PRESIDÊNCIA DA REPÚBLICA
Governo Fernando Henrique Cardoso

THE TELECOMMUNICATION SECTOR IN BRAZIL

BRASÍLIA
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1) Brazil

Brazil is situated in the American continent on the east side of South America. The Equator and the Tropic of Capricorn cross the country and most of its land is situated in the lowest latitudes of the Globe thus classifying it as a tropical country.

Brazil, with an area of 8,547,403 km^2 is the largest country in the South American continent. In relation to other countries in the world, only Russia, Canada, The Peoples' Republic of China (when considering their Mainlands only) and also the United States (when taking into consideration all its territories) are larger.

Along Brazil's entire east coast is the Atlantic Ocean. In the north, west and south it is bordered by all the countries of the South American Continent with the exception of Chile and Equador.

In 1994, according to IBGE, Brazil had a population of 155 million --- the sixth largest in the world — 1.96 times the population of Germany, and 2.7 times the populations of both France and Great Britain.

2) The Telecommunication Sector in Brazil before 1994

The chart below shows the main figures achieved in the telecommunication sector before 1994:

	Unit	Value
Telephone Density	Access/100 inhabitants	9,20
Fixed telephones	Access x 10^6	13,04
Mobile telephones	Access x 10^6	0,80
Public messaging service	Boxes x 10^6	0,20
Public telephones	Telephones x 10^6	0,36
Data transmission	Users x 10^6	1,00

The TELEBRÁS system is made up of a holding company and 28 subsidiaries. Among these subsidiaries, twenty-seven operate local calls and one, EMBRATEL, operates international and inter-city calls. The TELEBRÁS system is responsible for more than ninety-five per cent of both the fixed assets and the investment capacity of the country's Telecommunication Sector.

The TELEBRÁS system is responsible for 12.9 million out of 14.2 telephone points installed in the country before 1994, equivalent to 91%.

Among the twenty-eight companies operating in the TELEBRÁS system, eighteen were among the 500 largest companies in Brazil in 1994, according to *Conjuntura Econômica* magazine, a *Fundação Getúlio Vargas* publishing, in its August/1995 edition, as shown below:

The 500 Largest Companies in the Telecommunication Sector — 1994

Classification in the sector	General Classification	Name	Net income R$ million (**)
1	7	Telesp	1,846.50
2	15	EMBRATEL	1,271.46
3	31	Telerj	700.69
4	38	Telemig	474.23
5	53	CRT*	ND
6	55	Telepar	393.13
7	85	Telebahia	240.45
8	119	Telesc	210.93
9	134	Telebrasília	192.52
10	152	CTBC (Borda do Campo	134.67

(Continua)

Classification in the sector	General Classification	Name	Net income R$ million (**)
11	156	Telegoiás	147.41
12	159	Telpe	144.59
13	178	Teleceará	128.78
14	202	CTBC (Brasil Central)*	ND
15	217	Telest	105.93
16	303	Telemat	66.41
17	390	Telemazon	52.17
18	425	Telpa	50.30
19	472	Telern	42.80
20	479	Telasa	39.37

Source: *Conjuntura Econômica* — August 1995
(*) These companies do not belong to the TELEBRÁS System
(**) TELEBRÁS System Economic and Financial Performance Evaluation — Economic and Financial Directory.

In the 1990-1994 period, the investment int the Telecommunication Sector was between 0.51% and 0.84% of the GDP. In 1994, for the TELEBRÁS system alone, the overall economic investment was R$ 3.2 billion which corresponds to 0.66 of the GDP.

The TELEBRÁS system is resposible for approximately 90% of the investment effectuated in the Brazilian Public Network. In addition to this, significant investments were made in the Private Networks and Terminals, the value of which is R$ 1 billion Reais.

The 1994 relative median per sector, correspondig to the 18 largest companies in the telecommunication sector, indicated the following main figures:

Current Ratio	= 0.83
Degree of Indebtedness	= 0.31
Gross Margin	= 43.89%
Return on Equity (ROE)	= 3.60% (*)

Source: *Conjuntura Econômica* — August 1995
(*) This figure represented 10.06% in 1993

When considering the TELEBRÁS system alone, the degree of debt represented 8.4% of its own capital (December 1994 figures) with a rate of financial expenditures corresponding to 10% of the adjusted operational income.

However, the country's needs in terms of infrastructure and public telecommunication services are greater than the degree of services provided by the current operational structure.

