THE BRAZILIAN NATIONAL ACADEMIC NETWORK

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Abstract

The Brazilian academic and research community is currently preparing to install in 1988 a national academic network, connecting research centres in universities and in government and industrial laboratories. It is intended that this network be linked to similar networks in other countries, at least for the purpose of exchanging electronic mail. The network will probably be administered by the National Laboratory for Computer Networks (LARC), a consortium formed by institutions maintaining research programmes in computer networking.

1. General Background

Brazil is a country of continental proportions with a population approaching 130 millions. Although the average income is under US$ 2000 per annum, the economic development of the country is uneven and there exists a vigorous and technologically modern industrial sector, concentrated principally in the southeast and south of the country (the states of Minas Gerais, Rio de Janeiro, São Paulo, Paraná, Santa Catarina and Rio Grande do Sul). Brazil began its contact with computers in 1960, when a a Burroughs B-205 was installed at the Catholic University of Rio de Janeiro (PUC/RJ) with government support. From that time, the use of computers in all parts of the economy has grown steadily, and the country today has perhaps the seventh largest investment in this area in the world.

More than half the value of computers sold annually in Brazil today are manufactured by Brazilian companies. The local computer industry began in the 70s, when the Government introduced protective legislation to reserve the lower end of the market (mini- and microcomputers) for nationally controlled firms. Additionally, a large proportion of the computers sold in Brazil by foreign owned companies, such as IBM and Unisys, are also manufactured in the country. The larger Brazilian computer manufacturers owe their growth to a close association with one of the financial conglomerates, which have invested heavily in banking automation.

Telecommunications in Brazil is a government monopoly, exercised by the TELEBRÁS group, subordinated to the federal Ministry of Communications (MINICOM). Each state has at least one local telephone company, and long distance and international

telecommunications are the responsibility of EMBRATEL. The telephone service is fairly modern, and direct long distance and international dialling is possible from most of the urbanized parts of the country. Most of the national long distance traffic use terrestrial microwave links, but increasingly satellite communication is being used for reaching the remoter parts of the country. Additionally, satellite links are of enormous importance for international communications, and EMBRATEL has recently had launched two communications satellites.

EMBRATEL also offers a number of data communications services. The TRANSDATA service provides point to point data communication at speeds up to 9600 bpi, and is heavily used by private organizations for their own internal networking services. Since 1984, the RENPAC service provides a public data network offering CCITT X.25 and X.28 services to subscribers. RENPAC is linked through an international gateway service, called INTERDATA, to a growing number of similar PDNs in other countries, mainly in North America and Europe. There is also a service of point to point international data links, but the use of these is somewhat restricted today, on account of certain political postures assumed by the government.

Higher education in Brazil is principally the responsibility of universities, although a number of government research laboratories also grant degrees, usually at postgraduate level. Postgraduate education and research is mainly carried out at government maintained or supported institutions. The principal higher degree granting institutions include the federal universities, subordinated to the Ministry of Education, the state universities (almost entirely restricted to the state of São Paulo), and the engineering institutes of the Armed Forces, as well as a small number of private institutions. Both master's and doctoral degree programmes exist in most areas, and the federal government and the government of the state of São Paulo invest heavily in postgraduate student support. Additionally, an increasing number of Brazilians are also engaged in studies abroad, mainly at doctoral and postdoctoral levels, with the support of government grants.

The main financing agencies for research and postgraduate studies are the National Council for Scientific and Technological Development (CNPq), the Agency for Studies and Projects (FINEP), both of the federal Ministry of Science and Technology (MCT), the Coordination for the Improvement of Personnel in Higher Education (CAPES) of the federal Ministry of Education (MEC), and the Foundation for the Support of Research of the São Paulo state government (FAPESP).

