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Canadian Consulate General

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1. INTRODUCTION

1.1 Objectives of the Study

This study, commissioned by the Canadian Consulate General in Sao Paulo from Katzender & Associates, is a market assessment which aims to give Canadian companies an overall picture of the telecommunications sector in Brazil. Through a description and analysis of the present market structure and size, an estimation of short and medium term trends and an outline of strategic approaches to the market, the study will assist Canadian companies to identify business opportunities for their equipment or services.

Since March 1990, Brazil's economy has undergone a major move towards modernization and a reexamination of the state's role in domestic economic affairs. This move, has been driven principally by means of a more transparent trade regime, deregulation and privatization of state companies. The telecommunications sector offers excellent opportunities for investments of foreign capital and technology. At the same time, the government is taking decisive action to revise current legislation, aimed at changing Brazil's international image as a protectionist, highly interventionist and state controlled economy. As a consequence, the telecommunications market, as an important infrastructure of the modern state, will necessarily be affected by the impacts of these changes. New business opportunities for foreign companies will be a natural consequence of recently initiated deregulation and privatization processes, requiring investment, technology and human resources currently unavailable in Brazil. In fact, several Canadian companies are already reaping the rewards of this new business climate.

The first chapter of this study delineates the state's monopoly in telecommunications services as opposed to the first steps taken by the Government towards privatization, which should be further defined by the formal Constitutional revision, scheduled for 1993. It also describes the Government's efforts to gradually reduce the state's presence as a regulator of private industrial and service activities, and its efforts to promote free competition, largely absent in Brazil in the last decade. In addition, some of the niche equipment and service market opportunities deriving from these processes are mentioned.

The second chapter describes the current scope and future trends of the main telecommunication markets for both services and equipment. Service markets, classified by the type of human,

managerial and technological resources employed, (and by market segmentation), refer mainly to those provided by the Telebras System and its 28 state subsidiaries. Within the Telebras System, emphasis will be placed on Embratel, the long distance telephone and data communication operator, whose performance, expansion and investment plans will be presented, as well as for the emerging private Value Added Network (VAN) service providers. The equipment market is divided and classified both by technology and by customer base, detailing both present sales volume and future prospects. Main competitors, national and foreign capital joint-venture associations, both in manufacturing and product distribution, are outlined in each market segment. When applicable, the procurement practices for public and mixed capital buyers are described.

The third chapter provides general recommendations for market access strategies, which match both market requirements and governmental regulations.

The appendix summarizes the most relevant legal aspects related to the regulation of the Brazilian telecommunications market, focusing on those aspects that have influenced or limited the access of foreign investments and directed the formation of new equipment and/or service providers. Past and recent evolution of state purchasing practices, as well as import, industrial and technology policies are summarized, in order to provide the Canadian company with a better understanding of the marketplace.

1.2 The Brazilian Market, A Good Opportunity for Foreign Companies.

Optimism is warranted in assessing the future of Brazil's telecommunication market. New and fair competition practices among private and state companies in the service arena and fair treatment to foreign investments in the equipment market is expected during the next 2 years. Nevertheless, some legal issues such as patent protection laws, import controls and tax barriers are still undefined, pending review by Brazil's National Congress. Regulations governing capital, profit and royalties repatriation still await definition of regulations by the Central Bank. Some of the present difficulties and delays were due to the poor performance of the now deposed Collor administration. Despite recent political difficulties, the government's plans continue to focus on the short term reduction of the internal federal deficit and the modernization of the economy, allowing further interest rate reductions and economic growth in 1993.

Presently the principal barrier to the telecommunication sector's modernization and its full development is the constitutional monopoly which grants the State (federation, states and

municipalities) the exclusive right to provide public telecommunication services. Changing this monopoly will be difficult. Only Congress can change the monopoly principle expressed in Article 21 of the 1988 Constitutional Act, and this will encounter strong opposition from labour unions (very active in telecommunications) and nationalist opposition political parties, who still believe that state intervention in the economy means "efficiency" and "social benefits" for Brazilians.

Telecommunications is one of the main economic sectors in which international capital could return to Brazil with profitable results for all parties concerned. There is already unanimity that without huge investments in telecommunications (over US\$30 billion in the next 5 years), the present network will rapidly lose throughput and quality and will limit growth of the national economy. New technologies such as cellular, satellite and fiber optics will need to be employed to recover basic network growth. This will necessitate shared investments by the state, national and international private investors. Market integration with South American countries through common market agreements (the Mercosul agreement is to be fully implemented by 1994), may spur much needed long term investment, if modernization of Brazil's economy proceeds unimpeded. The telecommunications privatization program is the leading edge of this modernization drive and both government and Telebras officials are working hard for its short term implementation.

The current status of Canadian activity in Brazil's telecommunication market is in the preliminary phase for most of major market segments. In public switching, Canada's presence is marked by Northern Telecom which, through its recently installed office in Brazil and in association with Promon Tecnologia, is already competing in all Telebras turn-key equipment bids and associated consulting services. Although present in this market for only 12 months, the results have been very positive. Contracts for the implementation of public cellular systems (A Band) in Brasilia (together with Novatel), Espirito Santo and Minas Gerais have been awarded to Northern Telecom, as well as 2 bids for major packet switching systems (over 17,000 ports) for Embratel and Telemig. Bell Canada International Telecommunications is preparing for the opening of private cellular service (B band) concessions in association with the Iochpe Group. Newbridge Networks Corp., associated with a local company Moddata, was awarded Embratel's order for dedicated line Transdata Plus service (over 7,400 ports). Several other manufacturers, consultants and service providers are looking for business with Brazilian partners especially in EDI, Radio, Satellite and Data Communication equipment.

The positive presence of Canadian companies in the Brazilian market, demonstrated by the above examples, are clear indications that the quality and technology of Canadian products are recognized in Brazil, and that Canadian products are competitive in this market. These initial successes together with prospects for improvement of the Brazilian economy and competitive market strategies indicate that excellent opportunities are available to companies willing to invest marketing resources in this market.

Telescommunications is one of the main economic sectors in Brazil. Investment in telecommunications (over US\$0 billion in the next 5 years) without huge investments in telecommunications (over US\$0 billion in the next 5 years) will rapidly lose throughput and quality and will limit growth of the national economy. New technologies such as cellular, satellite and fiber optics will need to be developed and implemented. This will necessitate investment in telecommunications infrastructure and international private investors. Market integration with South American countries through common market agreements, the World Trade Organization and the Inter-American Economic Commission are also being pursued. The telecommunications industry is being liberalized and opened to foreign investment. The telecommunications industry is being liberalized and opened to foreign investment. The telecommunications industry is being liberalized and opened to foreign investment.

The current status of Canadian activity in Brazil's telecommunication market is in the preliminary phase for most of major market segments. In particular, the market for mobile telephony is being opened to foreign investment. In particular, the market for mobile telephony is being opened to foreign investment. In particular, the market for mobile telephony is being opened to foreign investment. In particular, the market for mobile telephony is being opened to foreign investment.

EDI, Radio, Satellite and Data Communication equipment.

2. MARKET ASSESSMENT AND FORECAST

2.1 PUBLIC TELEPHONE MARKET:

In order to understand the dynamics and size of the public telephone systems market, it is necessary to describe and analyze the monopolistic Telebras system of operating companies, which is dominant in the voice and data services and equipment markets. (All the information and data in this chapter was sourced at Telebras, and is, therefore, of public domain).

2.1.1 Telebras System Structure and Legal Aspects

Telebras, through its 28 operating companies, is the primary supplier of telecommunications services in Brazil and owns 94% of all public exchanges and 91% of the nationwide network of local telephone lines. Through its subsidiary Embratel-Telebras owns and operates 100% of the interstate and international long-distance telephone transmission facilities in Brazil. Telebras also provides other telecommunication related services such as telex and telegraph transmission, mobile cellular service, videotext and computer data transmission. (Telebras, with assets of US\$ 11.6 billion as of December 31, 1991, is the third largest company in Brazil).

As of April 30, 1992, the Brazilian telephone system was comprised of 16,2 million telephone sets in service and 10,8 million installed lines (10,3 million in service). Of the installed lines, 99,9% were connected to automatic exchanges, including 16% connected to digital SPC exchanges. Telebras and its subsidiaries had 266,000 pending applications for new telephone installations, (representing 2.6% of total lines in service).

Telebras and its subsidiaries, are subject to extensive regulation by the Ministry of Transport and Communications (through the National Communications Secretariat) in conjunction with the Ministry of Economy. Telebras was incorporated as a mixed-capital company with limited liability on November 9, 1972, pursuant to Law No. 5792 of July 11, 1972 for the principal purposes of:

1. Acting as a holding company for companies acquired or formed by Telebras to supply telecommunications services in Brazil;

2. Implementing policies of the Executive Branch of the Federal Government of Brazil (Executive Branch) in the modernization and expansion of the Brazilian telecommunications system.

