service to those research projects in Argentina which are heavily linked to European research institutions. These projects can be found in

the areas of Astronomy, Oceanographics, Climate, Global Changes, Distance Learning, Biology, Physics and Mathematics.

It was stated that a direct connection would considerably improve the collaboration between researchers in Argentina and Europe as the speed and quality available for applications would be significantly enhanced. An immediate benefit was foreseen for videoconferencing and distance education applications. It was furthermore stated that improved connectivity would also trigger the progressive growth of distant data processing or the remote management of equipment.

4.1.2.5 Contact Details

RETINA - Red Teleinformática Académica
Corrientes 2835 - 5to A
Buenos Aires
Argentina
Tel: 54-11-4963-3495
Fax: 54-11-4322-8422
http://www.retina.ar

Director: Dra. Emma Perez Ferreira, perezf@retina.ar
CTO: Guillermo Cicileo, gcicileo@retina.ar

4.2   Status and Developments in Bolivia

4.2.1   General Overview

Population	7.9 Mio [1]
Gross National Product	8.3 billion US $[2]
Per capita GNP	994 US$[2]
Internet Users	78,000[3]
Internet Users in percentage of population	0.98[3]

Source: population.com, ITU. Data [1] 1998, [2] 2000, [3] 12/1999

The low per capita income and the high illiteracy rate limit the expansion of the Internet in Bolivia. A little less than 1% of the population was connected to the global Internet at the end of 1999. Another reason for the scarce penetration of the Internet is the missing infrastructure, especially in rural areas.

4.2.2   BOLnet – The Bolivian National Research Network

4.2.2.1 The Organisation

The National Research Network of Bolivia, BOLnet, is part of and therefore dependent on the Vicepresidency of the Republic and the Council of Science and Technology of the country. The network is completely self-funding through the sales of connectivity services and information systems.

Currently there are 18 institutions connected to BOLnet of which are 7 universities and higher education facilities, 8 research institutions and 3 governmental offices and public services. It is estimated that 2000 users are connected to BOLnet.

4.2.2.2 The Network

The BOLnet network is star-shaped with the central node in the capital La Paz and secondary nodes in Santa Cruz, Sucre and Tarija. In the short-term it is planned to extend the network to 5 more regions, namely Cochabamba, Oruro, Potosi, Beni and Pando.

The current topology is as follows:

La Paz – Santa Cruz :   128 Kbps
La Paz – Tarija: 128 Kbps
La Paz – Sucre: 64 Kbps

These three IP connections are provided by ENTEL S.A. The network supports WWW, FTP, Email, Telnet and Remote Database Access Applications.

BOLnet's international connectivity is based on a connection to the commercial Internet in the USA via three downlinks of 0.5 Mbps which are provided by Transat.

4.2.2.3 Future Plans

Within the next three years, BOLnet plans to finalise its national connectivity by connecting the five remaining regions named above and to interconnect with the national research networks of Brazil and Chile (RNP and REUNA, respectively), as Bolivia is a bridge-nation between these two countries.

4.2.2.4 BOLnet and CAESAR

BOLnet expressed that it was interested in a direct connection to the pan-European research network GÉANT as this would give the network an international connectivity of major importance and would further the completion of the national connections. It was foreseen that applications in the areas of remote database access, Distance Learning, Virtual Libraries and Classrooms would profit most.

4.2.2.5 Contact Details

Red Boliviana de Comunicacion de Datos – BOLnet
Vicepresidencia de la Republica – La Paz – Bolivia
Fax: 591 2 2200750
www.bolnet.bo

Executive Director: Clifford Paravicini Hurtado, clifford@bolnet.bo

4.3   **Status and Developments in Brazil**

4.3.1   General Information

Population	165.85 Mio
Gross National Product (GNP)	767 billion US$
Per capita GNP	4,800 US$
Per capita investment in IT	103 US$
Internet Users	14M [1]
Internet users in percentage of the population	8.44 [1]

Source: population.com, bfai; all data 1998 except [1] 2001

The Brazilian telecommunication's sector has been in a constant upswing since the import ban on information technology was lifted in 1992. Since then Brazil can be considered as the biggest Latin American market for information technology. Internet and email are part of the daily life of many businesses, students and researchers. Between 1995 and 1999 the number of Internet domains in Brazil rose from 0.2 to 7.2 per 1000 inhabitants. About 7.3 Million of the 12 Million Latin American webpages have their origin in Brazil, constituting more than 60%. On average 3 Million PCs are sold per year. By mid-2001 about 14 Million Brazilians were able to enjoy access to the Internet which brings Brazil into a respectable 9th position in the world-wide list of number of Internet Users.

4.3.2   RNP – The Brazilian National Research Network

4.3.2.1 The Organisation

The AsRNP (Associacao Rede Nacional de Ensino e Pesquisa) is the entity responsible for the Brazilian National Research Network, RNP. AsRNP is a not-for-profit organisation and was mandated by the Brazilian Ministry of Science and Technology (MCT) to execute the Informatics Priority Programme of the government. The RNP network is financed by governmental funds and by investments made by Industry.

RNP is responsible for the provision of national and international connectivity to the university and research community. There are 15 additional State networks providing the extension of the national backbone in the Federal States. These State networks have distinct usage policies and provide connectivity to governmental and non-governmental institutions as well as the academia. RNP provides the interconnection between these State networks, as well as national and international transit according to the respective usage policy.

Currently there is a total of 369 institutions connected to the network, of which 242 are universities and higher education facilities (146 of these universities have their own research centres), 68 research institutions, 6 governmental agencies and 53 schools of basic, medium and technical level. It is estimated that about 760.000 users are connected to the RNP network, of which approximately 58.000 are researchers, professors and students associated to Brazilian research groups.

4.3.2.2 The Network

The RNP network has 27 Points of Presence (PoP) and traffic nodes in the capital cities of each Brazilian State and in the Federal District. The two main nodes are located in the cities of Rio de Janeiro and Sao Paulo. These two points are connected via virtual circuits to all other PoPs. Higher capacity links between 13 PoPs use ATM technology, lower capacity ones are based on Frame Relay (14 PoPs).
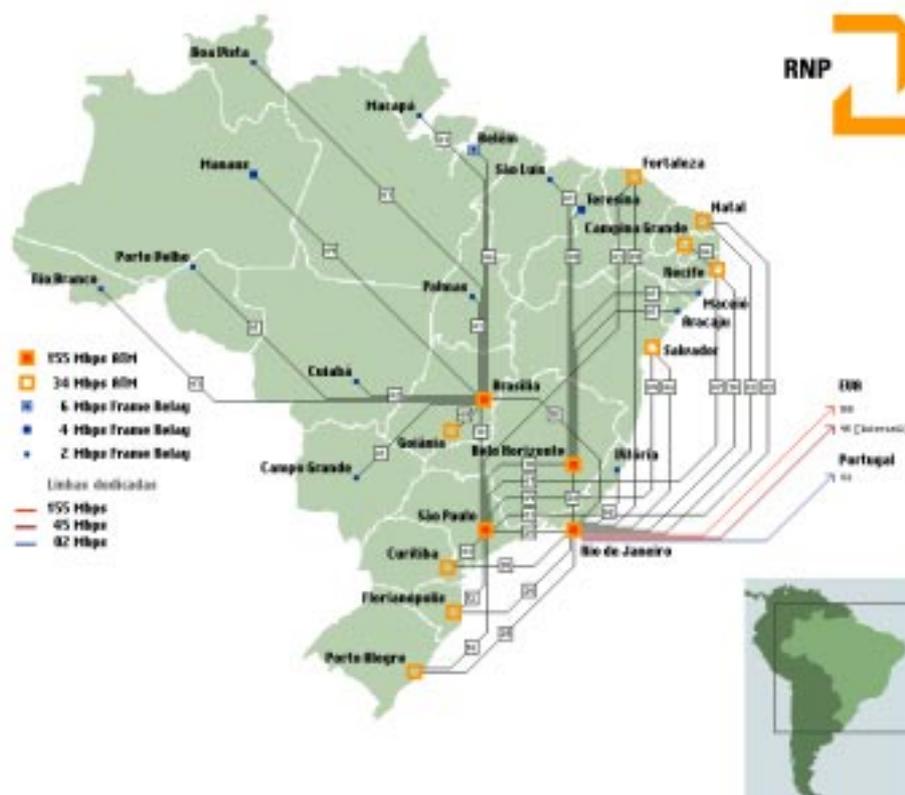
Fig. 2: RNP Network Topology (March 2002)

The Pops of Acre, Roraima and Amapa in the Amazon region are connected via satellite links.

In 13 cities the PoPs are connected to high speed dark fiber metropolitan networks which use ATM switching technologies at speeds up to 622 Mbps. These networks are used by business and academic consortia for experimental purposes or the development of new and advanced applications.

The network is entirely based on IP over ATM for the high capacity links (at speeds between 6 to 30 Mbps) and on IP over Frame Relay on the lower capacity links (1 to 6 Mbps). In addition to this infrastructure an optical technology testbed project is under development using IP over dark fiber for the interconnection of some RNP PoPs. This project is jointly carried out with telecommunications and informatics companies.

The main service offered is the conventional Internet connectivity to the Brazilian higher education and research institutions. This includes IP transit for all the academic and commercial state networks (based on peering agreements), international transit to Abilene and its connected research networks, as well as to the commodity Internet. Additionally, RNP offers native multicast services which is available in all the core routers of the network and IPv6 which is available in some PoPs. IPv6 transit is provided through tunnels to Abilene and the 6Bone project.

The applications supported by the network range from regular communication and collaboration services (Email, database access, discussion groups, file transfer, www, etc.) to the support of extended collaborative applications like high performance processing (the five

national high performance centres are connected to RNP), video streaming and conferencing, mainly for educative purposes. Together with universities and research centres, RNP is also involved in the development of pilot applications, either for the introduction of new services to the network or to demonstrate the use of innovative applications in advanced networks. Tests of digital video (telemedicine and TV) and Grid applications were performed last year. Tests of QoSIP, Directory Services, Voice over IP and Video are on the agenda for 2002.

The total bandwidth of the core network is approximately 250 Mbps. Since the circuits are contracted on an ATM / Frame Relay basis these 250 Mbps are almost completely used. Installed capacity for traffic exchange with commercial providers in Brazil is 200 Mbps.

The national connections between the 15 State networks is provided by Embratel, previously a government owned company, now a subsidiary of WorldCom. The State networks as well as the connections to the user organisations are contracted to different providers. Core routing equipment is based on Cisco routers with models ranging from the Cisco 12000 in the Rio de Janeiro PoP to the Cisco 2500 in some smaller PoPs.