TELEBRÁS' investments in the sector over the last three years — around US$ 3 billion on average per year — have provided to be insufficient to meet the real needs of the country. Not only must such investments be significant enough to fulfill the Networks growth demands, but also allow for its modernisation.

There is a need to perform an «up-grading» of the current installations through a broad digitalization programme. It is known that the currently existing Analogical Centres and even Step-by-Step are impeding the improvement of the quality of service and supplying new user facilities. In December 1994, the digitalization rate of the TELEBRÁS System was only 34.3%

Liabilities, as a factor of financing in the sector, have played an important role. TELEBRÁS' capital structure in December 1994 was as follows:

Voting Shares:	**119.048.241.888**
• Federal Government	52.25%
• Others	47.75%

Total Shares:	**298.729.052.587**
• Federal Government	23.0%
• Foreign Investment	13.92%
• Others	63.08%

The telecommunication Sector participation in the country's Gross Domestic Product (GDP) has increased. In 1994, there was a 13.1% increase in relation to 1993. This increase could have been even more significant if the charges had increased accordingly. Therefore, the Exploitation Income, the Rotation of Operational Assets — and consequently the 1994 Revenue — and the profitability figures were all jeopardized.

The charges issue has long since deserved government attention. There is no intention to increase the charges, but to establish a realistic charge system which is tied to the cost of the services and to the elimination of crossed subsidies. Therefore suitable conditions must be created for the sector's sef-sustained growth.

The introduction of the Real Plan along with economic stabilisation has provided the additional basis and has given rise to, among other things, security for the sector's potential investor. The fall in the inflation rates and the financial system stabilisation doubtlessly bring serious consequences to the economic and financial soundness of the companies, with, for example, the reduction in financial spending.

The Brazilian telecommunication System is among the most important in the world when considering those of similar proportions. In 1993, the Brazilian telephone network was placed 11th in the world, the installation of public telephones was 4th and the cellular network will soon be among the top four. Nevertheless, the level of public services is still low which is perceived by the low telephone density. This emphasises the need for massive investments in the sector corresponding to the market needs.

Some installation figures have already been presented in this paper. On the whole, there are some items which deserve particular attention.

a) The Satellite telecommunication System in Brazil

Brazil's national satellite communication network is modern, which provides various facilities — voice, video, data and texts — to the most remote regions of the country. This system serves almost all 4,974 Brazilian cities and towns.

First Generation:	A1 (1985) (undergoing deactivation process)
	A2 (1986)
Second Generation:	B1 (1994)
	B2 (1995)

There were 66 stations installed on land in December 1994.

b) Automatic Roaming in the Cellular System

Nowadays, Brazil has one of the largest Automatic Roaming Systems (a confirmation system for cellular users outside their registered area) in the world.

The service integrates all States in the country, forming one of the main networks in the world operating under standard IS-41B.

c) Optical Networks

Optical fiber had been increasingly used in the country in the local, intra-state, inter-state, and international segments.

In the local segment, which represents access networks, optical fiber has been used in the connections between Local Digital Centers as well as Optical Rings in the Access Network. The first High Speed Metropolitan Network and a High Speed National Network have also been implemented.

In the intra-state segment, several Basic Systems are being set up (Inter-City Intra-State Systems) using optical fibres OPGW

(Open Ground Wire) and transmission equipment with SDH (Synchronal Digital Hierarchy) technology.

In the international segment, EMBRATEL has participated in various associations, responsible for the contracting, installation, start-up and operation of the following international systems:

AMERICA Cable:	United States
	Central America
	Europe (*)
UNISUR Cable:	Argentina
	Uruguay
	Chile

Source: EMBRATEL
(*) The Americas cable is connected to the Columbus cable in Central America, which goes to Europe.

In the inter-city sector, before December 1994, the country installed 1354 km of optical fibers, equivalent to 1.4 times the London-Berlin flying distance, and 2.6 times the Berlin-Vienna flying distance.

d) REMAV — Redes Metropolitanas de Alta Velocidade (High Speed Borough Networks)

The first High Speed Borough Networks are being installed, which will supply wide band commuted and non-commuted services, thus meeting the growing demand in the data transmission area (text, images and video).

The REMAVs will be connected through RENAV — Rede Nacional de Alta Velocidade (High Speed National Network), currently under purchase.

The REMAV will have national geographic coverage, including, in the early stages, Florianópolis, Brasilia and Salvador. It will be based on ATM (Non-sinchronal Transference Mode) commuta-

tion equipment using Cell Relay technique and optical transmission systems, essentially based on SDH (Synchronal Digital Hierarchy).