Telebras is a holding company for 28 operating subsidiaries, and is required by law to own more than 50% of the voting stock of each operating subsidiary. Each of the Telebras operating subsidiaries, other than Embratel (which operates on a nationwide basis) has its operations limited to state or territorial borders. Telebras controls each subsidiary, defining growth, investment guidelines and establishing operating rules. All important administrative decisions by the subsidiaries must be approved by Telebras, and as a matter of Brazilian corporate law, the holding company is required to allocate 5% of its net profits to a legal reserve fund, until such fund attains 25% of the capital of the corporation. Corporate law also requires that a dividend of a minimum 25% of annual net profits be paid out to shareholders. Telebras is also in charge of controlling the dividend policy of each of its operating subsidiaries.

Although the Telebras system is the primary supplier of public telecommunications services in Brazil, the following 5 small independent local telephone companies continued to operate in parallel with the 28 monopolistic state-owned companies:

1. CTBC - 280,000 lines in service;
2. CRT - 556,000 lines in service;
3. CETERP - 72,715 lines in service;
4. SERCOMTEL - 63,828 lines in service;
5. CTMBV - 177 lines in service.

2.1.2 Revenues and Rates in Telebras system

The Telebras system provides basic telephone services, consisting of international, interstate and local telephone service. Of the consolidated revenues of the Telebras system in 1991 approximately 13.7% was attributable to international service, 44.8% to national long distance and 23.6% to local service. The balance was from other telephone and telephone related services, such as telex, cellular mobile telephone service and videotext or computer data transmission. The table below gives a breakdown by percentage of the consolidated revenues of the Telebras system by category of services for each of the years from 1987 through 1991:

Composition of Consolidated Revenues of the Telebras System:

	%	1987	1988	1989	1990	1991
International long-distance	12.32	11.84	10.93	12.97	13.71	
Domestic long-distance	46.44	45.78	49.48	44.82	44.79	
Local telephone service						
Monthly eqpt. rental	4.60	4.80	3.75	4.02	3.61	
Measured service	18.25	16.38	13.71	13.23	12.61	
Other local services	<u>5.04</u>	<u>2.30</u>	<u>3.10</u>	<u>3.37</u>	<u>7.40</u>	
Total	27.89	23.48	20.56	20.62	23.62	
Other services	<u>13.35</u>	<u>18.90</u>	<u>19.03</u>	<u>21.59</u>	<u>17.88</u>	
Total revenues	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	

The rate structure of telephone services, provided by Telebras and set by the National Secretariat of Telecommunications of the Ministry of Transport and Communications, states that all rates should be established on the basis of cost of service plus a return of 12% per annum on value of qualifying investments. The Telebras system's returns were 5.61%, 1.04%, 9.65% and -3.40% in 1988, 1989, 1990 and 1991, respectively.

It should be noted that return on investment figures are calculated at prices current through the year, whereas qualifying investments are adjusted to year-end level. The discrepancy between the official limit of 12% and the actual return earned by Telebras, is a result of the discrepancies between authorized tariff increases and real inflation. In general, tariffs for local services, principally the monthly service charges, are below cost with the cost of local services being subsidized by higher tariffs for domestic and international long-distance services.

Tariffs for domestic and international long-distance services vary according to peak period utilization, and on the basis of duration, distance, and the use of non automatic services (such as operator assistance). Net revenue from international services reflects business under approximately 80 bilateral agreements between Embratel (monopolistic long distance carrier) and foreign telecommunications administrations or private carriers, covering virtually all international traffic to or from Brazil. Revenues of the Telebras system from local services consist of fixed monthly usage charges, local and long distance usage, and other charges for maintenance and customer services. Commercial customers currently pay monthly rental charges at a rate approximately 4 times the rate for residential customers. Although residential and commercial customers accounted for 71% and 29% respectively of lines in service as of

December 31, 1991, revenues generated were respectively 39.8% and 60.2%. Over the past 5 years, the relative contribution of residential and commercial customers has remained fairly constant. In the second half of 1991 (effective September 18), Telebras was authorized to raise its charges for certain services at a rate in excess of the monthly inflation rate in order to permit Telebras to offset the effects of inflation during earlier periods

- In addition to a nominal installation charge, new customers are required to purchase shares of Telebras at book value in order to have new lines installed. The process is commonly referred to as "auto-financing". The actual cost of "auto-financing" to the new customers varies according to the region and operating company, subject to certain government defined maximums. Currently, auto-financing costs average the equivalent of US\$ 1,200, increasing Telebras' revenue by about Cr\$ 128 billion from this source alone. However, Telebras is considering abolishing auto-financing, and raising capital at the subsidiary level by increasing the rate of the monthly fixed rental fee, introducing charges for certain telephone services now provided at no cost, (maintenance, internal extensions etc) and establishing a system under which new subscribers would pay in advance for certain services. In this regard, Telebras is currently requesting an increase in basic rates, to be phased in over the next 5 years, from the current average of US\$ 2.13 to US\$ 10.00. No assurance can be given, however, that such increase will be implemented, considering current inflation rates of 25% per month.

2.1.3 Survey of Traditional Telephone Market

The following table gives certain indicators of the growth of the Telebras telephone system :

Development of Telebras Telephone System

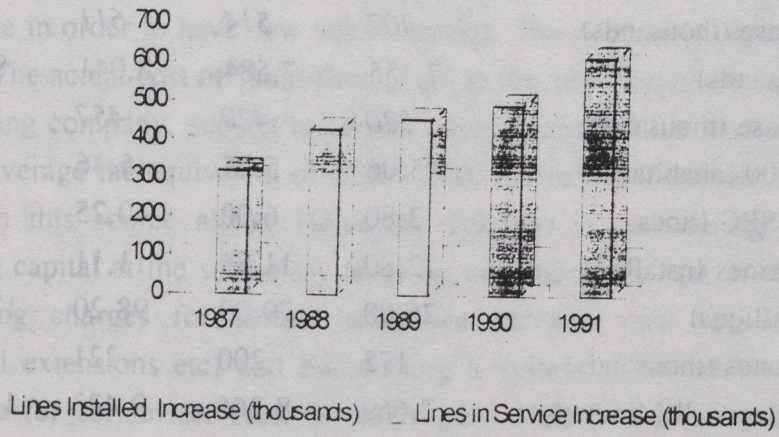
	December 31.				
	1987	1988	1989	1990	1991
Telephones in Service(thousands)	12,005	12,710	12,890	12,818	14,674
Telephones per 100 inhabitants	8,49	8,80	8,74	8,52	8,40
Lines Installed (thousands)	7,721	8,235	8,846	9,309	9,783
Lines Installed Increase (thousands)	407	514	611	463	474
Lines in Service (thousands)	7,155	7,584	8,041	8,536	9,155
Lines in Service Increase (thousands)	320	429	457	495	619
Lines in Service per 100 inhabitants.	5,06	5,25	5,46	5,68	6,01
Percentage of Digital SPC Lines	2,80	6,00	10,25	13,66	16,03
Employees per 1000 Lines Installed	12,80	11,89	11,11	9,99	9,11
Circuit-kilometers (millions)	76,00	79,00	98,20	125,00	n.a.
No. of Public Telephones (thousands)	172	200	221	227	236
Domestic Long Distance Call Minutes (millions)	7,669	8,366	9,423	11,132	12,849
Local Call Pulses (millions)	32,800	35,124	39,110	42,026	46,607

Telebras backlog of pending applications for service as of April 30, 1992 was approximately 266,000 lines. The average time required to meet requests for new services is 24 months from time of application, although such times vary from region to region. A Telebras survey shows that over 2.5 million potential customers, most of them with a annual income of US\$ 1000, would subscribe for telephone lines if the connection price and delivery time could be reduced. This repressed demand has existed since 1985 and it is understood that the desired up front free reduction will occur only after extensive privatization and massive investments by private capital have occurred.

In 1991, 618,030 new lines become operational. The Telebras system domestic telephone network has grown steadily in the past 5 years with lines in service increasing from 7,155 million in 1987 to 9,155 million in 1991, representing more than 2.0 million new telephone lines installed. Nevertheless, the density of telephone services in Brazil remains lower than in many countries with comparable domestic product per capita. Lines in service are concentrated in large urban areas. Of all the Telebras system lines in service, 31% are in the metropolitan areas of Sao Paulo , Rio de Janeiro and Belo Horizonte (17% are in the Sao Paulo area alone).

As shown in the following chart the annual increase in number of lines installed and those effectively in service varies from year to year according to Telebras subsidiaries difficulties in synchronizing the contracts involved in the commercial activation of a telephone project.