RNP disposes of three international connections. A 155 Mbps link provided by Embratel/Cable Wireless connects RNP to the commodity Internet in the US using POS technology. Within the AMPATH project, RNP is connected to Abilene with a 45 Mbps link using IP over ATM. Additionally there is a 2 Mbps link to the Portuguese research network, FCCN which is provided by the Embratel/Portugal Telecom consortia. The international connections add to 202 Mbps and are used at 50%.

There is also a recent joint initiative with the national research networks of Argentina, Chile and Brazil to promote a direct interconnection between these networks and to create a regional South American network.

4.3.2.3 Future Plans

In the short-term changes will be made on the transmission technology of the network. This will involve the replacement of some ATM/Frame Relay links by SDH dedicated circuits, mainly on the higher demand connections.

For the long-term there are plans to convert the present backbone into a number of IP over dark fibre or IP over WDM links, capable of providing a national broadband network to cater for the needs of the researchers and their large scale applications.

International connectivity is planned to comprise direct connections with other national research networks in Latin America and Europe. The link to the USA is foreseen to be upgraded to 622 Mbps and is expected to reach Gigabit speeds in the not so distant future.

As for network services RNP plans to incorporate routine mechanisms for DiffServ, Quality of Service measurements, IPv6 routing in the entire network, including translation and interoperability with IPv4. IP multicast services are planned to become available throughout the network to support particularly those applications involving audio and video transmission. At the same time it is planned to introduce new services, such as Voice over IP for user organisations, video content provision, directory services for research and scientific institutions and services to support GRID computation activities.

4.2.2.4 RNP and CAESAR

RNP expressed that an interconnection with GÉANT and the resulting access to the European national research networks was of strategic importance to the development of science and technology in Brazil. It was stated that there are effective and traditional links

between the Brazilian scientific community and several European countries, in particular Germany, France, the United Kingdom, Spain and Portugal. Efforts towards the establishment of adequate connectivity with Europe were started in the form of bilateral cooperation with Portugal and Germany, which in the case of Portugal led to a 2 Mbps direct interconnection between the two countries.

The directory for the Brazilian Research Groups kept by CNPq, the National Council for Scientific and Technologic Development, shows 225 institutions and 11,700 research groups in Brazil. 80% of all research done in Brazil is done by public universities which are the main RNP customer group. In 2000, these research groups were involved in 30 research programmes based on cooperation's between Brazil and European Union Member countries. Furthermore, there were 2,107 scholarships provided by the two federal agencies, CNPq and CAPES, Coordination and Personal Improvement at a High Level, which represented an exchange of researchers and students in several research areas. Table 1 gives an overview of the scholarships with the European Union and other countries.

COUNTRY	Quantity	Value (US$ 1.000)
Germany	188	576,84
Austria	2	15,35
Belgium	14	131,69
Denmark	7	21,29
Scotland	7	171,90
Spain	119	457,78
Finland	1	8,03
France	448	1.670,02
Netherlands	43	279,70
England	107	2.644,13
Northern Ireland	0	1,71
Italy	30	149,31
Norway	2	13,92
Wales	1	14,83
Portugal	40	106,89
Sweden	5	59,55
Switzerland	17	179,68
Others	1.076	8.039,73
Total	2.107	14.542,35

**Table 1: Brazilian Scholarships for exchange with the
European Union and Other countries**

It was expressed that direct connectivity with the countries served by GÉANT would also allow the collaboration in technology, communications and information technology projects developed within RNP and by its users. Cooperation in network projects in the area of advanced services (QoSIP, multicast, IPv6, directories and digital video) would be promoted, and would result in the setup of a new agenda for collaborative projects in these areas. Interest was expressed in the collaboration with European institutions and initiatives allowing the test, evaluation and usage of new network applications like videoconference in education, GRID processing etc.. A direct connection with a low delay would allow the usage of these innovative applications.

It was said that currently, all the traditional collaborative applications between research groups would benefit from direct connectivity. As for the future, there would be a clear benefit for the advanced network services and applications being tested by RNP. In the first

case it can be referred to applications such as data base access, collaborative projects in computational science, (ProTeM-CC Program with InRIA and IST), file transfer, personal videoconference and multicast based services. In the future, GRID based applications as in the case of high energy physics projects (CERN), genetic mapping projects, interaction projects in astronomy and remote manipulation engineering.

4.3.2.5 Contact Details

RNP
Estrada Dona Castorina, nº 100, salas 353 e 134
Rio de Janeiro – Brasil
22460-320
tel. +55 21 2274 7445
fax. +55 21 2259 7796
e-mail: <info@rnp.br>
site: www.rnp.br

General Manager: Nelson Simões, <nelson@rnp.br>
Planning and Administrative Manager: Wilson Coury, <wbcoury@rnp.br>
Operations Manager: Alexandre Grojsgold, <algold@rnp.br>
Innovation Manager: Michael Stanton, <michael@rnp.br>
Information Management: Marta Lealm <mleal@rnp.br>

4.4   Status and Developments in Chile

4.4.1   General Overview

Population	15.04 Mio [1]
Internet Users	2.3 Mio
Internet Users in percentage of the population	15%

Source: Census 2002, REUNA. All data 2002.

New technologies bring market growth to the Chilean economy. Although the prognosis for market growth in Chile for 2001 was 4.5%, it was expected that the telecom sector would enjoy a growth rate of about 7%. The main reason was seen in the growing market for new technologies.

The launch of the Wireless Local Loop in 2001 mainly served the expansion of the Internet usage. However, it was deployed mainly in the most economically suitable areas and did not contribute to bridge the connectivity gap that exists between the main population centres and the rural areas. The government established the goal of connecting 30% Chilean households to the Internet by 2004.

4.4.2   REUNA – The National Research Network of Chile

4.4.2.1 The Organisation

The National University Network (REUNA) is a non-profit, private law organisation whose members are 18 public and private universities in Chile. Research networking in Chile is funded via direct payment of the operational costs by the university members. No direct subsidy is given by any institution towards the costs of operating the network. The backbone bandwidth is provided by Telefonica through an agreement that included the ISP business operated by REUNA until 1997. For some network improvements and special projects funds are obtained through various tenders, of which the majority is managed by CONICYT, the national research, science and technology commission in Chile. Funds are also obtained through the connected universities. The other main source of funds for projects comes from CORFO, a government entity providing funds for the development of innovative business ventures.

REUNA provides national and international connectivity for research and development in Chile, the universities are free to connect to the provider of their choice for their commercial Internet connections.

It is estimated that in the 18 connected universities there are currently about 140,000 users using the REUNA network.

4.4.2.2 The Network

REUNA is a fibre optical network with a linear topology based on 10 backbone nodes from Africa to Osorno. The Network Operation Centre is based in Santiago. The universities are connected via an OC-3 link which uses the ATM protocol over SDH. The national connectivity is provided by Telefonica CTC, Chile. Figure 3 shows the REUNA network topology.
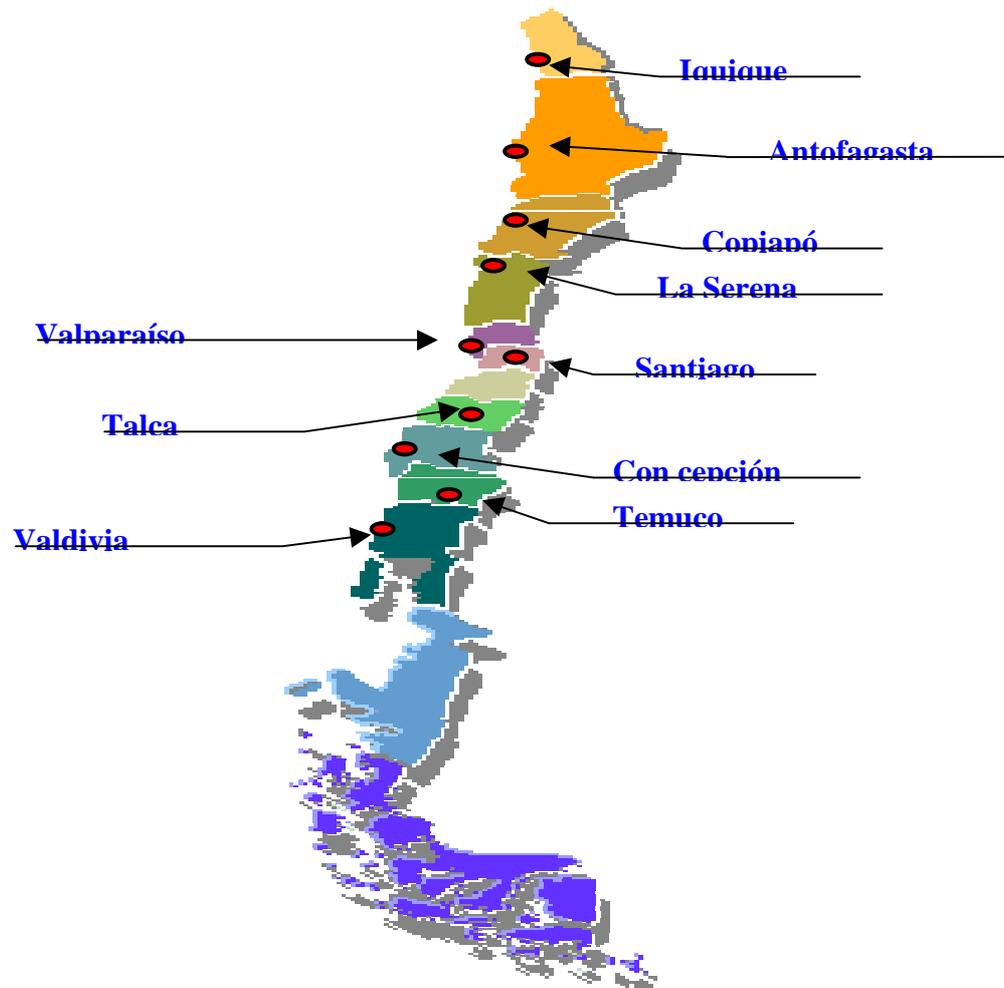
Fig. 3: Backbone Nodes of the REUNA Network

REUNA supports videoconferencing H.323 and ATM, Multicast ATM and IP, video streaming, cache for R&D networks, web services and provides platforms for Distance Education.

The traffic load of the network for R&D networking is currently 45 Mbps external and 100 Mbps total.

REUNA is connected to the North American research networks via a 45 Mbps link provided by Global Crossing in the framework of the AMPATH initiative.

4.4.2.3 Future Plans

REUNA plans to reach a backbone capacity of at least 622 Mbps within the next three years. The objective is to eventually have a backbone capacity of 2.4 GBps. It is also foreseen to connect to the international research networks in Europe, Asia and North America with speeds of at least 155 Mbps. REUNA hopes to have a regional network of 45 Mbps built in South America.