3) The Eighth Constitutional Amendment of 1995

On 15 August, 1995, Congress approved the constitutional amendment which had been proposed by the President of the Republic. This altered subsection XI and item «a» of subsection XII of article 21 of the Federal Constitution which brought into force the following:

«Article 21. It is the duty of the Federal Government:

.....

.....

XI — to exploit the telecommunication services, directly or by means of authorisation, concession or permission. This exploitation will be carried out according to the law, which will regulate the organisation of the services in addition to creating a regulatory body and other institutional aspects;

XII — to exploit, directly or by means of authorisation, concession or permission;

a) radio and television broadcast services:

.....

.....»

This constituted a great victory for the government for stimulating investments in the telecommunication sector infrastructure, which had been until now carried out exclusively by the public sector,

Various arrangements are already being made by the Brazilian government, so as to create the necessary conditions to enable a significant participation from private companies in the telecommunication sector, either national or international. Among them, the following are highlighted:

- Regulation of Concession Rights or Permission for the Exploitation of commerciallly based Telecommunication Services;
- Recuperation and Expansion programme of the telecommunication system and the Postal System;
- Structural reform of the telecommunication sector;
- Model for Joint-Ventures;
- Technical and Industrial Development Policy for the telecommunication Sector;
- Complementary Regulation of the Cable TV Service;
- Charges restructurisation.

4) The telecommunication and Postal Systems Enlargement and Recuperation Programme — PASTE

To meet the country's needs, the Communications Ministry has elaborated an ambitious programme regarding the telecommunication and Postal systems. The forecasted investments are R$ 37.6 billion Reais by 1999, and R$ 75.06 billion Reais by 2003.

The aim is that by 1999 every family or entity should have access, or at least some form of access to telecommunication services by means of expansion and service modernisation. Hence, a high growth rate for the 1995/1999 period has been forecasted.

Regarding Fixed Telephones — Conventional and low cost solutions — by 1999 around 24.7 million fixed telephone terminals should be installed, corresponding to an 11.6 million increase in new terminals.

Simultaneously, during this period the substitution of approximately 1 million analogical terminals for digital terminals must be carried out, thus reducing the currently installed analogical com-

mutation base from 9 million terminals to approximately 8 million terminals.

Concerning Mobile Telephones — By 1999, 9.6 million mobile telephone terminals should be installed in the country, representing an 8.8 million increase in mobile telephones — a network thirteen times the size of that of 1994.

Concerning Public Telephone Services — Local Public Telephones, Long Distance Calls, Toll Free, etc. By 1999, 800 thousand public telephones should be installed — a gain of 540 thousand telephones in the period and equivalent to almost three times the December 1994 figure. The installation of public telephones will be increased preferably equipped to use PhoneCard technology.

Regarding Virtual Telephones — One of the services supplied through the Public Messaging Service Center. By 1999, 6 million boxes will be installed — an increase of 5.95 million boxes within the period. The large-scale installation of this service aims to popularise the alternative voice and fax service at a low cost.

Regarding Data, Texts and Images —Including the link-up of personal and business cmputer systems; text transmission, fax; access to multimedia services and multiservice installations; the link between data bases and Internet type networks. By 1995, 6.5 million users will have access to the above — an increase of 5.5 million in the period, which corresponds to an increase of around six and a half times the capacity of that of 1994.

In addition to the above mentioned services, the following services will also have to be expanded:

▲**Subscription TV**. By 1999, this should be abel to link all the 7.0 million national territory users — approximately thirty five times the 1994 capacity.

▲**Radio calls**. By 1999, this should be available to 1.5 million users in the country — five times the 1994 capacity.

▲**Trunking**. By 1999, this should be available to 290 thousand users, two and a half times the 1994 capacity.

Regarding making all of the above mentioned possible, it is necessary to update various parts of the telecommunication sector: the external network, commutation centres, local trunking, inter-city trunking, energy equipment, public works and others.

Various projects of the government's Telecommunication Programme were grouped together, according to their nature, in the following programmes:

- **Access Network** — A group of installation or expansion projects of cables and equipment which link user equipment to telecommunication networks (external network);

- **Connection Networks** — A group of installation or expansion projects of cables and equipment which link-up (trunking) various types of commutation centres at both local and inter-city levels;

- **Basic Networks** — A group of installation or expansion projects for equipment necessary for the formation of networks which serve as a back-up for certain services, such as: Telephone Commutation Centres, Commutation Centres by lot, etc.;

- **Specialised Networks** — A group of installation or expansion projects for equipment which allow the use of the remaining networks for the provision of services of a specific nature, such as: Internet, Voice Post, Trunking, Paging, etc.;

- **Integrated Support Systems** — Make the integrated management of networks possible, as well as suitable infrastructure for the telecommunication networks.