TELEBRAS Telephone System Growth



In recent years, the Telebras system has begun to increase the proportion of lines that are served by digital SPC - Stored Program Control - exchanges. Of the new lines installed in 1991, 63% were digital and, in December 1991 16% of all lines were digital. By 2015, Telebras plans to replace all the electromechanical, crossbar and semi-electronic analog exchanges by digital exchanges, as shown in the following table:

Composition of Telebras System's Exchange Equipment

	Local Exchanges		Tandem/Transit Exchanges	
	Number of exchanges	% of Capacity	Number of Exchanges	% of Capacity
Electromechanical	1,483	7.4%	0	0%
Crossbar	1,460	61.6	204	42
Semi-Electronic	1,700	14.9	2	3
Digital	492	16.1	85	55
TOTAL	<u>5,135</u>	<u>100%</u>	<u>291</u>	<u>100%</u>

Interstate long distance service is provided through Embratel's microwave network. Telebras plans to convert the entire analog microwave network to digital capacity by end of 2005. To supplement the capacity of the terrestrial network, Embratel uses its own satellite system, with national coverage. In continued efforts to increase traffic capacity and network reliability, Telebras, through Embratel, has already contracted the installation of a US\$ 40 million, (402 km.) fiber optic system between Sao Paulo and Rio de Janeiro, with a capacity of 18,000 channels by March 1993. By the end of 1994, Embratel plans to interconnect the city of Belo Horizonte with both Sao Paulo and Rio de Janeiro. Finally by the end of 1996, Telebras plans to complete a network of fiber optic cables interconnecting all major cities in the northeastern, central and southern regions of the country.

Telebras system capital expenditures for the years 1990 and 1991 were US\$ 2.1 and US\$ 2.3 billion, respectively. In 1992, expenditures were revised downwards from US\$ 3.6 billion, to US\$ 3.0 billion. Telebras will have installed an additional 700,000 lines in 1992.

The following table shows Telebras major financial figures for the last 5 years:

<u>Financial Item</u>		<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>1990</u>	<u>1991</u>	<u>1992</u>
							(*)
Gross	Operational	3,1	4,3	6,6	7,3	5,9	6,6
Revenues (billions)							
Capital	Investments	1,5	2,0	2,6	2,1	2,3	3,0
(billions)							
Rate of Investment Return		3,4	5,6	1,0	9,7	N.A.	N.A.
(TRI)							

(*) forecast

An annual investment of US\$ 3 billion, is expected to remain constant before service privatization brings additional private capital to the market. According to Telebras plans, this level of investments will not be sufficient to reduce the huge telephone and data service (see next item) backlog. New investment is necessary.

Except for the existing programs (cellular and community telephone systems), described in the next chapter, all additional sales arising from future non monopoly services are not possible to forecast at this time.

2.1.4 Survey of New Telephone Markets

Technological evolution, service deregulation and demand pressure have created new market opportunities for Brazilian telephone companies to cooperate with private capital investors, allowing them to satisfy users need and to increase revenues. The first two examples of such cooperation are detailed below.

2.1.4.1 Community Telephone Program Market

When government admitted TELEBRAS's inability to cope with telephone line demand, mostly in small municipalities and rural areas, an innovative program of joint public and private investment was born: Community Telephone Program (CTP). The CTP's principle is to allow private consortia to plan, build and sell small telephone networks, in turn-key mode, for municipalities that foresee long delays before being serviced by the public telco. After the network is built to telco specs, it is transferred to the telco who will be in charge of its operation. Return of private investor capital is achieved through the sale of the line to the end user. These prices are currently well under the parallel market price, but still slightly higher than local telco

lines, which require months of delivery. After one year of operations, CTP still has a long way to go to reduce the demand for lines. More than 160 different localities, requiring over 50,000 lines, are being considered for CTP. The price per line, presently around US\$ 2,000, is expected to drop to US\$ 1,500 in 1993 as economies of scale and federal funding (BNDES) come into play.

Major players on this market are the following:

<u>Participants</u>	<u>Locality:</u>
Pirelli/Ericsson	Joinville S.Catarina
Monace Engen..	Sao Paulo
Promon	S.Catarina + S.Paulo
CONSTRUTEL	Minas + Mato Grosso
SPLICE	Sao Paulo

2.1.4.2 Mobile Cellular Market Survey

This market is one of the major areas of controversy between proponents of monopoly and privatization in Brazil. The current cellular communication standard is North American analog AMPS, which should evolve to digital as technology and price allow.

The first attempts of Telebras telcos to enter this market date back to 1989, when the first bids for public cellular services (band A) in the cities of Brasilia, Sao Paulo and Rio de Janeiro states were issued. Telebrasilia (10,000 lines) was won by the Elebra/ Northern Telecom consortium and Rio de Janeiro (10, 000 lines) by NEC of Brazil.

After several attempts to define the supplier for the state of Sao Paulo state (over 200,000 lines), the local Telco (Telesp) finally received bids for this service in late October 1992.

After several attempts by the Communications Secretariat (Appendix item A.2) to regulate private cellular concessions, and cancellation of the first four "B band " bids, the Government was forced by public pressure to authorize frequency bands for those Telebras system subsidiaries that are up to date with servicing of regular telephone line applications. As of August 1992, the A band mobile cellular market can be summarized as follows:

State	Line Number for First Phase	Line number In 5 Years	Supplier Consortium	Present Situation
Brasilia	2,500	10,000	Elebra/NT Canada	First Phase in 12/91
Rio de Janeiro	10,000	40,000	Comar/NEC	First Phase in 01/91 Second Phase in 10/92
Rio Grande do Sul	8,000	30,000	Ericsson	First Phase in 1992
Parana - Sercomtel	2,500	10,000	Ericsson	First Phase in 1992
Parana - Metrop.	12,000	50,000	Sid/ AT&T	First Phase in 1992
Parana - Inland	10,000	50,000		Bid July/92
Minas Gerais	15,000	66,000	Promon/NT Canada	1993
Santa Catarina	2,000	10,000		Proposals present. 08/92
Espirito Santo	2,800	30,000		Bid July/92
Sao Paulo	71,000	285,000		Bid issued 08/92 Winner in 12/92
Total Orders	135,800	581,000		

The cost per line in the last turn-key bids has been US\$ 1,200 (AT & T offered at US\$ 1,000 in Parana State), a significant drop from the regular line cost of approximately US\$ 3,800 per line.

The current service tariff structure, regulated by the Communications Secretariat, has replaced the up-front subscription fee of US\$ 2,000 by a connection fee (not reimbursable) of approximately US\$ 200 per line. Usage fees are divided between a flat monthly fee of US\$ 40 and an air time cost of 45 to 50 cents per minute. The average monthly time of usage has reached 180 minutes per user (June 1992 in Brasilia) and the cost to subscriber is reaching the average of US\$ 150 per month.

Accurately forecasting the cellular market future is very difficult at present due to uncertainty as to whether this market will be opened to private competition or will stay a monopoly. This segment being very responsive to price (Brazilian average annual income is US\$ 2,400) and costs depending on the scale of business. Telebras surveys indicate that 5 year market potential could reach 600,000 to 700,000 lines. This impressive service market is being closely studied by 5 major consortiums, each including one major international North American cellular service provider as listed below:

<u>Brazilian Partner</u>	<u>International. Partner</u>	<u>Main Target Market</u>
Monteiro de Carvalho Globopar Bradesco	SouthWestern Bell /Stet	Sao Paulo
Sid Telecom Andrade Gutierrez OAS	GTE / AT&T	Sao Paulo
Construtora Odebrecht Unibanco	Motorola / Ameritech	Sao Paulo
Ioschpe/ Maxion	Bell Canada Enterprise	3 Southern States
Estado de S.Paulo Safra	Bellsouth	Sao Paulo

The market for cellular equipment is already very competitive in Brazil. This is due mainly to aggressive marketing by locally established Ericsson and NEC. Newly arrived international manufacturers such as Nortel (Motorola/NT), AT&T, and Novatel are achieving initial market penetration only by offering low prices (Alcatel and Siemens have no AMPS standard equipment offers).

The 150,000 new line annual market (to be reached in 1993) will generate US\$ 300 million if related technical assistance, consulting services and digital transition during the period are included. The market for cellular users' terminals could reach over 100,000 units in 1994 (50,000 in 1993), meaning US\$ 100 million in additional sales and maintenance revenue. Users are free to import their own terminal and cellular sets free of import tariffs, but local taxes of 33% are applicable.

Cellular is one of the fastest growing telecommunication markets in Brazil. The Brazilian basic network (10 million lines) will need to be doubled by the end of the 90's in order service inland and minor cities not efficiently served today.

2.2 INTEGRATED OFFICE SYSTEMS MARKET

2.2.1 Introduction

This chapter analyses telecommunication equipment integrated into the modern corporate or private office market. Some office communications services are not analyzed in this study, because public Brazilian telecommunication companies (the only service providers) do not maintain individual or even aggregate data on this specific kind of traffic. Private network users usually optimize their private network performance by employing switching, access and network management systems. Outside their building or corporate area, however, these systems depend on the telco leased line availability and even, in some cases, of the investment capability to attend corporate communication needs. It is not an exception that a high traffic, national coverage, corporate user has to share costs to interconnect with public or other private networks. In these situations the resulting telecommunications resources are reverted to the telco ownership and the corporate user is compensated with future service rental credits.