4.4.2.4 REUNA and CAESAR

REUNA expressed an interest in a direct connection to the pan-European research network GÉANT in order to improve the integration with the scientific community in Europe. Asked about the applications that would benefit most from such a direct interconnection REUNA named videoconferencing, Interactive Classrooms, Access to scientific instruments, access to European observatory sites and medical centres.

4.4.2.5 Contact Details

Red Universitaria Nacional
Canadá 239
Providencia
Santiago
Chile
Tel (56-2) 337-0340
Fax (56-2) 204-0865
http://www.reuna.cl

Executive Director: Florencio I. Utreras futreras@reuna.cl
Technical Manager: Sandra Jaque sjaque@reuna.cl

4.5   Status and Developments in Colombia

4.5.1   General overview

Population	38.9 Mio
Gross National Product (GNP)	89.8 Mio US$
Per capita GNP	2,311 US$
Per capita investment in IT	30 US$
Internet Users	300.000 [1)]
Internet users in percentage of the population	0.77[1)]

Source: population.com, bfai; all data 1998 except [1)] end 1997

The sector of Information Technology in Colombia still has a backlog demand and therefore shows a dynamic growth rate. Most sectors were seriously harmed by the grave economic crisis of 1999, the sector Information Technology and its related fields could however count on a stable demand. In 1998 there were about 30 Internet providers registered in Colombia. In 1997 the Colombian Telecom started to interlink the national providers in order to avoid traffic having to go via the USA.

4.5.2   RedCETCol – The Colombian Research Network?

In Colombia, the CAESAR questionnaire was sent to RedCETCol as well as the Colombian Ministry of Communications, but unfortunately not returned to us. In addition to this, RedCETCol does not have a web presence. After the CAESAR workshop in Toledo, we were, however, approached by a professor from the University de Cauca in Columbia. He stated that the situation of RedCETCol was unclear and that he would need a couple of weeks to investigate the situation and would be in contact with us again. Unfortunately, his input can not be considered in this report, but will be part of the Final Report.

4.5.2.1 Contact Details

CETCol
Jaime Velez
Director de InterRed
jvelez@bogota.cetcol.net.co
mrodriguez@mincomunicaciones.gov.co

Dr. José Fernán Martínez Ortega
Departamento de Telemática - DTm
Facultad de Ingeniería Electrónica y Telecomunicaciones - FIET
UNIVERSIDAD DEL CAUCA
Dir: Calle 5 No 4-70 Popayán – Colombia
Tel: (+57 2) 8209800 Ext. 2127
E–mail: jfmartin@ucauca.edu.co
Telefax: (+57 2) 8209813

4.6.   Status and Developments in Costa Rica

4.6.1   General Overview

Population	3,84 Mio [1]
Internet users	250,000
Internet users in percentage of the population	6.74

Source: population.com, ITU. All data 12/2000, except for [1] 1998.

Costa Rica is one of the Latin-American countries with the lowest illiteracy rate and one of the highest per capita incomes. For these reasons the demand for Internet access is very high. Up until 2001 there was only one provider for Internet services, the ICE (Insituto Costarricense de Electricidad) subsidiary RACSA (Radiografica Costarricense). In 2001 ICE announced a further expansion into the Internet market with a planned DSL network that was to connect 100.000 users. ICE had already collected experience in the field when it connected a couple of private enterprises and universities in April 2001.

4.6.2   CRNet – The National Research Network of Costa Rica

Unfortunately also Costa Rica did not return the CAESAR questionnaire. This was surprising to us, as CRNet is known as one of the more progressive research networks in the region and its President Guy de Teramond is known for his initiative. We also send mail requesting information to a technical person in CRNet, but also the mail was not answered.

The CRNet website from which this information is taken was created in 1996, the most recent information dates back to 1998. In his position of Costa Rica's Science and Technology Minister (until the beginning of 2002) Guy de Teramond gave an interview to the Linux Journal in January 2002. The existence of CRNet as a national research infrastructure was confirmed in this interview. However, due to the fact that most information given in this chapter is probably from the year 1996-1998 it has to be handled with caution.

4.6.2.1 The Organisation

CRnet was created as a not-for-profit organisation in 1993. The website states that there are 25 connected universities, research centres and governmental institutions. The Linux Journal Interview reported, however, that there are 24 connected universities and 10 governmental organisations.

4.6.2.2 The Network

Figure 4 shows the CRNet network topology as presented in the CRNet website. The sites are connected with speeds ranging between 32 Kbps and 128 Kbps. The website states that a couple of links are to be upgraded to 512 Kbps. The national connectivity is provided by the monopolistic provider ICE (Instituto Costarricense de Electricidad), the international connectivity is provided via a PanAmSat satellite link.

As we have not received any information from CRNet directly, we cannot give any information on their future plans or how they judge the CAESAR project.
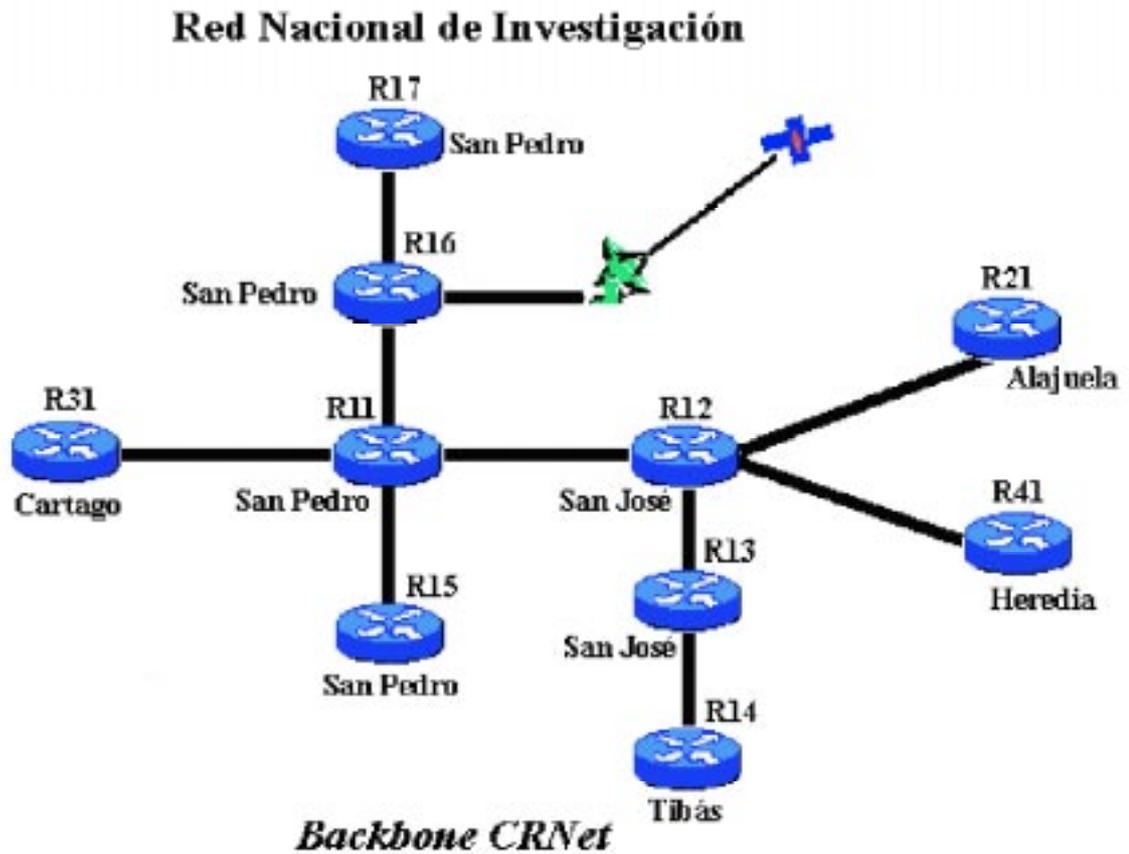
Red Nacional de Investigación

Fig. 4: CRNet backbone

4.6.2.3 Contact Details

CRNet
Red Nacional de Investigación de Costa Rica
Costa Rica - Centro América
http://www.crnet.cr
Teléfono/Fax: +506 225-5911

Presidente: Guy de Teramond, gdeter@ns.cr or gdt@ns.cr
CTO: Abel Gmo. Brenes Arce, abrenes@ns.cr

4.7   Status and Developments in Cuba

4.7.1   General Overview

Population	11.11 Mio [1]
Internet Users	60,000
Internet Users in percentage of the population	0.54

Source: population.com, ITU. All data 12/2000, except for [1] 1998.

The change to the modern information society is slow and difficult in the socialist republic of Cuba. However, with the turn of the Millenium, information technology was given a new priority, especially in the areas of public health, education and formation. Cuba has been connected to the Internet since 1996. Since 1997 the government is putting more emphasis on the usage of the Internet.

4.7.2   RedUniv – One of Cuba's national research networks

4.7.2.1   The Organisation

RedUniv is one of several research networks in Cuba and is the network of the Ministry of Higher Education. The RedUniv network interconnects 17 university centres, 5 research institutions, all of national character, and the network of the CENTIC, the Centre for New Information Technologies and Communications of the Ministry of Higher Education in Habana. Included in these organisations are approximately 60 libraries, all engineering universities, a great majority of the faculties for natural science and mathematics and the social science faculties. It is estimated that about 7,000 professors and scientists which represent more than half of the science conducted in Cuba are interconnected via the RedUniv network.

The various research networks that connect the universities and research centres are in different stages of development. Next to RedUniv, there are the networks of the Ministry of Public Health and of the Ministry for Science, Technology and Environment. The Ministry of Education (which is different from the Ministry of Higher Education) is at this point in time constructing its network. There are also research centres belonging to productive organisations that have their own links to similar organisations.

Scientific research is funded in various different ways. In the case of RedUniv the funding is derived from the resources of the connected centres, from collaborative work and from the central state funding bodies.

4.7.2.2 The Network

RedUniv connects at least one university or research centre in each of the Cuban provinces. For this reason the network covers the entire country. The connection speeds at this moment range from 19.2 Kbps to 2 Mbps, depending on the size of the connected institution. This is to be raised to 128 Kbps to 3 Mbps in the near future.

Fig. 5: Map of the Cuban research network RedUniv

The base technology of the network is IP. It is hoped that in the future there will also be use of ATM and WDM technologies as the technologies itself are already available in the country. There are many applications running in the network, these are mainly Virtual Libraries (as there is a library in each connected centre), interactive platforms, scientific-technical databases, normal Internet services(such as WWW, email, FTP, etc.), Distance Education (where the infrastructure is available), cultural content and formation for professionals to post-graduate level (in some provinces).

The national connectivity is provided by INFOCOM, which belongs to ETECSA , the incumbent Cuban telecommunications provider.

