



RNP
Rede Nacional de Pesquis

**BRAZILIAN RESEARCH
NETWORK
(REDE NACIONAL DE PESQUISA)**

General Overview

**TADAO TAKAHASHI
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ABSTRACT

This paper describes the development of the academic network in Brazil. It summarizes the present physical, institutional and operational situation of the Brazilian Research Network.

THE BRAZILIAN RESEARCH NETWORK (RNP):

A GENERAL OVERVIEW

Non-commercial networks in the World

The second half of this century was, undoubtedly, marked by the so-called **revolution of Informatics**, provoked by the massive application of computers in all human activities, from the most remote and advanced to the more immediate and prosaic. Even in Brazil, the wide diffusion through the mass communication media made the computer a familiar item in the Brazilian socio-cultural context. If, on the one hand, the typical Brazilian family is far from having access to personal computers, which is still a consumer item of the medium/high class, there is undoubtedly a generalised knowledge of the strategic role of computers in modern life.

In common judgement, a computer is directly related to **arithmetical and symbolic processing** at unimaginable speeds. The computer is, according to this viewpoint, an amplification of the "cerebral" functions of the human being. More recently, the dissemination of graphical and voice applications reshaped the image of the computer as something also related with the enlargement of **vision and speech abilities**. Finally, the generalisation of applications in which computers control mechanical arms, assembly lines etc., leads also to their being related with the extension of **traction and motion abilities**. All of these perceptions, permeated by qualities of unending **speed, precision and strength**, in a final analysis, composes today the "spoken photo" of computers as dull versions of the robot heroes that star successful films in the world and in Brazil.

There is another revolution under way, in which computers also have a central role, and that is less known by the general public, although it may be the most important one: the **revolution of communication networks**

Certainly, instantaneous communication around the world is part of the universe of possibilities of the layman, thanks to the telephone, and principally thanks to TV communication systems by satellite: the live transmissions of the World Soccer Cup and of the Formula One races no longer surprise anyone.

There is, however, another type of communication, namely, that of **computer networks** for non-commercial uses, which has grown in recent years to a dimension unimaginable to the lay person.

Computer networks began to be formed at an appreciable level in the United States, in the seventies, for military uses. The success of the military initiative led the research community in the US to form, in the eighties, **networks to support education and research** where use was practically **at zero cost for the professor or student**, through the splitting of the communication costs between the academic institutions which decided to participate. Probably the most important network in the eighties, the so-called BITNET, that began in 1983 with the interconnection of two Universities, could count something of the order of 2,500 participating institutions in 1990, in the US, and was associated with networks in Europe, Japan and Latin America. Through BITNET, a Brazilian researcher can today daily interact with his peers throughout the world, at practically zero cost, sending and receiving **electronic messages**. The researcher can participate in **electronic conferences, discussion groups**, etc., dispersed in the world, without leaving his work-place.

The networking phenomenon, which had started in the US as a military application and was then generalised in the higher education and research community, rapidly spread to other areas and places.

For example, the area of **first and second level education** was one of those most active in the use of networks in the US. Many country-wide networks (i.e.: K12net) and specially of regional coverage were built up in the US, with ramifications in other countries.

In parallel, networks for the most diverse uses were assembled (PEACENET, ECONET, FIDONET etc.), by non-governmental organisations with common ends, enlarging their reach and efficacy of action to almost the whole world.

Finally, already in the nineties, networks tend to continue to grow in the world in two complementary directions, namely:

- gaining presence in the homes of common people, as a facility similar to the FAX and telephone, that, by the way, they complement, using the same telephone line, and
- forming a gradually integrated **network of networks**, which already has global reach.

Non-commercial networks in Brazil

Brief history

In Brazil, educational networking initiatives began to materialise in 1988, with the installation of three leased connections to the United States at FAPESP, LNCC and UFRJ. These connections fundamentally sought to permit communication between educators and researchers of universities and research centres in Brazil and their peers abroad. The principal institutions of this type in the country were quickly connected to LNCC or FAPESP, and the embryo of a Brazilian **academic network** began to take shape. The main connections and institutions active in networks in the country today, are shown in Figure 1.