The common voice telephone services monopoly is very strict, but the same is not true for data transmission, information services or other data processing communications services. As will be detailed in the next chapter, some of these services are operated either by joint cooperative networks (banking, insurance, automobile industry) or by privately owned data processing networks that provide public data communication services, usually embedded in information processing (VAN) services.

The integrated office system equipment market in this study will be divided into the following classes of equipment:

- Switching Equipment
- PBX - Private Branch Exchange Systems
- KS - Key Systems
- mPBX - small size PBX Systems with Analog Technology only existing in Brazil:
- Telephone Sets

Other classes of equipment - ACD, voice mail, billing systems and other ancillary products of the IOS market are not surveyed in this study due to a lack of market data.

The statistical data used to study switching equipment and telephone set makers are based on public domain information published by Abinee which collects data monthly from its associated

manufacturers and consolidates figures of sales in terms of number of lines, systems and telephone sets. Equipment categorization by Abinee has not been subdivided to closely follow the technological evolution of IOS systems, as is the case of ACD - Automatic Call Distributors, hybrid PBX/KS system and small size digital distributed Key Systems equipped with multi-function sets. Abinee data is recognized by the users and suppliers of systems as a precise and reliable source of strategic planning data, and suppliers continue to actively participate in this monthly exchange of aggregate information.

2.2.2. IOS Market Structure and Competitors

The Brazilian IOS market structure follows international standards with regard to product manufacturing and distribution channels. Many traditional international manufacturers such as Ericsson, NEC, Siemens, Philips, Northern Telecom and Alcatel are present in the Brazilian market (some for more than 60 years), manufacturing and distributing their products either through their own sales structure or through associated distributors and resale partners. The local content of equipment is currently 80% for high end systems, 30% to 40% for recently arrived hybrid PBX/Key Systems and 95% for the locally developed small size mPBX systems.

IOS distribution networks, formed by small and medium size companies, usually resell low cost systems by means of commission agreements. Factory based marketing, installation, training and technical sales assistance teams support the major accounts by means of appropriate proposal and financing structures.

Since 1985, the local telcos have not participated in this roughly 700,000 line per annum market. Federal investment restriction policies had dictated that telcos had to abandon this traditional activity of IOS equipment sale and rental. Presently telcos only maintain special advisory groups, to give advice to their customers, for system dimensioning and for options of equipment. Telcos have not yet explored the Centrex capabilities of their electronic SPC exchanges, due mainly to a lack of marketing planning. Sales are therefore restricted to trunk circuit rental and, more recently, to such limited functions as 800 type service, DID, conference, follow me, sequential trunk groups and other primitive trunking and signaling features. ISDN basic rate and common channel signaling between PBX and public networks is expected to arrive in the next 2 to 3 years, as well as many of the benefits derived from the intelligent network concept.

The Brazilian market regulatory environment (see Appendix) has greatly influenced the competition in the IOS market. All major multinational telecommunications companies presently participating in the Brazilian IOS market were forced, in the mid 80's, to engage in minority

associations with local Brazilian groups in order to meet the Informatics Law. Having to build new marketing and manufacturing structures, apart from their public switching manufacturing and commercial operations, these multinational companies have significantly increased costs and consequently prices. The limitations to importing new technology and capital assets caused a gap between products on the Brazilian market and their international line of products and technical and market solutions. Only after 1990 were key systems liberated from the import controls. The remainder of IOS products (PBX, Telsets, Voice Mail and ACD) have been freed of import control since October 1992. As a consequence, multinational companies can now regain capital and technological control over their local manufacturing and distribution operations and new international suppliers can directly enter the IOS market.

The most relevant multinational companies already present in Brazil in association with local partners are:

<u>Company</u>	<u>Multinational Partner</u>
MATEC	L.M.Ericsson - Sweden
Equitel	Siemens - Germany
Netcom	Nippon Electric -Japan
Multitel	Alcatel - France
SAT	Philips - Holland
Elebra (Later Promon)	Northern Telecom-Canada

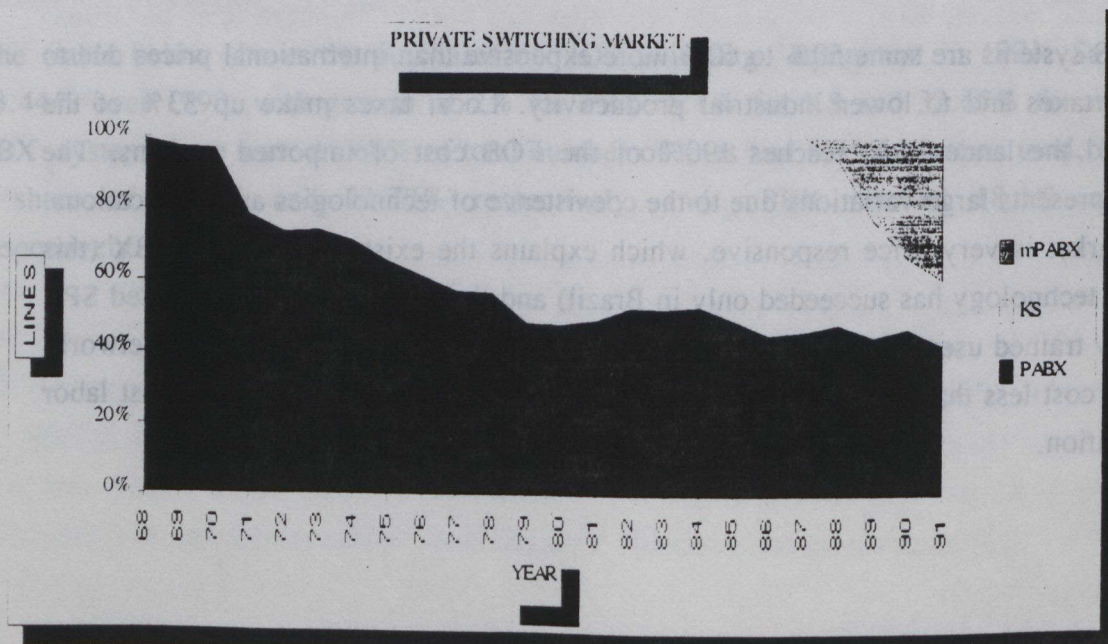
A great number of Brazilian companies producing small size analog PBX systems based on local technology has resulted from the action of the Market Reserve policy introduced by SEI in the 80's. These companies, short of cash to invest in new technology, are now looking for foreign partners in order to meet new competition. As will be shown in the next item, many of these local manufacturers have achieved a reasonable sales performances (some over 50,000 lines/year), constructed extensive distribution networks and developed marketing skills that could be very interesting to any foreign entrepreneur who wishes to team up to succeed in Brazil.

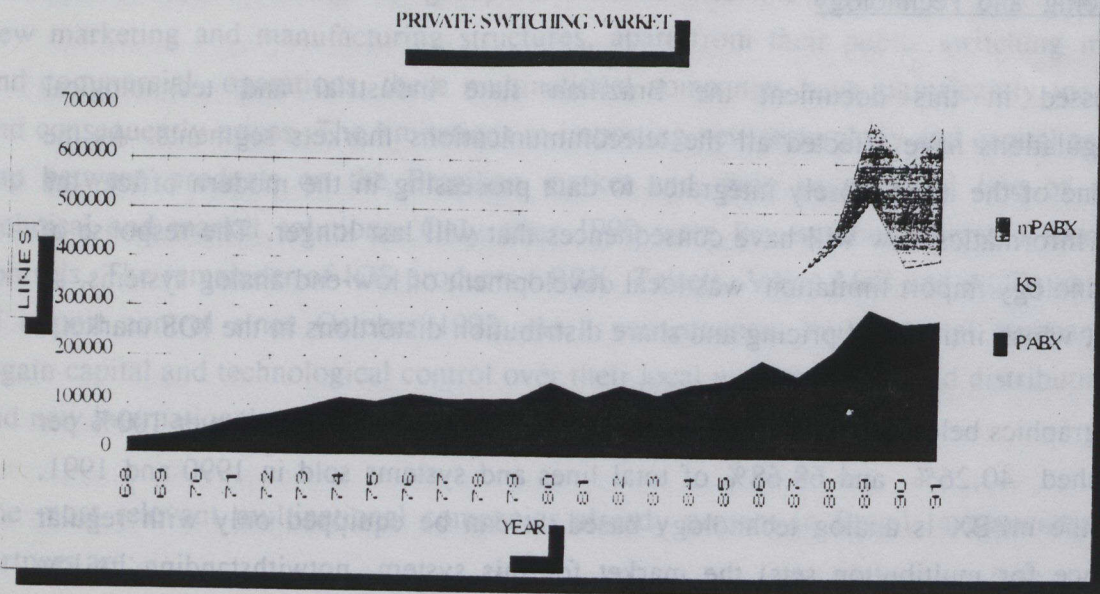
2.2.3 IOS Pricing and Technology

As already stressed in this document the Brazilian state industrial and technological interventionist regulations have affected all the telecommunications markets segments. As the IOS segment is one of the more closely integrated to data processing in the modern office, the legacy of the old Informatics Law will have consequences that will last longer. The response of the market to technology import limitation was local development of low-end analog systems, so called MicroPBX, which introduced pricing and share distribution distortions in the IOS market.