2. Academic Interest in Networking

Since the end of the 70s, research workers in Brazilian institutions have been concerned with problems of networking, but for a number of reasons, mainly financial, these interests

have necessarily been restricted to local area networks and theoretical studies of communication protocols. The National Laboratory for Computer Networks (LARC), a consortium of eight universities and a government research laboratory, all with research interests in networks, was set up to coordinate activity in this area in 1979, with the objective of establishing an interuniversity research network. Unfortunately, almost all available financial support for university computer networking was immediately invested in another initiative in the north and northeast of the country, which eventually failed when this support was later withdrawn. More recently, support has become available for the development of the original idea of LARC, restricted initially to four institutions in Rio de Janeiro. This project, known as Rede-Rio, involves the development and implementation of OSI-ISO protocols to be used eventually in a national academic network, and is expected to begin this year.

The scientific community in Brazil has recently become aware of the advantages offered by academic networking for scientific cooperation, both within the country and, particularly, at an international level. The resulting pressure on academic computing centre managements has led several of these to investigate ways and means of satisfying the demand for data communications services, usually in an individual way, and has led to a series of separate contacts with overseas networks, although so far without reaching any long term solutions. The time is obviously ripe for a general solution to the problem.

At two separate meetings this year, one in July at the annual congress of the Brazilian Computing Society (SBC), and one specially convened in October with the participation of representatives of the wider scientific community, EMBRATEL, government research support agencies and the federal Special Informatics Secretariat (SEI), agreement was reached on the form a general solution should take. It was agreed that a national network should be set up in 1988, connecting the principal research centres in the country, and that this be linked to foreign academic networks as soon as possible. In principle, the network should be administered by LARC, although many of the finer administrative details remain undefined. It is hoped that these pending issues will be resolved at the latest by March 1988. The network summary which appears below represents the consensus of opinion as of October 1987, and should not be regarded as binding.

3. The Proposed Brazilian Academic Network

3.1 Aims

To provide non-commercial data communications services for research workers at universities, government and private research laboratories and for the government agencies involved in supporting research.

3.2 Arquitecture of the network

3.2.a Protocols and Standards used

OSI-ISO and CCITT

3.2.b Subnet infrastructure and transmission speeds

Use of Brazilian PDN (X.25) with global connectivity to majority of cities with research institutions. 2400, 4800 and 9600 bps available between PDN and host.

3.2 Accessible sites (provisional list)

Federal University of Ceará (UFCe), Fortaleza, Ceará.
Federal University of Paraíba (UFPb), Campina Grande, Paraíba.
Federal University of Pernambuco (UFPe), Recife, Pernambuco.
Federal University of Minas Gerais (UFMG), Belo Horizonte, Minas Gerais.
Federal University of Rio de Janeiro (UFRJ), Rio de Janeiro (capital).
Catholic University of Rio de Janeiro (PUC/RJ), Rio de Janeiro (capital).
National Laboratory for Scientific Computing (LNCC), Rio de Janeiro (capital).
Federal Data Processing Service (SERPRO), Rio de Janeiro (capital).
Army Engineering Institute, Rio de Janeiro (capital).
Air Force Institute of Technology, São José dos Campos, São Paulo.
Institute for Space Research (INPE), São José dos Campos, São Paulo.
University of São Paulo, São Paulo (capital).
University of Campinas, Campinas, São Paulo.
Technological Centre for Informatics (CTI), Campinas, São Paulo.
TELEBRÁS - Research and Development Centre (CPqD), Campinas, São Paulo.
National Laboratory for Synchrotron Radiation (LNLS), Campinas, São Paulo.
Federal University of São Carlos (UFSCar), São Carlos, São Paulo.
University of São Paulo (USP-S.Carlos), São Carlos, São Paulo.
Federal University of Rio Grande do Sul (UFRGS), Porto Alegre, Rio Grande do Sul.
FAPESP, São Paulo (capital).
FINEP, Rio de Janeiro (capital).
CNPq, Brasília, Federal District.

3.4 Gateways to other networks

To be negotiated.

3.5 Facilities made available to end-users

Electronic mail initially.

3.6 Addressing structures and formats used

To be decided.

3.7 Administrative rules/restrictions

Non-commercial use only. The full details are still being worked out.

3.8 Current status

The user community, and possible sources of financial and material support are agreed in principle on the establishment of the network in the short term (early 1988). However, the full details of the project are still being worked out, and include the cession of software by an existing network overseas, and the negotiation of gateway access to other networks, with which contacts have already been made.