Still in 1988, CNPq initiated a study that sought to organise the necessary federal efforts in networks and guarantee the orderly growth of network embryos in each state. The study led to the launching of a project in 1989, the National Research Network (RNP), on the part of SCT/PR, whose execution is being coordinated by CNPq.

Figura 1: Current Connections in Brazil (f03492ia.ps)

The main activity of RNP during 1992 has been the implementation of a **backbone of connections** with **points-of-presence** in the principal state capitals of the country, complemented by **connections to USA, Europe and Latin America**. While inheriting a few connections from the presently operating structure, this backbone intends to optimise the national infrastructure, assuring:

- compatibility of technological solutions,
- efficiency and global robustness of the connection grid, and
- dissemination of networks in all states and regions of the country.

The proposed backbone (according to Figure 2), should be concluded till next June, and the global equipment costs (US\$650 thousand) and connections (some US\$1 million per year) are being integrally covered by CNPq.

In parallel to (and, in at least two cases, SP and RJ, anticipating) the efforts of RNP, the main states in the country are planning or implementing complementary regional connections, so that, until the end of 1992, one expects to have a network covering practically all the large educational centres in the country.

Therefore, the cost for an institution to be connected in the network will be limited to the cost of the connection to the nearest **point-of-presence** of RNP or the state network where the institution is located. All services from then on will have **zero cost** for the institution.

Figura 2: The Backbone of RNP

Strategy of action of RNP

As can be understood from the brief description above, RNP has been prioritising:

- the installation of the national connection backbone, and
- the seeding of complementary efforts in the states.

This present action is the first step of a medium-range strategy, which is composed of the following steps:

- i. Implementation of basic connection facilities (1991/1992)
- ii. Implementation of basic services for general use (1992/1993)
- iii. Offering of applications to an amply diverse audience (1992/1994)

Step (i) is the current priority, which will have a first phase concluded by July '92, and will be followed by upgrading efforts still in 1992, to be implemented in 1993.

Step (ii) has begun in 1992, and includes the planning and implementation of the following services:

- repositories of software and documents, in the country;
- uniform access to data bases in various areas;
- access to bibliographic and request of reference copies data bases; and
- inter-operability between services.

Finally, step (iii) includes the further efforts in various directions, including the offering of services to communities with very specific interests, such as

- visually impaired people;
- first/second level students;
- remote posts where the facilities of telecommunications are precarious or non existing.

The underlying idea is that RNP be able not only to support research and education networking, but also to offer services in a wider spectrum and, why not, of more immediate social interest to society.

Involvement and financing of RNP

The implementation of RNP has counted with the participation of practically all the large R&D institutions in Brazil. Particularly, RNP has a Technical Committee that is presently composed by the following researchers and specialists:

<i>Name</i>	<i>Institution</i>	<i>Area</i>
Abigail Carvalho	UFMG	Human Sciences
Alexandre Grojsgold	LNCC	Networks
Daniel Sigulem	EPM	Medicine & Health
Hélio Kuramoto	IBICT	Sciences of Information
Jason Gallas	UFSC	Physics
Liane Tarouco	UFRGS	Networks
Michael Stanton	PUC/RJ	Informatics
José Augusto Suruagy	UFPe	Informatics

From a concrete point of view, RNP operates in 1992 with headquarters in Campinas, a centre of operations at FAPESP, in São Paulo, an information centre at LNCC, and a laboratory at IMPA. The networking project is subordinated to CNPq in Brasília, and each **point-of-presence** of the backbone will be under the responsibility of an institution, by delegation of the Government of the state where it is located, as follows:

<i>State</i>	<i>Point-of-Presence</i>	<i>Institution</i>
Pará	Belém	UFPA
Ceará	Fortaleza	UFCE
Pernambuco	Recife	ITEP
Bahia	Salvador	UFBA
DF	Brasília	CNPq
Minas Gerais	Belo Horizonte	UFMG
São Paulo	São Paulo	FAPESP
Rio de Janeiro	Rio de Janeiro	LNCC
Paraná	Curitiba	CELEPAR
Santa Catarina	Florianópolis	UFSC
Rio Grande do Sul	Porto Alegre	UFRGS

As for financing, RNP has operated along the following lines:

- i. Basic funding (equipment, cost of connections, costing of activities, scholarships) has been borne by CNPq and SCT, for activities of federal scope¹
- ii. Complementary support in the country, in equipment, software, operating expenses etc., has been received from various companies, such as UNISYS, DEC, SUN, etc., and specially IBM.
- iii. Indirect complementary support abroad, in lesser scale, has been obtained from organisms as OAS, PAHO, PNUD, etc.

The financing for the implementation of a large facility such as a network is necessarily a long term multi-institutional effort, where one of the principal problems is to harmonically manage the interests of the network, the end-users and sponsors.

In the case of RNP, the following tentative division of interests has been pursued, in the process of obtaining the resources for the network²

In each state, the local efforts are independently financed, through the local state governments, generally via foundations or funds for support to research. Special mention should be given to SP, RJ and RS, which have participated in RNP since the beginning.

<i>Type of activity/cost</i>	<i>Possible sources of funds</i>
Equipment and basic connections, costing of services, operation of the Network at Federal level	CNPq, SCT/PR, FINEP
Technical events, initial research and development, equipment, Software	CNPq, Companies (IBM, DEC, ORACLE SUN etc.)
Cost of local and international connection (from 1993)	IDB, World Bank, TDP-US, EMBRATEL
International cooperation (from 92/93)	OAS, PNUD, ONUDI, JICA, FUNDESCO ANTORCHAS, ANDES, NFS
Applications towards social ends (from 1992)	PNUD, VITAE

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² The larger part of the potential sources of support starts to be formally approached in 1992, with the basic part of the national network already concluded.

Liaison Activities

A network is by definition an open-ended effort. Thus, RNP has to coordinate activities with several other projects, within the country, with other countries and with international organisation. Main cooperative activities include:

i. INTERNET

RNP is responsible for the coordination of international connections from Brazil to INTERNET for educational and research purposes. This task is carried out in close cooperation with the National Science Foundation in the US.

ii. Statewide networks in Brasil

RNP purports to offer nation-wide and international backbone services to regional and/or statewide networks. This task is accomplished at the political level by CNPq and state governments in the country, while RNP directly interacts with research institutions and networking initiatives in the states.

iii. Specialised networks

RNP seeks to offer transparent gateway services to/from other specialised networks in Brazil or abroad, including:

- STM-400, the commercial messaging service offered by EMBRATEL,
- ALTERNEX, the service node of IBASE, the most active ONG innetworking in Brazil, through which users can reach such diverse networks as PEACENET, ONGNET, etc.,
- REDE NORDESTE, the network which supports weather prediction in the north-east of Brazil, under the coordination of INPE,
- HEALTHNET, the network administered by SATELLIFE (US) and dedicated to health applications.

iv. Regional networking efforts in Latin America

RNP is involved in providing basic connection services to supranational networking initiatives in LA, including:

- the LA&C Networking Initiative, which seeks to generate a networking plan for the whole LA&C to be presented to international development agencies before the end of 1992,
- DRYNET, an initiative of research communities in the Brazilian caatinga, the Argentina chaco, and the Chilean chico to advance cooperative work in sustained development,
- UNAMAZ, the networking initiative sponsored by the Amazon Treaty, involving institutions from all countries in the Amazon basin.

v. Networking applications

RNP seeks to provide support to the development and operation of all kinds of networking applications, including:

- data bases
- high performance computing
- software repositories,
- etc.

For this purpose, RNP has sought ties with several institutions, including IBICT, RITLA, BIREME, etc.