As shown in the graphics below, in only three years, growing at a average rate of over 100% per year, mPBX reached 40,26% and 68,68% of total lines and systems sold in 1990 and 1991, respectively. As the mPBX is analog technology based, it can be equipped only with regular telsets (no interface for multibutton sets) the market for this system, notwithstanding its low price, will fall very sharply in the next 2 to 3 years.

As shown by the 2 historic series on IOS market graphics below (1968 - 1991) the mPBX systems took its growth from the Key System market. Traditionally the Brazilian market was divided in equal shares between PBX and KS systems, but as the import of new KS digital technology was not allowed for 5 to 7 years, the cheap mPBX has covered this user need reducing drastically the KS market share; In 1986, 247,827 KS lines were sold, whilst only 122,030 KS lines were sold in 1991.





For medium and high end PBX systems the technological barrier has not limited totally the import and local integration of modern technology. After 1986, with the launching of Northern Telecom SL-1 systems (in partnership with Elebra), almost 100% of switching systems over 200 lines purchased were digital, and as consequence after 1990, this lower limit has reached 100 lines and less. Presently no multinational company or its local partner deliver analog technology IOS systems. Some of the Brazilian owned companies have evolved from the mPBX to medium size (up to 256 and 512 lines) analog PBX Brazilian systems.

The Brazilian IOS systems are some 50% to 60% more expensive than international prices due to local and import taxes and to lower industrial productivity. Local taxes make up 33% of the factory price, and the landed cost reaches 190% of the FOB cost of imported systems. The pricing structure presents large variations due to the coexistence of technologies and applications. The Brazilian market is very price responsive, which explains the existence of the mPBX (this type of transition technology has succeeded only in Brazil) and the demand for sophisticated SPC features by highly trained users at banks, hotels and larger corporations. Internal Cable Network, Power and MDF cost less than at the international level due to the availability of low cost labor and good competition.

For orientation purposes, the Private Switching Systems price per line in 1991 is approximately as follows, (based in direct informal poll with the major manufacturers and specialized press surveys):

<u>Equipment Type</u>	<u>Number of Lines per System</u>	<u>Price per line(installed) (US) *</u>	<u>Technology</u>	<u>Observations:</u>
Micro PBX	up to 48 lines	70 -100	Analog	regular phones
Medium PBX	20 to 1024	240 - 280	Hybrid Analog	button phones
Medium PBX	64 to 1024	320 - 350	Hybrid Digital	All kinds sets
Key Systems	2 to 128	380 - 420	Analog	custom sets
Key System	20 to 128	280 - 350	Hybrid Digital	display sets
High End PBX	256 to 10,000	450 - 600	Digital	all types sets

* Prices include power , MDF , installation and all taxes

The listed prices above are for the first quarter of 1992, but with the recent entry in the market of new suppliers (Tadiran [Digital KS], Goldstar [Analog and Digital KS], Northern Telecom [Norstar and Meridian 1] and others), and with the gradual reduction of import and local taxes planned by the Government prices in this market should begin to approach international levels.

2.2.4 Market Survey

The table below shows the purchases of IOS switching equipment in 1991. Sales were up 13.44% over 1990 ,with growth of 2% for PBX, 5.1% for KS and 33.65% for mPBX. The PBX system share was 41.64% of total number of lines and 8.55% systems total, KS achieved a share of 18.1% and 22.77% respectively, and mPBX reached 18.1% and 68.68% respectively.

Table - 1991 IOS Market

Supplier	Number of Lines				Number of Systems				Market Share (%)		
	PBX	mPBX	KS	TOT.	PBX	mPBX	KS	TOT.	PBX	mPBX	KS
AMELCO	378	0	478	856	14	0	16	30	0.13	0.00	0.39
BATIK	8334	38310	0	46644	253	9889	0	10142	2.95	14.03	0.00
EQUITEL	73270	13934	37480	124684	702	2354	2752	5808	25.95	5.10	30.53
FASOR	4733	16529	0	21262	125	2362	0	2487	1.68	6.06	0.00
IBCT	1952	18842	3512	24306	218	2141	279	2638	0.69	6.90	2.86
INTELBRAS	7787	33894	0	41681	222	3993	0	4215	2.76	12.42	0.00
LEUCOTRON	23637	12694	0	36331	1008	1154	0	2162	8.37	4.65	0.00
MATEC	57490	17920	1497	76907	448	2294	99	2841	20.36	6.56	1.22
META	0	53999	0	53999	0	6062	0	6062	0.00	19.78	0.00
MONYTEL	24651	15562	728	40941	333	1038	47	1418	8.73	5.70	0.59
MULTITEL	14173	0	55371	69544	177	0	5753	5930	5.02	0.00	45.11
NETCOM	7949	0	19148	27097	106	0	2465	2571	2.82	0.00	15.60
NUTRON	16101	43606	0	59707	587	4473	0	5060	5.70	15.97	0.00
SAT	36608	0	0	36608	276	0	0	276	12.96	0.00	0.00
SPLICE	0	1777	0	1777	0	121	0	121	0.00	0.65	0.00
TELEBIT	1329	5902	0	7231	50	689	0	739	0.47	2.16	0.00
TELEQUIPO	0	0	4544	4544	0	0	711	711	0.00	0.00	3.70
ZETAX	3972	0	0	3972	36	0	0	36	1.41	0.00	0.00
TOTAL	282364	272969	122758	678091	4555	36570	12122	53247	100.00	100.00	100.00
%	41.64%	40.26%	18.10%	100.00	8.55%	68.68%	22.77%	100.00			

The average number of lines per system was 77 for PBX, 10 for KS and 7 for mPBX. In normal sales to the Brazilian market, 90% of all systems are under 120 lines (15% more lines per trunk) and all systems over 100 lines initial capacity are required to be digital.

In terms of number of lines, Equitel (Siemens) is first with over 124,000 lines, followed by Matec (Ericsson) with almost 77,000 lines and Multitel (Alcatel) with 69,550. For companies with locally developed technology (Batik, Nutron, Meta and Monitel), sales are now over 45,000 lines each, some of them supplying both PBX and mPBX systems.

In terms of number of systems the leaders are mPBX manufacturers such as Batik with 9,889 systems, Meta (6,062), Nutron (4,473) and only one KS distributor Multitel (Alcatel) with 5,753 systems sold (45% of KS market). SAT (Philips) with 36,608 lines and Northern Telecom (not in the poll) are PBX distributors who have recently changed their industrial partner and their figures are not steady in 1991.

The table below contains historic data on the IOS market that will permit better understanding of the behavior of each class of systems over a 5 year period.

Table - Brazilian Private Switching Market 5 Years Overview

Source: ABINEE

Thousand lines

	1986	1987	%	1988	%	1989	%	1990	%	1991	%	AVER
PBX	202.2	171.1	-15.42	220.19	28.73	305.2	38.61	276.9	-9.28	282.4	1.98	8.92
KS	247.8	201.7	-18.61	209.03	3.64	220.5	5.47	116.0	-47.39	122.0	5.21	-10.34
mPBX	-	-		33.48		165.8	395.4	204.2	23.16	273.0	33.65	113.1
TOTAL	450.1	372.8	-17.18	462.70	24.13	691.5	49.45	597.1	-13.65	677.4	13.44	11.24

The annual growth of the market is influenced by economic conditions, but over a period of 5 years the average growth has been 11.24%. 1987 and 1990 were years of harsh economic recession, and the market declined by 17.18% and 13.65%, respectively. In compensation, economic growth in years like 1988 (+ 24.23%) and 1989 (+49.45%) covered the losses from previous years.

The most spectacular growth was in mPBX systems which in 4 years of existence have accumulated an average growth rate of +113.05% decreasing the KS market share by 10.34% per year over the 5 year period.

Given that this pattern of constant average growth of 10% held firm during the last 5 years, it is reasonable to assume similar growth over the next 5 years. The mPBX market share will decline over the period, as the end users realize the digital hybrid systems price and performance benefits, changing the segment growth figures, which will probably be close to 18% for mPBX and 3% for digital hybrid systems.

The following table shows an overall market growth of 10% per year reaching 1.064 million lines in 1997 from 678 million in 1991. Combined KS and small size PBX systems will make up 55.3% of the growth and digital medium and high capacity PBX will maintain a market share of around 44.7%.