3.9 Future plans

a. To extend the scope of the network to all interested research centres in the country.

b. To develop and install OSI-ISO protocols to replace the software used initially, with extension of the services offered.

c. To seek a stable administrative and financial structure.

3.10 Administrative and Technical Contacts

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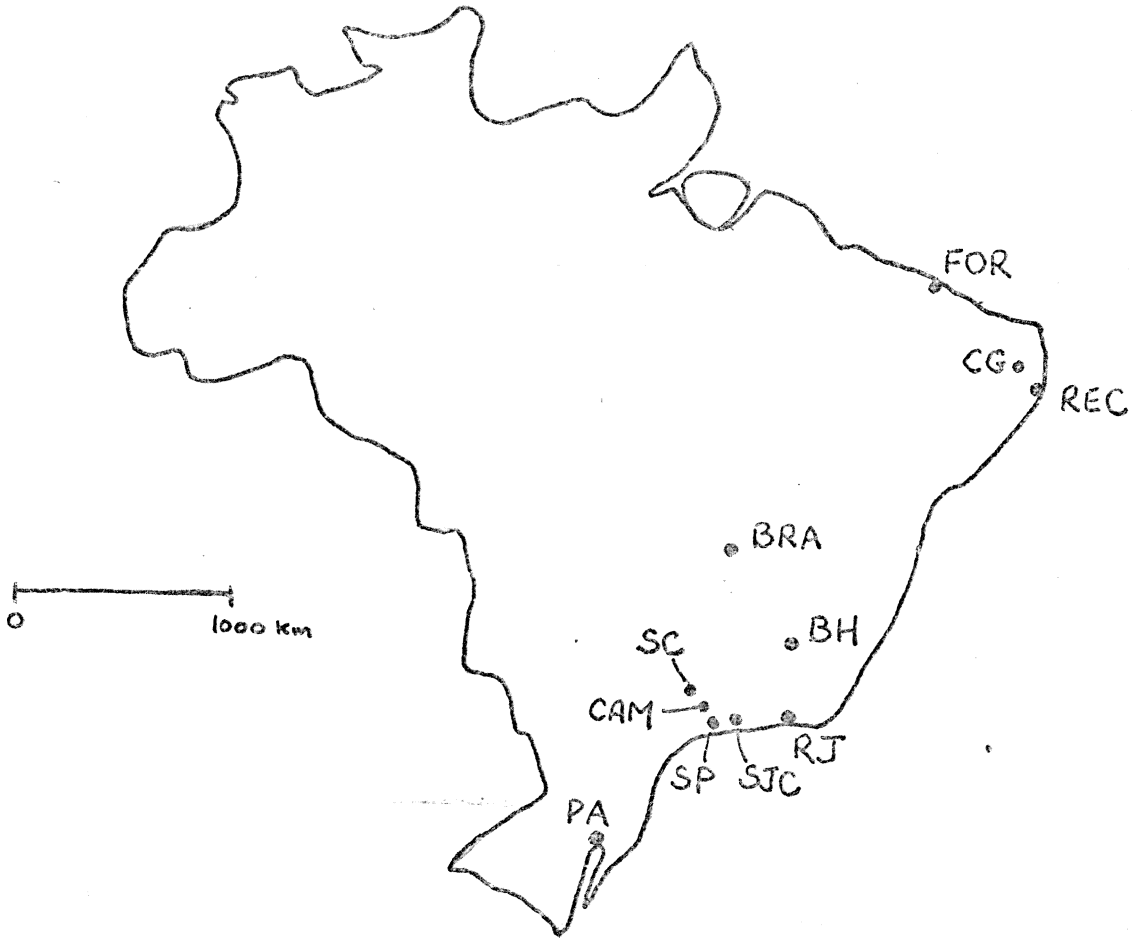

Key to Place Names

BH	Belo Horizonte	REC	Recife
BRA	Brasília	RJ	Rio de Janeiro
CAM	Campinas	SC	São Carlos
CG	Campina Grande	SJC	São José dos Campos
FOR	Fortaleza	SP	São Paulo
PA	Porto Alegre		

Figure 1. Principal cities linked by the network.