The RedUniv network is currently not connected to any of the advanced research networks around the globe. There are connections to the commercial Internet via satellite.

4.7.2.3 Future Plans

The research networks in Cuba develop in parallel, redUniv can currently be considered as the most advanced of the Cuban research networks. It is foreseen that in the next three years all research networks connect to a 1 GBps Cuban national backbone, with the connections within the country upgraded to at least 25 Mbps. International connectivity should move from satellite based to submarine cable based which would lead to an increase in bandwidth and stability.

4.7.2.4 RedUniv and CAESAR

It was stated that RedUniv was very interested in a direct connection to GÉANT. This would bring an immediate benefit to those researchers connected to RedUniv and a future benefit to all researchers as it could speed up the interconnection between the various national networks.

It was stated that there are currently important collaboration programmes running between Cuba and several European countries (mainly Spain, but also France, Germany and the UK).

A direct interconnection would facilitate the use of Distance Education Programmes, Virtual Libraries, joint research programmes and more.

4.7.2.5 Contact Details

Centre for New Information Technologies and Communications (CENTIC) of the Ministry for Higher Education (MES), Cuba
Address: Calle 23 #565 esq. a F. Vedado. Municipio Plaza. Ciudad de La Habana. Cuba. C.P. 10400
Telefax: (53+7) 830 3674
http://www.mes.edu.cu

Director CENTIC: Dr. Daniel Stolik Novygrod, dstolik@reduniv.edu.cu
Manager of the Network Office: Dr. Jorge Luis López Presmanes, pres@reduniv.edu.cu
Manager of Information Management: Dr. Raúl Torricella Morales, torri@reduniv.edu.cu
Administrator of the RedUniv Node in the MES: Ms. C. Jorge Daniel Villa, villa@reduniv.edu.cu

4.8   Status and Developments in Ecuador

4.8.1   General Overview

Population	12.17 [1)]
Internet Users	180,000
Internet Users in percentage of the population	1.39

Source: population.com, ITU. All data 12/2000, except for [1)] 1998.

4.8.2   FUNDACYT – working towards a research network for Ecuador

4.8.2.1 The Organisation

A national research network infrastructure does not exist in Ecuador at this point in time. FUNDACYT, the Foundation for Science and Technology in Ecuador organises an information network for Ecuadorian research activities (REICYT) and is working towards the creation of a national infrastructure.

FUNDACYT is a non-profit organisation created to support science and technology in Ecuador. It belongs to the Vicepresidency of the Republic. A second organisation is called SENACYT. This is the policy making body, FUNDACYT is the executive body.

REICYT (the Ecuadorian Information Network for Science and Technology) was created with funds received via a loan granted by the International Development Bank for the development of science and technology in Ecuador. Additionally, REICYT receives national support.

REICYT was formed by 29 universities and higher education institutions, 3 research institutions and one governmental office.

4.8.2.2 The Network

All REICYT institutions have their own independent connectivity to one of the commercial providers in Ecuador. The bandwidth of these connections ranges from 64 Kbps to 256 Kbps.

The technology used in these connections is based on IP and Frame Relay.

In the REICYT agreement every institution agreed to develop information services useful for their own institution and to provide bibliographical information (?) CHECK, Anita?.

There is no organised connectivity to the global Internet.

4.8.2.3 Future Plans

FUNDACYT and REICYT are working towards the development of a national research infrastructure in Ecuador.

4.8.2.4 FUNDACYT and CAESAR

It was stated that REICYT is an information network in which the connected universities and institutions develop different information services. The aim is to use the given infrastructure to create a research network. It was said that FUNDACYT and REICYT are very interested in a direct connection to GÉANT as this would give researchers access to updated

information for their research, remote databases, as well as the possibility to join collaborative activities.

4.8.2.5 Contact Details

Fundación para la Ciencia y la Tecnología – FUNDACYT
Av. Patria 850 y 10 de Agosto. Edificio Banco de Préstamos 9no. Piso. Quito – Ecuador
Telephone : (5932) 2505142 / 2550553
WWW: www.fundacyt.org.ec

Subsecretary of Science and Technology in Ecuador: Dr. Santiago Carrasco,
scarrasc@fundacyt.org.ec
FUNDACYT System Engineer: Anita Herrera, aherrera@fundacyt.org.ec

4.9   Status and Developments in El Salvador

4.9.1   General Overview

Population	6.03[1]
Internet Users	40,000
Internet Users in percentage of the population	0.65

Source: population.com, ITU. All data 12/1999, except for [1] 1998.

4.9.2   CONACYT – Working towards a research network for El Salvador

4.9.2.1 The Organisation

Research networking in El Salvador is organised by CONACYT, the Council for Science and Technology. CONACYT is a public law organisation, mainly autonomous, not-for-profit and decentralised. It is the authority for matters concerning Science and Technology in El Salvador. Research networking is funded by the Central Salvadorian government.

There is currently no research infrastructure in El Salvador. CONACYT is working towards such an infrastructure in the framework of the REDISAL project. It is foreseen that 30 universities and research centres will eventually connect to the network.

4.9.2.2 The topology

As there is no network, a topology can not yet be given. CONACYT, however disposes of a 386 Kbps dedicated link that is provided by TELECOM and a satellite link provided by SPRINT.

There are 15 ISP currently offering services in El Salvador. The main technology used is IP.

There is currently no direct connectivity to any of the advanced research networks in the world.

4.9.2.3 Future Plans

It is foreseen to create a national infrastructure for research and to keep upgrading and updating the information provided on the REDISAL website on universities and research centres. It is also planned to develop a database with a platform accessible to other research networks. Furthermore CONACYT would like to connect to the advanced research networks around the globe and to promote research networking within the country and abroad.

4.9.2.4 CONACYT and CAESAR

It was stated that there is a high interest in a direct connection with GÉANT. The benefits for the at this point in time rather isolated academic and research community would be countless. National researchers in El Salvador would have exposure to international science and would be able to exchange with researchers in similar areas of investigation.

4.9.2.5 Contact Details

Consejo Nacional de Ciencia y Tecnología (CONACYT)
Colonia Médica, Avenida Dr. Emilio Alvarez,
Pasaje Dr. Guillermo Rodríguez Pacas, edificio Espinosa No.51,
San Salvador, El Salvador,
Centro América.
Tel: (503) 226-2800
Fax: (503) 225-6255
Web: www.conacyt.gob.sv
         www.redisal.org.sv

Name	Email address	Job Title
Ing. Carlos Roberto Ochoa	crochoa@conacyt.gob.sv	Executive Director
Lic. Roberto Alegria	ralegria@conacyt.gob.sv	Head of Science and Technology Development
Ing. Doris Ruth Salinas	dsalinas@conacyt.gob.sv	Coordinator Information Technology Centre
Ulises Trujillo	ulisest@conacyt.gob.sv	Domain registration e IP
Ing. Luis Martinez	amartin@conacyt.gob.sv	Information Assistant
Ing. Myrna Evelyn de Vanegas	evanegas@conacyt.gob.sv	Head of Standardisation Metrology and Quality Control
Ing. Doris Margarita Jaime	djaime@conacyt.gob.sv	Coordinator Quality Systems
Ing. Rafael Lino	rlino@conacyt.gob.sv	Coordinador de Acreditación
Lic. Ricardo Harrison	rharri@conacyt.gob.sv	Laboratorios
Ing. Milagro Sandoval	sandoval@conacyt.gob.sv	Standardisation Corrdinator
		Coordinator for Product Certification
Lic. Felix Carcamo	fcarcamo@conacyt.gob.sv	Head of Financing for Science and Technology Development
Lic. Maritza Guerra	mguerra@conacyt.gob.sv	
Lic. Ana Delmy Garay	agaray@conacyt.gob.sv	International Cooperation Assistant
		International Cooperation Assistant

4.10   Status and Developments in Guatemala

4.10.1 General Overview

Population	10.80[1]
Internet Users	65,000
Internet Users in percentage of the population	0.51

Source: population.com, ITU. All data 12/1999, except for [1] 1998.

4.10.2 Research Networking in Guatemala

4.10.2.1   The Organisation

The national research network of Guatemala, MayaNet, was created in 1995 and existed as a research network for almost 5 years. Its members were the five existing universities, two regional research institutes and the National Council of Science and Technology (CONCyT). However, in 2000, CONCyT decided to take matters into its hands and developed a policy of letting government dependencies be a part of MayaNet. Soon, MayaNet no longer was academic/scientific but mostly governmental. Most of the original 8 members have retired from MayaNet. There is currently no initiative in the country to recreate a research infrastructure.

4.10.2.2   Contact Details

Luis R. Furlán
Director,
Tecnologías de la Información y Comunicación
Universidad del Valle de Guatemala
E-mail: furlan@uvg.edu.gt

4.11   Status and Developments in Honduras

4.11.1 General Overview

Population	6.14 Mio [1)]
Internet users	40,000
Internet users in percentage of population	0.64

Source: population.com, ITU. All data 12/1999, except [1)] 1998.

In 2002, the question whether to privatise or to liberalise the telecommunication sector is again at the top of the governmental agenda in Honduras. Although public-owned HONDUTEL is the company with the highest turnover in Honduras, so far it seems impossible to find an interested buyer for it.

In 1999 Honduras had about 300.000 installed telephone lines and a demand of another 425.000. HONDUTEL, however, is not in a position to cover the demand. HONDUTEL has an average of newly installed telephone lines per employee of 17, whereas in neighbouring Costa Rica and Guatemala, the rate is 150 to 180 per employee. This is one of many reasons why there is a big demand for the privatisation of HONDUTEL or the liberalisation of the telecoms sector in the country. In December 1999, 40,000 users were connected to the Internet, which means about 0.64 % of the population.

4.11.2 Research Networking in Honduras

Although we were at first promised a swift answer, we never received the CAESAR questionnaire back from Honduras. Therefore the following information has been gathered from the HONDUNET website. It is not entirely clear whether HONDUNET can be considered a national research network or not. The institutions that are connected to it, speak for an inclusion as a research network. However, the important involvement of the national provider HONDUTEL cast a doubt and leave the question whether or not Honduras has a research network open.

In 1993 the Hondurian Council for Science and Technology (COHCIT), coordinated the structure and formulation of the project HONDUNET. This was achieved through the participation of some academic institutions, such as the Pan-American agricultural school of Zamorano and the autonomous national university of Honduras (UNAH), the Honduranian telecommunications provider Hondutel and with the financial help of the Organisation of American States under the Red Hemisferica project. HONDUNET is the digital network of Honduras which provides connectivity between the academic institutions, laboratories and research centres, technology-driven companies as well as national institutions. HONDUNET interconnects these institutions based on Internet technology and via the HONDUTEL network. The backbone is based on CISCO routers in various points of presence throughout the country.