Table - Brazilian Private Switching 5 years Forecast

Source: TELEBRAS

Thousand

Lines	1991		1992		1994		1995		1996		1997		AVERAGE	
	EQUIP	REF.	%	Lines	%	Lines	%	Lines	%	Lines	%	Lines	Lines	%
PBX	282	11	313	11	348	11	386	11	429	11	476	390	11	
KS	123	20	147	20	177	18	200	15	240	15	275	209	18	
mPBX	272	7	292	5	307	3	316	0	316	-1	312	309	3	
TOTAL	678	13	753	12	831	11	911	9	984	8	1064	908	10	

Price decreases are expected as local taxes decline (20% average is the Government target for 1994) and import competition grows. Hybrid KS and small size PBX systems will be priced at around US\$ 300 per line and medium and high capacity PBX will be around US\$ 450 per line. For planning purposes, the annual private switching market size will be US\$ 400 million in 1994 and remain almost constant in value up until 1997.

The telephone set market for 1991 is 1.2 million units split evenly between IOS and public service segments. The growth of this market will be slower than the IOS 10% growth, due mainly to the public systems limited projected growth over the next 2 to 3 years (see chapter 2.1). Other voice terminals such as fax and voice treatment devices are entering the Brazilian market mostly by means of illegal imports and the market figures are not reliable.



2.3 DATA COMMUNICATIONS MARKET

2.3.1 Market Structure and Embratel's Historic Role

Apart from a few telephone lines and international circuits equipped with user-provided imported modems, the data communications (DC) market for services and equipment practically did not exist until 1974, when Embratel announced its first leased circuit offering for local and long-haul data communications: the Transdata service.

Created in 1965 by Law 4.117 and incorporated into the Telebras system in 1972, Embratel has consolidated its mission and objectives, not only in DC, where it has, and continues to play a decisive role, but also in providing domestic and international long distance basic and specialized voice services as well as data, text and satellite services. Headquarters in Rio de Janeiro, Embratel has over 12,500 employees (1991) and operates nationwide through 5 Regions, 31 Districts and 25 Sub-districts, 10 Operation and 63 Maintenance Centers.

Table 1 - Embratel Network - shows the evolution of the main infra-structure indicators of Embratel in the 1987-1991 period.

	1987	1988	1989	1990	1991
Microwave trunks	22,562	22,562	22,572	22,776	23,430
Voice channels installed per km. (10^3)	108.22	109.99	119.93	127.14	146.28
Optical systems (km)	-	5	46	96	249
Satellite earth stations	30	38	45	50	54
Mux channels installed (10^3)	142	144	169,6	198,8	226,0

The commercial launch and sustained growth of data communication services, and of the related equipment markets, occurred mainly in the late 70's and in the 80's, driven by growth in the information systems market, and supported by consistent efforts and investments in local technology development and manufacturing.

Embratel's revenue totaled US\$ 1.46 billion in 1991, and is projected to reach US\$ 2.2 billion in 1996, with total investments of US\$ 3.8 billion planned for the 1992-1996 period.

In 1981-1989, total supplier annual revenues in the information systems market grew from US\$ 1.1 billion to US\$ 7.1 billion, with approximately 12% corresponding to teleprocessing and data communications-related equipment.

The mid and late 80's were also marked by the introduction and commercial launch of Embratel's packet-switching offering, the Rempac network, and of its domestic satellite data services. In this period, store-and-forward message services were also been made available by Embratel, as its first step towards other telematic and value-added services.

From an applications perspective, the main customer base for DC in Brazil has always been made up of large and medium-size mainframe (mostly IBM) companies, with a strong preference for large centralized on-line systems (banking, manufacturing, distribution and retail). The application mix is presently changing, with fast growing interest in downsizing, distribution, microcomputer and workstation communication, interconnection of Local Area Networks and messaging value-added services, like EDI. Data and voice integration are also becoming more popular.

The late 80's also saw some emergence of private value-added-networks, typically out of DP-service bureaus and/or information diffusion operations, some of which were initiated in the 70's, focusing on remote information services, facilities management and inter-company value-added communications services, with EDI as their principal focus. At the same time, while data communications was a virtual monopoly of Embratel inside the Telebras system, by effect of Resolutions 109/79 and 525/88 (see also item 2.2 above), government decided to decentralize DC service to telcos. This came about as a consequence of political pressure from the individual states to provide faster and more adequate responses to local customer needs.

The two most important legacies from these 15 years of simultaneous development of the customer base, basic services, legislation, technological, industrial policies and the associated investments in manufacturing, engineering and operations management, are certainly an informed and demanding market for quality DC services and technologically up-to-date and diversified equipment. Both are presently effected by a lack of new investment, changing government procurement, industrial and technology policies and the ongoing economic recession, however they are also primed for growth, as the Brazilian economy opens up and benefits from deregulation and privatization.

The next two sections provide qualitative and, as available, quantitative descriptions of the DC service and equipment markets and attempt to forecast future market opportunities.

2.3.2 Data Communications Services Market

2.3.2.1 Dedicated services

Point-to-point/multipoint local and long-haul leased circuits, (1.2 to 19.2 kbps), including modems and maintenance are provided mainly by Embratel nationwide, with the Transdata network, and recently by 10 state companies, through operational agreements with Embratel. Other systems exist based on in-house corporate service planning and engineering.

Embratel has almost 35,000 in-service circuits, while the recent state-level offerings will reach a total of approximately 10,000 circuits, including circuits that Embratel has transferred to telcos in recent agreements. Main users are banks, large multinational manufacturers, distribution and retail companies, supermarkets, state companies and public utilities.

In response to market growth and increasing demand for high-speed data circuits, Embratel is launching its Transdata Plus service having contracted over 100 E1 multiplexing centers, with a total capacity of 7,400 ports and 600 Mbps bandwidth, both to increase its future low speed capabilities, as well as to provide new enhanced 64 kbps to 2 Mbps leased circuits, for data, digital voice and video applications. The leading 6 state companies are following this tendency and tenders are in process (43,000 ports in Telesp bid along). Embratel also offers dedicated international specialized data circuits over its international facilities.

Table 2 - Dedicated Services Figures - shows Embratel's 1991-effective and forecasted number of commercialized circuits and associated investments for the 1992-1996 period.

Table 2 - Dedicated Service Figures

<u>Year</u>	<u>1991</u>	<u>1992</u>	<u>1993</u>	<u>1994</u>	<u>1995</u>	<u>1996</u>
Transdata circuits (10 ³)	35	15	9.8	11	12	13
64 k-2 Mbps circuits	121	248	314	441	543	600
Investments (US\$ Mi)	73.3	88.2	45.7	6.0	4.2	3.3

2.3.2.2 Packet-switching services

Concluded in 1984 Embratel's nationwide CCITT-standard X.25 packet-switched network and service, Rempac (with dedicated and switched accesses via telephone and the telex networks) has presently over 14,000 installed port capacity and approximately 4,000 ports in service.

Typical applications are short file transfers and inquiries, and the main users are also from finance, retail and manufacturing industries. It can be said that the Rempac service has not yet realized its full market potential, due mainly to the fact that SNA connectivity has not been supported and investments have been based on the availability of local Compac technology products.

Forecasting growth in the demand for packet-switching services, (as downsizing, distribution and the microcomputer bases develop), Embratel has just contracted over 100 new centers, totaling 15,000 ports, to be operational in early 1994, featuring extensive SNA support.

Although Resolution 525/88 explicitly refers to only the decentralization of the leased-circuit service to the telcos, 6 of them are in the process of building their own state-level packet-switching networks. If their current market plans are implemented, the total number of public packet-switching ports will exceed 80,000 by 1994. These plans and the level of integration or competition with Embratel are currently being examined by Telebras.

International packet-switched access to various countries (agreements with MCI and AT&T) is provided by the Interdata service, which has been growing at an annual rate of 20% over the last 2 years.

Table 3 - Packet Switching Service Figures shows Embratel's 1991-effective and forecasted number of installed network ports and the associated investments in the 1992-1996 period.

Table 3 - Packet Switching Service Figures

<u>Year</u>	<u>1991</u>	<u>1992</u>	<u>1993</u>	<u>1994</u>	<u>1995</u>	<u>1996</u>
Rempac Ports (10 ³)	12.5	15.7	25.6	39.3	53.1	71.3
Investments (US\$ Million)	23	23.2	56.7	32.2	74.9	25.3

2.3.2.3 Message Handling Services

In 1989 Embratel launched its STM-400 service, a CCITT X.400-based store-and-forward messaging service, with presently 7,000 active users, out of an installed capacity of 16,000 electronic mail boxes. Nationwide access is provided via the Rempac and the PSTN systems. Outgoing telex and fax message conversion is also supported. An international gateway via Sprint-Mail provides access to similar systems in 13 countries (Infonet access is also provided).