The Connection Network project to be developed by EMBRATEL in the 1995-1999 period must be taken into consideration. Firstly, this project aims to link Florianopolis, in the south of Brazil, to Fortaleza, in the northeast of the country, through the utilization of Long Distance Optical Systems — in order to increase reliability — and adopting a net topology — in order to increase availability. To achieve this aim, underwater optical cables and land-laid cables will be used.

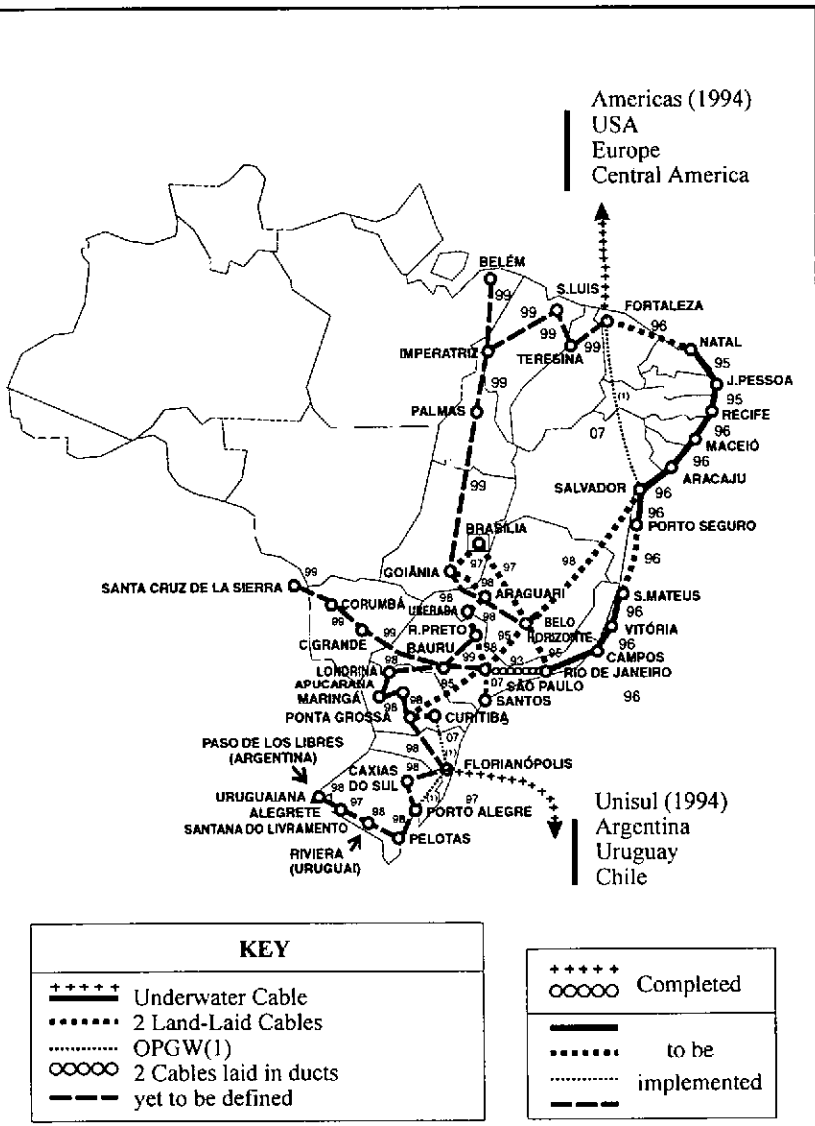
Simultaneously, the project will implement links within states, through Optical Systems using OPGW cables. Not only will this process increase the number of towns served, but will also enable the interconnection of nets, which was proposed in the topology defined in the project.

These systems work with transmission speed of between 622 Megabits and 2.5 Gigabits using synchronal digital hierarchy (SDH) transmission equipment. This transmission equipment has already been prepared to accommodate the implementation of the Integrated Supported Systems (TMN).

Each pair of fibres has capacity to transmit 30240 voice channels or 30240 data circuits, equivalent to 64 Kbps.

This programme totals twenty-one thousand kilometers of optical fibres in the inter-state stretches and a further eight thousand kilometers of local lines for the 1995-1999 period. Given that each route contains 1 or 2 optical cables of 18 or 24 fibres each on average, the total amount corresponds approximately to 640,000 km of optical fibres, that is, almost 16 times the Earth's perimeter.