In 1995 Honduras was connected to the global Internet. The equipment was financed by the Organisation of American States and is located in the premises of Hondutel, the UNAH and COHCIT. Access can be achieved via a dedicated or a shared service. Currently only HONDUTEL, UNAH and COHCIT have dedicated access, with the Universidad Pedagogica de Honduras being in a trial period for dedicated access. A good number of other institutions have asked for direct access, such as academic and research centres, information centres, and various governmental organisations as well as governmental offices. Currently the network supports email, file transfers and access to the WWW. Every users is asked a symbolical fee of $12 per month.

4.11.2.1   Contact Details

Jorge Romero D.,
Director de Informatica del Consejo Hondureño de Ciencia y Tecnología COHCIT
romero@cohcit.gob.hn
jrd_hn@yahoo.com

4.12   Status and Developments in Mexico

4.12.1 General Overview

Population	95.83 Mio
Gross National Product	426 billion US$
Per capita GNP	4,392 US$
per capita investment in IT	42.33 US$
Internet Users	3.42 Mio [1]
Internet users in percentage of the population	3.36 [1]

Source: population.com, bfai, ITU; all data 1998, except [1] 07/2001

In the past 8 years, the Mexican telecommunications' sector grew four times as fast as the rest of the Mexican economy. The overall still low penetration of information technology in business, education and public services and the pressure of conformance with US standards exerted by Mexico's integration into the North American Free Trade Area (NAFTA) offer continuous great potentials for the future. The Internet grew between 1995 and 2000 from 94,000 to 2.7 Mio users and is projected to reach 9.5 Mio by 2004. The number of Internet Service Providers increased from 29 in 1995 to 248 in 2001. President Fox plans to launch the ambitious Internet project "e-Mexico" in 2002. Following the Singaporean example of "Singapore-One", "e-Mexico" aims at installing public Internet access facilities in 10,000 communities.

Mexico's telecommunications market is totally deregulated but still dominated by the de facto monopoly of Telmex, who still owns 94% of the terrestrial telephone network, 78% of the mobile sector and 60% of all Internet accesses.

4.12.2 CUDI – The National Research Network of Mexico

4.12.2.1   The Organisation

The Corporacion Universitaria para el Desarrollo de Internet (CUDI) and its national research infrastructure is financed via company sponsoring and payments received from the associated centres. Scientific and technological research in Mexico is initiated by the National Council for Science and Technology (CONACyT). CUDI membership currently numbers 70 universities or higher education facilities and 7 research institutions. It is estimated that about 1.4 Million students, professors and researchers study in CUDI member institutions.

Next to CUDI, the interconnection between research or education centres is based on private networks owned by the university connecting the institutions or also via the commercial Internet.

4.12.2.2   The Network

The topology of the CUDI network is based on three different levels. Level 1 is the 8000 km backbone that connects 22 main population centres in Mexico via 155 Mbps links. Level 2 is the access network for associated academic institutions via 34 Mbps and Level 3 the access network for affiliated institutions via links that have least 2 Mbps. All links are terrestrial and supported by the optical fibre networks of the Mexican network operators. The backbone connectivity and the majority of the access links have been donated by Telefonos de Mexico S.A. and Avantel. These companies also rent some access lines to the affiliated institutions.

The network is currently based on IP, IP+ATM and ATM technologies. CUDI is in the process of developing VPNs. The network also supports IPv4 and IPv6.

The networks supports applications in the areas of Distance Learning, Digital Libraries, Health, Earth Sciences, Robotics, remote laboratories and Astronomy.

The average weekly traffic load on the network currently amounts to 20 Mbps.
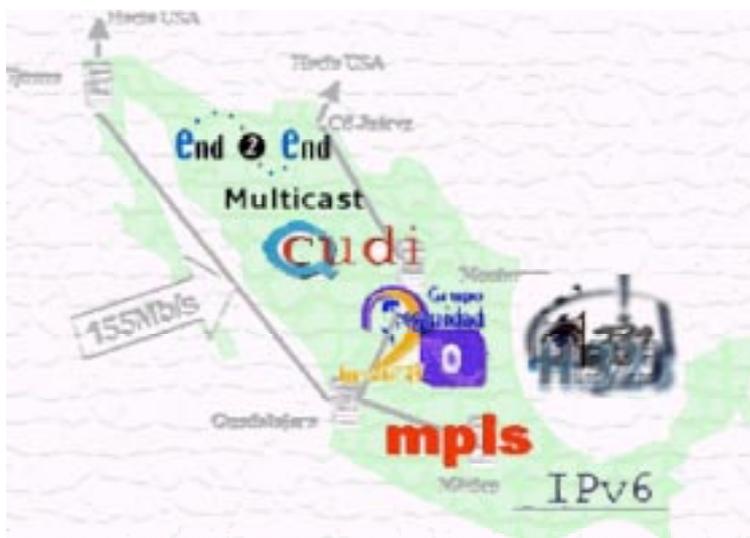

Fig. 6: The CUDI network

CUDI is very well connected to the North American advanced research networks with a 155 Mbps link to CENIC in San Diego and a 100 Mbps link to University of El Paso in Texas.

As a private research network, CUDI, does not have any interconnection with the commercial Internet. This exchange with the commercial Internet is organised by every University to its own needs.

4.12.2.3   The Future

It was stated that the objective of CUDI in the next three years is extend its reach to all higher education and research campuses in the country and to develop meaningful applications and collaborations.

4.12.2.4   CUDI and CAESAR

It was stated that as CUDI already has connectivity with GÉANT via Abilene, a direct connection would be seen as an alternative route towards the European destinations. The direct connection would improve the reliability of the already existing connection to GÉANT.

4.12.2.5   Contact Details

Corporación Universitaria para el Desarrollo de Internet (CUDI)
Vicente Suárez 92, Col Condesa CP 06140, México DF, México
Teléfono: +52 (55) 52113060
Fax: +52 (55) 52115199

http://www.cudi.edu.mx
Director General: Carlos Casasús López Hermosa ccasasús@cudi.edu.mx
General Coordinator: José Antonio Ramírez Vidal jarv@cudi.edu.mx
Network Committee: Gabriela Medina Galindo gabym@noc.unam.mx
Network Control: Hans Ludwing Reyes hans@internet2.unam.mx

4.13   Status and Developments in Nicaragua

4.13.1 General Overview

Population	4.8 Mio [1]
Internet Users	20,000
Internet Users in percentage of the population	0.42

Source: population.com, ITU. Data 12/1999, except [1] 1998.

With only 0.42% of the population having access to the global Internet in December 1999, Nicaragua forms the rear light of Internet usage in the Latin American countries. Nicaragua also had the lowest penetration of fixed telephone lines with only 30 lines per 1000 inhabitants in April 2001.

In March 2001, the Nicaraguan government announced a reduction of the minimum requirements for possible buyers of the monopolistic telecommunications provider ENITEL. This gave new momentum to the privatisation efforts which could lead to an improvement of the sector.

4.13.2 Research Networking in Nicaragua?

Over the last four months, we have not been able to establish contact to the research networking community in Nicaragua. In the beginning we tried to contact RAIN (Red Academica y de Informacion Nicaraguense) which was named as the national research network organisation in Nicaragua. However, the RAIN website (http://ns.ni/rain.html) is no longer accessible. In the next step, we asked the Director of the PANNET network in Panama whether she had a contact in Nicaragua. However, mail to the contact given to us returned, address unknown. In the beginning of May 2002, a DANTE employee attended a conference in Santo Domingo and brought home the contact details of a person in Nicaragua who works for the country's NIC, but although the mail this time was not returned, it remains unanswered.

For these reasons, we cannot comment on the situation in Nicaragua.

4.14   Status and Developments in Panama

4.14.1 General Overview

Population	2.76 Mio [1]
Internet Users	45,000
Internet Users in percentage of the population	1.6

Source: population.com, ITU. All data 12/1999, except [1] 1998.

In 1998, the national telecom operator of Panama, INTEL, was privatised. The British provider Cable & Wireless acquired 49% of the INTEL shares. In accordance with the contract, Cable & Wireless modernised the telephone system of Panama and in 2002 all telephone exchange points were for example digitalised. There are about 500,000 terrestrial telephone lines installed in the country which gives Panama one of the highest penetrations of terrestrial telephone lines in Latin America.

It is foreseen that the situation in the telecommunications sector will improve even further when the monopoly that Cable & Wireless holds will fall in 2003. This will bring new players into the market and it is expected that especially the Internet sector will profit as Cable & Wireless is currently the only Internet Service Provider in the country. The opening of the market is not only to bring down prices but it is also expected that new applications and new technologies will be made available.

4.14.2 PANNET – A University Network in Panama

4.14.2.1   The Organisation

There is no single research network in Panama. Each university, research centre or governmental organisation has its own network and connections. However, the PANNET network which is managed by the Technical University in Panama has a great importance in the country and also manages the .pa domain registry. The Universities and their networks are in general funded by the central state government.

The PANNET network interconnects the Technical University of Panama which has more than 10 connected research centres. It is estimated that PANNET is currently used by about 7,000 users.

4.14.2.2   The Network

The PANNET network is of extended star-shape. Every centre is connected via Frame Relay links. As there are centres of the Technical University in many regions of the country, the network covers the whole of Panama. The links are between 256 and 512 Kbps, with one 1.54 Mbps satellite link to the commodity Internet and one 1.54 Mbps link to the main PANNET node. The network is based on IP technology and also supports Multicast. Applications supported are the normal Internet services, such as Email, FTP and WWW as well as videoconferencing and virtual libraries.

Cable and Wireless Panama have donated both the national and international connectivity.