The main users are from the retail, distribution, manufacturing, automotive and, more recently, finance industries. The current number of private domains (PRMD's) is 20, and this is expected to grow, as LAN interconnection and microcomputer networking develop. From an application point-of-view, Embratel is concentrating its efforts on establishing itself as a competitive value-added networking option to the fast-growing demand for standard EDI services.

In this context, Embratel is gearing up for X.400 88/92, X.435 (EDI) and store-and-forward fax systems the next two years. Directory services X.500, store-and-forward voice X.440 and the integration with mobile Standard C are also planned for the next 2 to 4 years. Embratel's international division will issue specific tender for STM-400 integrated store-and-forward fax equipment before end of 1992.

Following the same market strategy attitude as with the Rempac network, Embratel is also engaged in providing enhanced IBM protocol connectivity, at the message level, via Profs, Office Vision, TCP/IP and AS-400 machines. Telephone access capabilities are being improved via the use of X.32 and V.32 bis modems. Given that service is currently offered out of a single switching center located in Rio de Janeiro, STM-400 network decentralization is also in Embratel's mid range plans.

Table 4 - Message Handling Service Figures shows Embratel's 1991-effective and forecasted number of commercialized mail boxes/users and the associated investments in the 1992-1996 period.

Table 4 - Message Handling Service Figures

<u>Year</u>	<u>1991</u>	<u>1992</u>	<u>1993</u>	<u>1994</u>	<u>1995</u>	<u>1996</u>
Mail Boxes (thousands)	5.9	10	18	28	40	54
Investment(US\$ millio	4.6	3.7	6.9	15.2	3.0	0.3

2.3.2.4 Satellite-based Data Services

Through its first generation national domestic satellite, Brasilsat A1 and A2, (with its 24 transponders each), Embratel provides the following DC services :

Datasat Uni - unidirectional information diffusion up to 19.2 kbps, VSAT stations. Very low commercial use, mainly news agencies/resellers. No growth or investments forecasted.

Datasat Bi - bi-directional, interactive communications, VSAT stations (TDMA and variations), offered in dedicated and shared configurations. In dedicated networks, the master antenna is provided by the user and with speeds up to 64 kbps, depending on the technology used. Main users are banks and very large private and state companies, and the total number of VSAT stations contracted by the major 8 users exceeds 2,500. In shared mode, Embratel provides the master antenna and speeds do not exceed 9.6 kbps, due to limitations in the access network. There are currently 120 VSAT stations in this shared network. Typical applications are on-line/real-time transaction systems, mainly in banking. Embratel forecasts saturation of the market for dedicated VSAT networks, with not more than 3,000 stations by 1996, while it forecasts expressive growth in the number of shared network stations to about 2,000 by 1996. Investments in 1991 were US\$ 8.2 million, and shall reach a total of US\$ 8.7 million in 1992. Little investments forecasted for the 1993-1996 period.

Datasat Plus - dedicated circuits, 19.2 kbps through 2 Mbps, SCPC/MCPC. Typically used by very large users and by 12 major private intracompany networks, presents contracted equivalent capacity of approximately 120 x 48 kbps circuits. Users can provide and run their own earth stations or can lease them and contract Embratel for operation. The current major 20 companies use 125 earth stations with the main application being for the transfer of very large files.

Table 5 - Datasat Plus Service Figures - shows Embratel's 1991-effective and forecasted number of installed earth stations and circuits, and the associated investments. Note that these investments refer only to Embratel and do not reflect the direct user expenditures on their own earth stations.

Table 5 - Datasat Plus Service Figures

Year	1991	1992	1993	1994	1995	1996
No. of Circuits	107	145	177	188	190	190
Embratel Leased Earth Stations	48	71	76	81	82	82
User-owned Earth Stations	19	52	78	80	80	80

Demand for integrated data, voice, fax and image services are treated as special customer projects. As there are no published tariffs for this kind of domestic service, price quotations are processed and reviewed case-by-case with each customer. Generally in this early stage of implementation the prices are 2 to 4 times higher than in North America. This situation constitutes a strong inhibitor to a more generalized and extensive use of satellite-based services in Brazil, a country where, by its size and geographical dispersion, there is certainly a considerable market to connect to remotely located sites for economic activities such as agriculture, warehousing, mining, public utilities and transportation.

A recent survey of potential users (Grin Consultoria / Plano Editorial - "A Comunicacao de Dados no Brasil - Uma Visao dos Usuarios") showed that users expect major change in the next 1 to 2 years, driven by deregulation and the entry of new suppliers, leading to more competition and better price/performance offerings. Embratel will be launching its second generation national satellite system, Brasilsat B1 and B2, with 28 transponders each, scheduled for early 1994, with priority for extensive digitalization of the network.

Despite uncertainties over the future of the Brazilian economy, analysts believe that the number of VSAT stations could reach 5,000 units by 1995, depending on the service evolution in terms of pricing, technology and usage alternatives available, as well as on strategic decisions still to be made by some large corporate users.

In the international arena, Embratel offers the Digisat service, based on the Intelsat, 64 kbps to 2 Mbps digital circuits, available in dedicated as well as in shared configurations (Teleports), using terrestrial lines, optical fibers or radio links on the access networks. There are currently 5 users of dedicated international networks, all of them subsidiaries of multinational companies, but Embratel believes that the number of Teleport users will grow extensively, and that this will be the predominant form of international satellite communications in the years to come. The Mercosul is also an important element in Embratel's strategy and plans for growth in South America.

2.3.2.5 Value Added Network Services

In this item we include information diffusion and data-base access services, in addition to communications-oriented VAN services, as they historically and still exist in Brazil.

Although Embratel and Serpro have operated and provided access to some government-related and international data-bases and information diffusion services since in the 1980's, it can be said that the actual drive for the development of this market came from a few private companies in the 70's as

DP-service bureaus, as well as from a few newcomers in the late 80's, focusing basically on decision-making-oriented value-added information and application services for the financial and news markets.

CMA, a privately-owned company that presently operates nationwide and in 6 countries, played an important historic role in the development of this market segment. Followed by Meca, Milmar/Reuters and Momento, CMA supplies the market with real-time historical information on the main international and national financial, commodity, stock, foreign exchange, news and insurance markets, along with specialized application services.

Service providers estimate that the total user base of these services is over 5,000, with an annual market size around US\$ 50 million. Despite current economic woes this market is expected to grow at an annual rate of over 20%, especially if Telebras investments in basic networks promote access network capilarization, as service providers expand their offerings with new value-added inter-company messaging and finance-related EDI communications services.

As of October 1992, with the end of the market protection for information systems, and the liberalization of international data base services, new international players are expected to compete for this fast growing market. Some current service providers are circumventing problems in the local distribution network, with metropolitan wiring centers, optical fiber links and satellite- and radio-based competitive solutions.

The mid and late 1980's were also marked by the appearance of private value-added network providers, mainly companies moving from conventional DP-services, like remote computing and facilities management, (with a strongly IBM-dominated user base) to business DC services like remote logon, file transfer, electronic mail and EDI.

The major players in this market are Proceda (owned by the Argentine group Bunge y Born), GSI (a joint-venture of IBM with the Gerdau steel group) and Interchange (a recently created EDI services provider owned by Citibank in Brazil). International interconnections to GEIS, IBM/IN and Infonet are offered in Brazil by Proceda, GSI and Interpac Telematica respectively. Origin (from Holland) has also recently started operations in Brazil, through its local Philips-related subsidiary, Origin do Brasil.

Value-added network services are a growth market with annual revenues of over US\$ 100 million, and the service providers, along with Embratel, forecasting 30% yearly growth for the next 3 to 5

years. One should also consider that there is no tradition in Brazil of third-party networks and outsourcing. This market shall develop slower than projected by the present vendors, unless it receives substantial infrastructure investments, along with management, marketing and operations expertise not available in Brazil.

2.3.2.6 Summary remarks

As a whole, DC services accounted for 32% of Embratel's 1991 revenues (US\$ 470 million out of US\$ 1.46 billion), while it only accounted for 9 % of the Telebras group's revenue (US\$ 517 million out of US\$ 5.9 billion). If we add the total revenue collected by the private network service providers, approximately US\$ 150 million, we come to a total DC market of about US\$ 667 million in 1991.

Given that Embratel is in the process of duplicating its data communications services over the next two years, one could expect the Brazilian market for DC services to reach US\$ 1 billion in 1993 and growth at an aggregate yearly rate of 20%, to US\$ 1.7 billion in 1996.

As VAN providers forecast a steady 30% yearly growth in demand between 1992 and 1996, the VAN's share of this market could reach US\$ 400 million by 1996. The remaining US\$ 1.3 billion would likely be split between Embratel and the local Telcos (even if partially privatized) at a ratio of approximately 3/2, with data communications representing 35% of Embratel's business.

Considering that Telesp alone is planning to invest close to US\$ 350 million in data communications services in the next 3 years (one US\$ 250 million bid issued for 1992) , and that this service segment only represented 1% of Telesp's 1991 revenue it is clear that substantial business opportunities exist in this market.