The programme is showed in details in the picture below:


Americas (1994)
USA
Europe
Central America
BELÉM
S.LUIS
FORTALEZA
NATAL
J.PESSOA
RECIFE
MACEIÓ
ARACAJU
PORTO SEGURO
IMPERATRIZ
TERESINA
PALMAS
SALVADOR
BRASÍLIA
GOIÂNIA
ARAGUARI
S.MATEUS
VITÓRIA
BELO HORIZONTE
CAMPOS
RIO DE JANEIRO
SÃO PAULO
SANTOS
SANTA CRUZ DE LA SIERRA
CORUMBÁ
UBERABA
R.PRETO
C.GRANDE
BAURU
LONDRINA
APUCARANA
MARINGÁ
PONTA GROSSA
CURITIBA
PASO DE LOS LIBRES
(ARGENTINA)
CAXIAS
DO SUL
FLORIANÓPOLIS
URUGUAIANA
ALEGRETE
SANTANA DO LIVRAMENTO
PORTO ALEGRE
PELOTAS
RIVIERA
(URUGUAI)
Unisul (1994)
Argentina
Uruguay
Chile
KEY
Underwater Cable
2 Land-Laid Cables
OPGW(1)
2 Cables laid in ducts
yet to be defined
Completed
to be
implemented

The charts below represent the aims and the earnings forecasted for the periods 1995 to 1999 and 1999 to 2003.

Telecommunication
Service Development Targets
(Estimations)

measure: millions

Telecommunication services	1995	1996	1997	1998	1999	2003
Fixed Telephones (points)	14.3	16.5	18.9	21.7	24.7	40.0
Mobile Telephones (points)	1.9	4.8	6.8	8.2	9.6	17.2
Virtual Telephones (boxes)	0.4	1.5	3.0	4.6	6.0	12.6
Public Telephones (telephones)	0.4	0.46	0.54	0.66	0.80	1.65
Data Transmissions (users)	1.5	2.5	3.8	5.2	6.5	16.1
Subscription TV (subscribers)	0.7	2.0	3.7	5.5	7.0	16.5
Radio Messaging Services (paging) (subscribers)	0.4	0.7	1.0	1.2	1.5	3.9
Trunking (points)	0.008	0.10	0.15	0.21	0.29	0.8

Telecommunication
Annual Earnings
(Estimation)

measure: millions

Telecommunication services	1995	1996	1997	1998	1999	2003
Fixed Telephones (points)	1.2	2.2	2.4	2.8	3.0	15.7
accumulated earnings	1.2	3.4	5.8	8.6	11.6	27.3
Mobile Telephones (points)	1.1	2.9	2.0	1.4	1.4	7.6
accumulated earnings	1.1	4.0	6.0	7.4	8.8	16.4

(Continua)

Telecommunication services	1995	1996	1997	1998	1999	2003
Virtual Telephones (boxes)	0.35	1.10	1.50	1.60	1.40	6.6
accumulated earnings	0.35	1.45	2.95	4.55	5.95	12.55
Public Telephones	0.04	0.06	0.08	0.12	0.14	0.85
accumulated earnings	0.04	0.10	0.18	0.40	0.54	1.39
Data Transmission (users)	0.5	1.0	1.3	1.4	1.3	9.6
accumulated earnings	0.5	1.5	2.8	4.2	5.5	15.1
Subscription TV (subscribers)	0.6	1.30	1.70	1.80	1.50	9.5
accumulated earnings	0.6	1.90	3.60	5.40	6.90	16.4
Radio Messaging Services (subscribers)	0.2	0.3	0.3	0.2	0.3	2.4
accumulated earnings	0.2	0.5	0.8	1.0	1.3	3.7
Trunking (points)	0.01	0.02	0.05	0.06	0.08	0.72
accumulated earnings	0.01	0.03	0.08	0.14	0.22	0.94

PRESIDÊNCIA DA REPÚBLICA
Secretaria de Comunicação Social
Subsecretaria de Imprensa e Divulgação

Apoio Institucional
Ministério das Comunicações

ESTA OBRA FOI FORMATADA
E IMPRESSA PELA
IMPRENSA NACIONAL,
SIG, QUADRA 6, LOTE 800,
70604-900, BRASÍLIA, DF,
EM 1995, COM UMA TIRAGEM
DE 1.000 EXEMPLARES


BRASIL
GOVERNO FEDERAL