The traffic load per month on the network is 180 GB external and 22 GB in total.
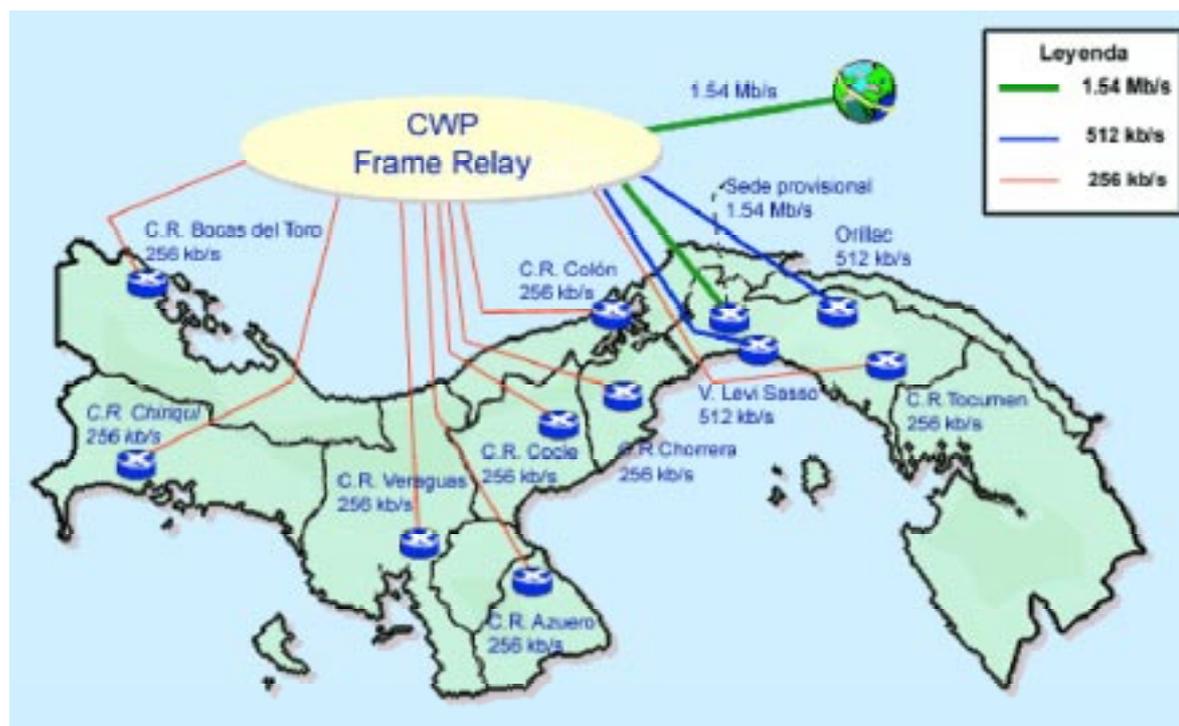
Fig. 7: The PANNET network

4.14.2.3   Future Plans

PANNET is planning to at least triple the current connectivity within the next three years to support the academic and research projects in Panama.

4.14.2.4   PANNET and CAESAR

It was stated that PANNET is interested in investigating the possibilities of a direct connection to GÉANT as the access to high-speed networks would optimise research in Panama in every sense. Today the network only interconnects the Technical University in Panama and there are no connections to other institutions nationally or internationally. A connection to GÉANT would improve the situation dramatically.

4.14.2.5   Contact Details

Universidad Technologia de Panama
Ave Manuel Espinoza Batista, campus, Octavio mendez Perreira, Sede Provisional
www.utp.ac.pa (University)
www.pannet.pa (Academic Network)

Director PANNET and administrative contact for the .pa domain:
Sidia Moreno de Sanchez , ssanchez@pannet.pa
Director of Networks and Communications:
Fernando Castillo, fcastillo@pannet.pa

4.15   Status and Developments in Paraguay

4.15.1   General Overview

Population	5.2 Mio [1)
Internet Users	75,000
Internet Users in percentage of the population	1.36

Source: population.com, ALADI Workshop, 2001. All data 2001, except [1)]1998.

Paraguay suffers from a great lack of communications infrastructure. Only about 6% of the population is covered by the national telephone network. This factor has of course seriously hampered the development of the Internet in the country. However, in the last years some more ISPs were able to bring their services to the market which led to an improvement of connectivity also for users who live outside the Capital Asuncion.

4.15.2   REDUNA – The Network of the Universidad de Asuncion in Paraguay

4.15.2.1   The Organisation

For many years, the National University of Asuncion has worked towards connecting its faculties to an academic research backbone. Today, 80% of the faculties are connected via a fibre optical network which is called REDUNA (Network of the Universidad Nacional de Asuncion). REDUNA is managed by CNC the National Computing Centre at the University de Asuncion. CNC has collaborated in this project since its beginnings and has supported the work in the areas of network design, development and implementation. In 1996 CNC has also established the connection to the commodity Internet via a satellite link.

The staff at CNC is highly technical and able to deliver technical solutions to the connected faculties. The group has achieved the first connection from Paraguay to the international Internet and today also is responsible for the .py domain.

The funds for the networks are obtained via consulting services, assistance and support for network development and implementation, as well as through courses given for professional formation and through the supply of Internet services to the academic community and the general public. There are currently 16 faculties at the University of Asuncion, 5 research centres and 30 governmental offices connected to the backbone. It is estimated that about 1,500 users are regularly using the network.

The national ISPs offer Internet services to the public and also connect various universities and research institutions.

4.15.2.2   The Network

The University network consists of the fiber optical backbone and various subnetworks of the academic entities. Via a satellite antenna which is managed by CNC connections are established between REDUNA and the Internet as well as the Metropolitan Network of the Public sector (RMSP). The fiber optical backbone is 10/100 Mbps. The local networks are based on 10/100 Mbps Ethernet networks. The connection to the Internet for the users of the Campus network is provided via an 896 Kbps satellite connection. The network is based on IP technology. ATM is used in the interconnection with the RMSP network and VPNs and Dial-Up connections are used to connect those academic institutions that are not located within the University campus.

The network supports the normal Internet services, such as WWW. Email or FTP, but also Distance Education applications.
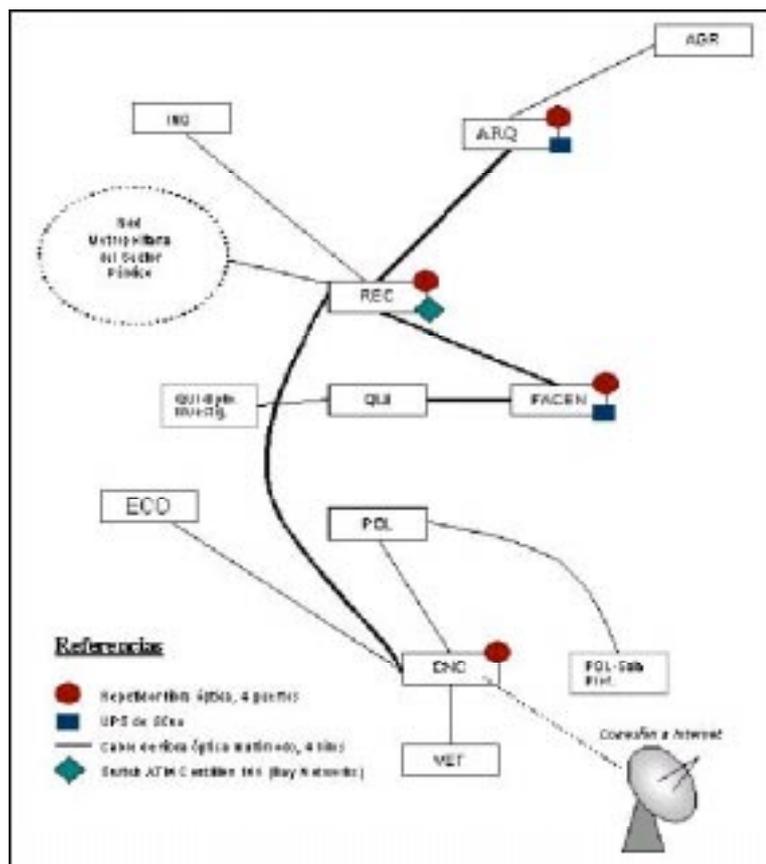
Fig. 8: The Network of the Universidad Nacional de Asuncion

There is currently no connection between REDUNA and a national Internet provider, however, it was mentioned that CNC is planning to upgrade its satellite connection which is provided by PanAmSat. The upgrade will include a connection to the national NAP which is connected to a national network of ISPs.

CNC is part of ENRED, the Forum of networks in Latin America and the Caribbean. The institutions also collaborate with the Iberoamerican Network for Software Technologies which is organised by CYTED. It was also stated that there is an active exchange with various Brazilian Universities and that CNC is associated to CLEI and actively participates in its informal network which brings CNC close to the research networking organisations in more than 12 countries.

4.15.2.3   The Future
It was stated that in Paraguay many projects which aim at promoting new technologies are planned, but that due to the economic situation it was very unlikely that any of these projects would see an implementation.

4.15.2.4   CNC and CAESAR
CNC stated that it was interested to connect directly to GÉANT, as this would bring benefit to the academic research community in Paraguay and that European researchers would certainly also benefit from the knowledge exchange. It was furthermore stated that the biggest advantage for researchers in Paraguay would be that they would no longer need to travel as information would be available through the network. As resources are extremely

scarce in Paraguay and academics are paid very low salaries, an interconnection with GÉANT would bring communication to a completely new level. CNC stated that they would be very willing to use their resources for the best of the community and to create as well as participate in educative programmes and international conferences using the network which would be beneficiary to all participants. The hope was expressed that a connection to GÉANT would create synergies which would improve the level of research and development in Latin America as well as in Europe.

It was stated that at this point in time bandwidth in the country was very limited and therefore videoconferencing could not yet be supported by the network. It was hoped that as bandwidth increases and with a connection to GÉANT, videoconferencing would be one of the applications to benefit. CNC also stated that their national GRID project would benefit substantially from a direct connection to GÉANT.

4.15.2.5   Contact Details

Centro Nacional de Computación
Universidad Nacional de Asunción
Campus Universitario, San Lorenzo
Paraguay
Tel./Fax: : 595 21 585550
http://www.cnc.una.py

General Director: Lic. Blanca de Trevisan,: blanca@cnc.una.py
Technical Director: Lic. Juan Segovia, jsegovia@cnc.una.py

4.16   Status and Developments in Peru

4.16.1 General Overview

Population	24.79 Mio [1]
Internet Users	2 Mio
Internet Users in percentage of the population	8.1

Source: population.com, OSIPTEL,Peru. All data 2002, except [1] 1998.

The estimates on how many people in Peru are currently able to connect to the Internet are very diverging. By mid 1999 the Red Cientifica de Peru (RCP) connected about 120,000 users, Telefonica de Peru an additional 100,000 users. It was estimated that in 1997 about 240,000 users could connect to the Internet using their own computer at home and that that figure had risen to about 400,000 by the beginning of 2000 and to 2 Million in 2002.

To improve the situation RCP investigated the forming of alliances with Telecom Italia as well as consortium of banks called WorldTel. The objective of the alliance was to build a optical fiber network in Peru's Capital Lima.

4.16.2 CONCYTEC – working towards a national research network for Peru

4.16.2.1   The Organisation

There is currently no national research infrastructure in Peru. Various universities and national research institutions, like the Institute for Nuclear Energy, the National Institute for Telecommunications, the Ocean Institute, the Institute for Fisching Technology and the Institute for Agricultural Research among others collaborate in various thematically organised networks. In order to interact these groups use the commercial Internet services provided by various commercial vendors in Peru.

CONCYTEC, the National Council for Science and Technology, leads the "Grupo Promotor de la Sociedad de la Informacion en el Peru" which is also participated by the President of the Council of Ministers, the Ministry for Transport and Communications, the National Institute for Statistics and Information, the National Institute for Telecommunication's Research and the supervising body of the private investment into telecommunications. The group' s objectives are to make proposals and plans for the development of the Information Society in Peru and to promote its uptake.

In the context of the development of the Information Society, the role of the creation of a national research network infrastructure and organisation is seen as very important.

Commercial Internet Services are provided by Telefonica del Peru, Millicom, Terra, Red Cientifica Peruana (RCP), Diario El Comercio and others.

CONCYTEC pointed out that in Peru, there are 76 universities, of which 31 are public and 45 private universities. The main population centre is the Capital Lima where 26 universities are located. Overall, it is estimated that there are 280,000 students in Peru. Within the university campuses there are a total of 215 libraries and 1169 laboratories.

4.16.2.2   The Future

It was stated that there are plans to create a national research network for Peru. At this point in time, CONCYTEC is gathering data about the public and private research institutions, to understand their situation and the potential for development in relation to research. The

survey also includes an analysis of the connectivity and information requirements of these institutions. Based on the results of the survey, the next steps will be planned.

4.16.2.3 **CONCYTEC and CAESAR**

CONCYTEC expressed an interest in connecting to GÉANT. It was stated that this would allow Peruvian researchers to collaborate and exchange information in an international environment. The Centre for Materials Research and the Centre for Biotechnology were named as organisations with a great potential to collaborate.

4.16.2.4 Contact Details

Consejo Nacional de Ciencia y Tecnología CONCYTEC
Calle del Comercio 197, San Borja, Lima
Tel: 225 1150
URL: www.concytec.gob.pe

Dr. Benjamín Marticorena Castillo, President,
Dr. Juan Sierra, Executive Director
Ing. Miguel Arestegui Matutti, Manager of the National Centre for Information and Documentation of Science and Technology
Dr. Nelson Manrique Gálvez, Manager of the Information Society Programme,

4.17   Status and Developments in Uruguay

4.17.1 General Overview

Population	3.2 Mio [1]
Internet Users	370,000
Internet Users in percentage of the population	11.1

Source: population.com, Jupiter Communications. All data 02/2000, except [1] 1998.

Within a regional comparison the level of education in Uruguay is very high. Expenses for Research and Development reach 0.5% of the GNP, also a high number in comparison with other countries in the region. The terrestrial telephone network is 100% digitalised. 26 of 100 inhabitants have a terrestrial telephone line, 3.4% a mobile phone and by 2000, more than 11% had access to the Internet.

Until today Administracion Nacional de Telecomunicaciones (ANTEL) is the only provider of national data communication. A slow process of liberalisation and demonopolisation has started which will eventually improve the situation, but so far the results are very limited. It is to be noted that Uruguay is a country with only about 3 Million inhabitants and a significant and increasing level of poverty which might make investments little attractive.

4.17.2 RAU – The National Research Network of Uruguay

4.17.2.1   The Organisation

The Red Academica Uruguay (RAU) is managed by the Univeridad de la Republican Montevideo. The university is autonomous and receives its funds from the government. RAU was created in 1990 by the Central Information Services of the Universidad de la Republica after it had received an important investment in equipment. The objective of RAU is to bring information and communication services to the academic community of Uruguay.

4.17.2.2   The Network

The RAU network topology is star-shaped with the central node situated in the Information and Communications Services (SeCIU) section of the Universidad de La Republica. SeCIU itself is connected to the local telecoms provider ANTEL which supplies the national and international Internet connections. In Montevideo there are

34 links of 64 Kbps
6 links of 128 Kbps
5 links 256 Kbps
1 link of 1 Mbps

At this point time RAU migrates all 64 Kbps links and some of the 128 Kbps to 256 Kbps links. Some of the 256 Kbps links migrate to 1 Mbps.

Intraregional there are the following links:

2 links of 128 Kbps
1 link of 64 Kbps
One 512 Kbps in the process of being implemented

Links to the national provider Antel

Additional there is a 2 Mbps link for the traffic with the rest of Uruguay as well as for regional traffic to Brazil and Argentina. International connectivity is achieved through a 4 Mbps link. The international network connections are managed by ANTEL.

The network offers access to the Internet for academic institutions, non-governmental institutions and state entities. RAU also manages the .uy domain, offers web-hosting as well as email services for professors and academic staff.

4.17.2.3   The Future

It was stated that at this point in time, the RAU network seeks connectivity with the North American Internet2 networks. This connectivity is supposed to be achieved via the research networks of Brazil or Argentina which are connected to Abilene via AMPATH. It was stated that the most important obstacle of this connection are the high prices offered by ANTEL for connectivity of more than 2 Mbps bandwidth.

It was stated that RAU has launched an important publicity activity within the academic community to make the RAU activities more known. The activity also aims at pointing out the difficulties that still exist with access to the Internet. All Rectors of the Universities, as well as all Directors of the Research Institutions in Uruguay are currently signing a document which highlights the problems reaching the Internet 2 because of high prices for telecommunications. This paper will be presented to the President of Uruguay in a press conference.

4.17.2.4   RAU and CAESAR

It was stated that RAU was interested in connecting to GÉANT and very interested in connecting to a regional Latin American network. This would foster regional and international collaboration and would open important opportunities for researchers at universities and research institutions in Uruguay.

4.17.2.5   Contact Details

RAU
Universidad de la Republica
Colonia 2066,
CP 11200, Montevideo
Uruguay
Telephone: (5982) 408 39 01
Fax   :   (5982) 401 58 43
URL: www.rau.edu.uy

Ida Holz, Director, holz@seciu.edu.uy
Luis Castillo, Coordinator Hardware and Communications

4.18   Status and Developments in Venezuela

4.18.1 General Overview

Population	23.24 Mio [1]
Internet Users	950,000
Internet Users in percentage of the population	4.04

Source: population.com, ITU. All data 02/2000, except [1] 1998.

4.18.2 REACCIUN – The National Research Network of Venezuela

4.18.2.1   The Organisation

REACCIUN, the national research network of Venezuela is managed by the National Centre
for Information Technology (CNTI), which belongs to the Ministry of Science and
Technology in Venezuela. The network is funded by the state government via the budget
given to the universities and research organisations which are connected to the network.
Currently there are 78 institutions connected to REACCIUN, 30 of which are universities or
higher education facilities, 10 are research centres and 38 are governmental institutions or
private companies whose research supports the academic research and development of the
country.

4.18.2.2   The Network
The REACCIUN network is star-shaped with a central node in CNTI from where the network
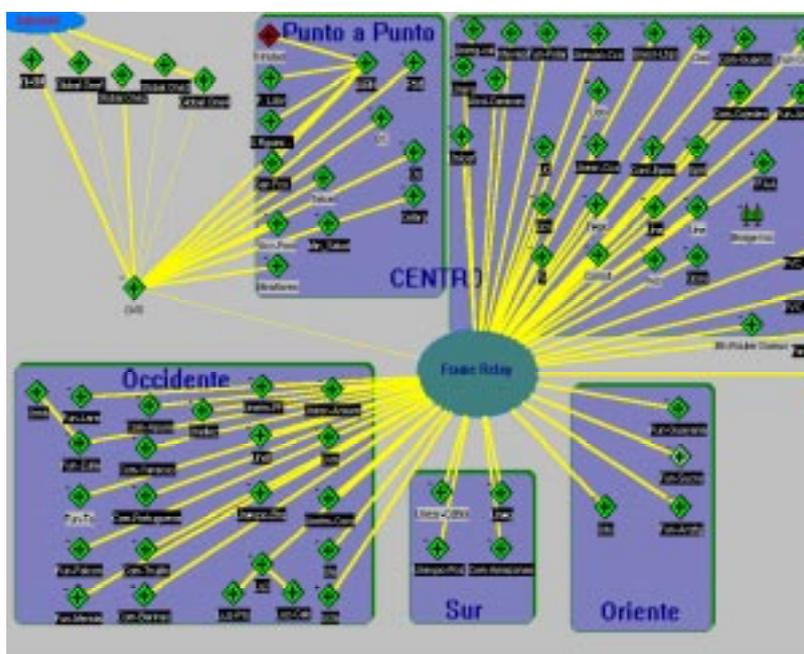is managed.

Fig. 9: The REACCIUN Network

The network is based on IP technology using Frame Relay and Wireless, and supports all application supported by IP. Traffic in the networks amounts to 16 Mbps total. The provider of the national connectivity is Compania Anonima Nacional Telefonos de Venezuela (CANTV).

International connections are provided by Verestar and Equant. One connection is based on a satellite link and allows for a direct connection to the USA. The other link is based on microwave technology to the PoP of a national provider which then provides connectivity to the US commodity Internet.

4.18.2.3   The Future

It was stated that at this point in time the research network is working towards becoming an "Internet2", which entailed a significant upgrade of the national and international connectivity. It was added that REACCIUN is currently in the process of affiliating itself with the North American AMPATH initiative.

4.18.2.4   REACCIUN and CAESAR

It was stated that REACCIUN could consider affiliating itself with the CAESAR project for direct connectivity to GÉANT as this would allow researchers in Venezuela access to information about similar research projects around Europe.

4.18.2.5   Contact Details

Centro Nacional de Tecnologías de Información (CNTI)
Avenida Abraham Lincoln, piso 6, plaza Venezuela, Caracas.
Phone: +58-212-794-0695.
WWW: http://www.cnti.ve.

General Manager: Jorge Berrizbeitía, jorgeb@reacciun.ve.
General Manager: Sarah Da Rocha, sdarocha@reacciun.ve
Technical Manager: Luis Miguel Vázquez, lvazquez@reacciun.ve.

5.   FIRST CONCLUSIONS

The Final conclusions of the CAESAR project can only be drawn once the data from the traffic and demand analyses has been gathered and evaluated, the information received from the operators has been analysed, the findings of the CAESAR workshop in Toledo been taken into account and in-depth discussion with the Latin American partners have taken place .

However, we feel that at this stage first conclusions can be given.

The main conclusion from the study so far is that there is a need for regional connectivity within Latin America. In order to interconnect Latin America and Europe from region to region and in a cost-effective way a regional research network infrastructure needs to be created. In parallel, the organisational setup that such a regional network would need, will have to be investigated and planned.

Throughout the project, we have tried to group the countries and their research networking activities into different clusters to reduce the amount of different approaches from 18 to a smaller number. At first we thought that we should probably have three different clusters, but now, having analysed the situation in each of the countries, we came to the conclusion that a more precise grouping would consist of 5 different clusters.

Table 2 provides a quick overview of the main characteristics of the NRENs or related organisations in the 18 Latin American countries.

Country	Organisation	Existing NREN?	national connections	external capacity	Number of connected sites	connection to US Internet2
Argentina	RETINA	yes	256 Kbps – 34 Mbps	59 Mbps	56	yes
Bolivia	BOLnet	yes	64 – 128 Kbps	1.5 Mbps	18	no
Brazil	RNP	yes	2 – 30 Mbps (backbone up to 622 Mbps)	202 Mbps	369	yes
Chile	REUNA	yes	155 Mbps	45 Mbps	18	yes
Columbia	RedCETCol	not known				
Costa Rica	CRNet	yes	32 –512 Kbps	not known	34	no
Cuba	RedUniv	University Network	19.2 Kbps – 2 Mbps		23	no
Ecuador	FUNDACYT	in planning				no
El Salvador	CONACYT	in planning				no
Guatemala		non-existent				no
Honduras	HONDUnet	not known				
Mexico	CUDI	yes	2 – 155 Mbps	255 Mbps	77	yes
Nicaragua		not known				
Panama	PANNET	University Network	256 – 512 Kbps	1.54 Mbps	11	no
Paraguay	REDUNA	University Network	10/100 Mbps fibre optical backbone	896 Kbps	51	no
Peru	CONCYTEC	in planning				no
Uruguay	RAU	yes	64 Kbps to 1 Mbps	6 Mbps	46	no
Venezuela	REACCIUN	yes			78	no

Table 2: The Main Characteristics of the Research Networking Organisations in 18 Latin American Countries

Group A is formed by the big (in bandwidth) and relatively advanced research networks with already existing connectivity to GÉANT via their established connections to the US Internet2 networks. Argentina, Brazil, Chile and Mexico form this Group A. Their research networking activities are comparable to what is done in many European NRENs at this moment.

Group B is formed by those networks that can be found in Bolivia, Costa Rica, Uruguay and Venezuela. Like Group A, these countries have consolidated national research networks. Their infrastructure is based on less bandwidth and they have not yet achieved connectivity to other global research networking activities.

Group C is very similar to Group B, with the important difference that in Cuba, Panama and Paraguay there is not a single research network infrastructure, but various networks in the case of Cuba and in the case of Panama and Paraguay university networks that are more or less developed. In all three cases the networks approached by CAESAR, RedUniv, PANNET and REDUNA respectively, are leading the research networking activities in their country.

Group D is formed by Ecuador, El Salvador and Peru. In these countries there is no research infrastructure (yet), but there are governmental organisations working towards the creation of one.

Group E is made up of those countries where there is currently no research network infrastructure and also a lack of political interest to create one. Colombia, Guatemala, Honduras and Nicaragua are clustered into this group.

The countries in Group A are the most likely countries to be able to form a regional network. All four countries have well established national and international connectivity. From the organisational point of view, the networks clustered in Group B and C, should also be able to join the regional network alongside Group A. It is possible, however, that Group C, due to the fact that they are not single consolidated national research networks could face higher national obstacles to connect to a regional network.

It can be foreseen that eventually also the countries in Group D would find ways to connect to the regional backbone and maybe even in parallel build their national research infrastructure. It could also be that the opportunity to connect to GÉANT via a regional backbone could create a momentum that would facilitate the creation of the national research network in these countries.

As for the near future (within the next three years) we can foresee difficulties connecting the countries in Group E (Colombia, Guatemala, Honduras and Nicaragua) to the regional Latin American network in order to connect to GÉANT.

The follow-up from the successful CAESAR workshop in Toledo which was held in June 2002, will help to bring about a clearer picture on the possible solutions for intra-regional connectivity within Latin America, as well as for an interconnection of the two regions. During the workshop the representatives of the 12 Latin American research network organisations present committed to deal with the issue of a Latin American research networking organisation and regional connectivity. The Final report of the CAESAR project will take these findings into consideration and will make final recommendations.

ANNEX 1

A.   Questionnaire English Version

1.   Your Organisation
- Please state the name of your organisation, full address, telephone number and website
- Please state the names and email addresses of your key personnel (management and technical)
- Please describe who organises research networking in your country (governmental office, private organisation, etc.).
- How is research networking funded in your country?
- Is there another organisation providing connectivity to the national research community apart from your organisation?

2.   Your Network
- Please describe the network topology
- Please supply a network topology map which includes the bandwidth of the links and differentiates between satellite and terrestrial links
- Please name the provider(s) of your national connectivity
- Please describe the technical set-up of your network and the underlying technology (IP, ATM, WDM, Multicast, VPN, etc.)
- Please describe the applications currently supported
- How many institutions are currently connected to your research network?
    - Number of universities and higher education facilities
    - Number of research institutions
    - Number of governmental offices and public services (libraries, hospitals, etc.)
    - Others
- What is the approximate number of users connected to your research network?
- What is the average traffic load?
- Please describe your plans for the development of research networking in your country in the next 3 years.

3.   Your International Connections
- Please describe your network connections to other research networks in Latin America
- Are you connected to any of the US research networks? (Abilene, ESnet, NASA, etc.)
- Are you a member of the AMPATH project?
- Please describe your network connections to the commercial Internet
- Are you connected to the ARCOS ring? (only, Cuba, Venezuela, Colombia, Panama, Costa Rica, Nicaragua, Honduras, Guatemala, Mexico)
- Please name the provider(s) of your international capacity
- What is the price in Mbps/month of your international connectivity?

4.   CAESAR
- Is your organisation interested in a direct connection to GEANT?
- Please name a possible Point of Presence (POP) for the direct connection to GEANT.
- What would be the benefit to research networking in your country?
- What applications would benefit most?
- Please state contact details of researchers in your country that could benefit from a direct interconnection (if known).

B.   Cuestionario Version Española

1.   La organización

- Indicar el nombre de la organización, dirección completa, número de teléfono y dirección de su presencia en el WWW
- Indicar los nombres, apellidos y direcciones de correo electrónico (email) de su personal responsable (gestión y técnico)
- Describir quién gestiona la red de investigación en su país (una oficina gubernamental / empresa privada, etc.)
- ¿Quién proporciona los fondos para la red de investigación en su país?
- ¿Existe alguna otra organización que proporcione conectividad a la comunidad investigadora en su país, aparte de su organización?

2.   La red de investigación

- Describir la topología de la red
- Incluir un mapa de la topología de la red, incluyendo el ancho de banda de los enlaces y diferenciando entre los enlaces terrestres y los de satélite
- Proporcionar el nombre del proveedor o proveedores que proporcionan su conectividad nacional
- Describir las tecnologías que se utilizan (IP, ATM, WDM, Multicast, VPN, etc.)
- Describir las aplicaciones soportadas
- ¿Cuántas instituciones están conectadas a la red de investigación?
    - Número de universidades e instituciones de educación superior
    - Número de centros de investigación
    - Número de oficinas gubernamentales y servicios públicos (bibliotecas públicas, hospitales, etc.)
    - Otros (escuelas...)
- ¿Cuántos usuarios, aproximadamente, están conectados a la red de investigación?
- ¿Cuánto tráfico hay en la red, aproximadamente? (externo/total)
- Describir los planes para el desarrollo de la red de investigación en su país en los próximos tres años.

3.   Conexiones internacionales
- Describir los enlaces con otras redes de investigación en América Latina
- ¿Está la red conectada con las redes de investigación en EEUU (Abilene, ESnet, NASA, etc.)?
- ¿Es la red un miembro del proyecto AMPATH?
- Describir los enlaces con la red Internet comercial
- ¿Está la red conectada con ARCOS? (solo Cuba, Venezuela, Colombia, Panamá, Costa Rica, Nicaragua, Honduras, Guatemala, Méjico).
- Proporcionar el nombre del proveedor o proveedores que proporcionan su conectividad internacional
- ¿Cuál es el precio de su conectividad internacional en Mbps/mes?

4.   CAESAR
- ¿Está interesada la organización en una conexión directa con GÉANT?
- Proporcionar el nombre y datos detallados de un posible Punto de Presencia (POP) para la conexión directa con GÉANT

- ¿Cuál seria el beneficio para los investigadores en su país?
- ¿Qué clase de aplicaciones podrían ser más interesantes?
- Proporcionar detalles de contacto de investigadores en su país que podrían beneficiarse de una conexión directa (si se conocen).

C.   Questionario Versao Portuguesa

1. INSTITUIÇÃO
- Nome da Instituição/Endereço Postal (sede social)/Telefone/Página da Internet.
- Nome e endereço de correio electrónico dos responsáveis da instituição (Direcção e Área Técnica)
- Descreva quem é a entidade responsável pela Rede Académica e de Investigação no seu país (departamento governamental, instituição privada, etc.)
- Como é financiada a Rede Académica e de Investigação no seu país?
- Para além dessa instituição, existe actualmente no seu país mais alguma entidade que forneça conectividade à comunidade académica e de investigação?

2. REDE
- Descreva a topologia da Rede.
- Forneça um mapa com a topologia da Rede incluindo a largura de banda para cada um dos *links* e diferencie *links* terrestres de l*inks* satélite.
- Indique os fornecedores de serviços (*providers*) da sua Rede.
- Indique a arquitectura da rede bem como as tecnologias de suporte à mesma (IP, ATM, WDM, Multicast, VPN, etc.)
- Enumere as aplicações existentes na Rede bem como os serviços oferecidos.
- Actualmente qual o número de instituições ligadas à sua Rede?
  - **-** Número de Universidades e outras Instituições de Ensino Superior;
  - **-** Número de instituições de I&D;
  - **-** Número de organismos da administração pública (bibliotecas, hospitais, etc.);
  - **-** Outros (Escolas, etc).
- Qual o número aproximado de utilizadores finais ligados à Rede?
- Qual é a carga média da rede? (externa/total)
- Descreva os planos de evolução da Rede do seu país para os próximos 3 anos.

3. LIGAÇÕES INTERNACIONAIS
- Identifique e descreva as interligações existentes com outras Redes Académicas e de Investigação da América Latina.
- Está ligado a alguma uma das Redes Académicas e de Investigação dos EUA (Abilene, ESnet, NASA, etc.)?
- É membro do projecto AMPATH?
- Descreva as ligações da sua Rede à Internet comercial.
- Está ligado ao ARCOS *ring* ? (só aplicável a Cuba, Venezuela, Colômbia, Panamá, Costa Rica, Nicarágua, Honduras, Guatemala, o México)
- Identifique o nome do(s) fornecedor(es) de serviços (*provider*) que garante(m) a sua conectividade internacional.
- Qual o preço Mbps/mês da sua conectividade internacional?

4. O CEASAR
- A sua instituição está interessada em ter ligação directa com o GEANT?
- Indique e dê algumas indicações sobre um possível Ponto de Presença (PoP) para acolher a ligação ao GEANT.
- Quais seriam as vantagens desta ligação para a Rede de investigação do seu país?
- Que aplicações tirariam dela maior proveito ?
- Indique os contactos de investigadores do seu país que poderiam beneficiar de uma ligação directa (se conhecidos).