2.3.3 Data Communications Equipment Market

The development of the market for data communication equipment was also driven by Embratel's moves in the 1980's, by government policies stimulating local R&D and production, and by the proliferation of private intracompany on-line networks and of large corporate networks, built atop Embratel's and the telco's basic services.

Present and future market conditions are largely determined by TELEBRAS's on-going and planned procurements and by large corporate users in their struggle to best take advantage of newly

available technologies and of the new business opportunities that shall result from deregulation and privatization. The elimination of both non-tariff as well as tariff barriers is already a determining factor in the entry of new players and import technological options. The majority of the local equipment vendors are establishing different forms of associations and alliances with foreign suppliers and/or operating companies in order to main competitive.

2.3.3.1 Multiplexers

TDM data multiplexers were initially used with the Transdata network, whose present 30,000 ports have been supplied by NEC and latter complemented by Promon/PHT, with locally developed compatible equipment. In the mid and late 1980's, large users of teleprocessing and on-line networks made extensive use of statistical muxes on dedicated data circuits. The installed base exceeded 5,000 units and generated revenues in the order of US\$ 30 million between 1990 and 1992. The major suppliers were Digitel-Case and ABC Dados-Gandalf/Infotron. This market is bound to decrease in importance, especially in the high-end equipment range, as E1-muxes, routers and entry-level data/voice muxes become more popular.

The next generation of data multiplexers for both the Telebras and the private markets will be E1-compatible. Embratel has already awarded Moddata-Newbridge a US\$ 37 million contract for its Transdata Plus network. Table 2 - Dedicated services figures - indicates an additional US\$ 150 million is scheduled for the 1992-1996 period, basically for the acquisition of multiplexers and modems.

Telcos are in the process of acquiring E1 (Telesp bid already mentioned) capacity in the next 2 to 3 years, at an estimated total value of US\$ 100 million. A Grin/Plano survey indicated that major large users are also expected to follow the trend ,spending an additional US\$ 60 million in the same period. Telebras and the Telcos growth rate of 20% per annum until 1996.

The major vendors in E-1 market are Moddata-Newbridge, Equitel-Siemens, NEC and Alcatel-Elebra, in addition to some 6 other alliances still in formation.

2.3.3.2 Packet switching Equipment

X.25 packet-switches were first introduced with imports in the Rempac network, whose present 16,000 ports have been supplied by SESA, and complemented by some additional local industrial developed (CPqD-Telebras R & D Center) Compac systems. Embratel has awarded Promon-

Northern Telecom a US\$ 33 million contract for the next 15,000 port expansion of its Rempac network, due late 1993.

Table 3 - Packet Switching Service Figures - indicates an additional US\$ 190 million is scheduled for further expansion of Rempac between 1993 and 1996, basically for the acquisition of packet-switches, modems and access gear. Six major Telcos are in the process of procuring and launching their intra-state or regional X.25 networks over the next two years, with a total forecasted capacity of 40,000 ports, at a total value in excess of US\$ 60 million. It is Telcos assumption that there is a substantial non-satisfied demand for these services within their respective customer bases. Telesp alone shall develop 20,000 new ports. In the private arena, large banks have purchased X.25 private networks, at a total value of US\$ 15 million. This number is expected to grow in the next 2-5 years with deregulation and privatization, although arriving technologies and services, like E1, frame relay, cell relay and virtual networks may cause some delays and changes in focus in this market.

The major vendors in this market are Promon-Northern Telecom, Equitel-Siemens, Matec-Ericsson, Alcatel-Elebra, DFV-Hughes, SID-AT&T/EDA, Moddata-BBN and CPM-Telematics. This market is expected to grow at an annual rate of 20% in the period 1994-1996.

2.3.3.3 Satellite stations

The most expressive segment in this equipment market is VSAT stations, with over 2500 stations contracted and approximate sales of US\$ 150 million over the last 4 years, including the master stations of the 8 major private networks. This segment is expected to grow at 25% per year from 1993 to 1995, when the installed base will reach 4,900 units, and expected sales in the order of US\$ 145 million. Market growth could pick up significantly if new operating companies competing with Embratel establish themselves in Brazil as result of privatization.

The installed base of SCPC earth stations totals 125 units, at an average price of US\$ 400,000, and generated total sales of US\$ 50 million in 1991. This segment is expected to grow at 20% per annum in the next 4 years, not just for data applications, but including digital voice and image systems. This will mean an additional 120 stations, at an average price of US\$ 200,000 and revenues of US\$ 24 million in these 4 years.

The major suppliers of VSAT's are Promon-Hughes, Vicom-GTE/NEC, Villares-AT&T/Tridon and Moddata/VSI. NEC Corporation is dominant in SCPC systems, and many new associations are

occurring in the marketplace, among them, Moddata-Scientific Atlanta, Ichtus-STM, Interpoint-Vitacom, Alfasat-Spar, Cidretron-Gilat/EF, Equitel-Fairchild and Villares-Comsat.

2.3.3.4 Modems and access devices

Embratel's Transdata and Rempac networks were the major markets for low-speed V-series modems up to 9.6 kbps. Embratel's procurement policies have also determined investment in R&D locally an establishment of good sales networks.

Local companies like Parks, Elebra, Moddata, Ichtus and Rhede have already delivered to Embratel and to users of non-dedicated private lines and of the PSTN for data communications, some 300,000 modems, in the 1985-1991 period. These same companies, and other newcomers, are now increasing the range of their products and services through agreements with foreign modem-suppliers, like Racal Milgo, AT&T/Paradyne, Microcom, GVC and RAD, distributing imported high-speed, compression based and digital modems.

Considering Embratel's and the Telcos expansion plans for the next 3 years, (Telesp alone is bidding on 150,000 modems this year), the aggregate demand for modems is expected to be an additional 300,000 units in this period. Embratel also plans to enhance the accessibility of its data services, besides the conventional copper line + modem medium, through extensive use of optical fiber links (2-34 Mbps), radio-modems (900 MHz, < 19.2 kbps), packet-radio (64 kbps) and digital radio (2-8 Mbps, 15/18/23 MHz). The Telcos are bound to follow suit. Consolidated sales forecasts are not yet available for these categories of equipment.

2.3.3.5 Summary remarks

Considering Embratel's forecasted investments of US\$ 350 million, the Telcos US\$ 400 million and the private networking and satellite stations US\$ 270 million, the total market for DC equipment could reach US\$ 1 billion over the 1992-1996 period.

3. RECOMMENDATIONS.

This final chapter assesses the opportunities and suitable strategic approaches to the Brazilian telecommunications market.

Market strategies for the Brazilian telecommunications market must be carefully analyzed prior to implementation, considering political and economic uncertainties, and the lack of accurate market data. Canadian companies wishing to approach the Brazilian market, be it for services, consulting, sales, transfer of technology or manufacture of equipment, will have to take a careful approach and follow a sequence of steps to avoid problems - over and above the usual measures taken.

In all cases, after the preliminary steps of market investigation have been completed, legal counsel should be sought, in order to ensure that all negotiations are conducted within legal parameters with regard to both Canadian and Brazilian laws and regulations.

Several points must be considered when discussing the suitability of any given product in the Brazilian telecommunications marketplace. Successful business initiatives will include:

- Short, medium and long term market perspectives.
- An analysis of the compatibility of products with local requirements and regulations.
- An analysis of pricing and quality vis-a-vis comparable, locally manufactured products.
- The nomination of a suitable representative/agent in Brazil.
- The availability of specialized labour, for either manufacture or maintenance.
- The availability of components from local industry, to keep costs down.

If considering investment in Brazil, the following factors must also be analyzed:

- The regulation governing foreign capital participation.
- The level of investment required to initiate business.
- The outcome of the revision of the Brazilian Constitution in 1993 to abolish government monopoly in telecommunications services.

Without discrimination between direct sales to the Brazilian market or investment in Brazil to supply the market locally, there are several market segments that show promise for Canadian suppliers.

Success will depend on the technology available and the aggressiveness of the marketing approach taken. It must be remembered, however, that the investments for operation of

privatized value added services in telecommunications depend on the constitutional revision scheduled for 1993. There are no guarantees at the moment that these proposed changes will be approved.

The main sectors presenting opportunities for Canadian business include:

1. Consulting services for mobile cellular systems.
2. Mobile and fixed cellular telephone services and systems.
3. Consulting services for data communication systems.
4. Voice and data terminals and ancillary equipment.
5. Consulting services for optimization of satellite communication systems.
6. IOS (KS and PBX) systems and ancillary product distribution.
7. Radio-based paging and trunking services and equipment.
8. Consulting services and systems for voice and data network planning and management.
9. WAN and LAN data digital access and interconnect systems.
10. Short haul digital transmission systems.
11. Market research and survey services.
12. Small size switching networks and related services for rural applications.
13. EDI and other VAN consulting, software and network services.
14. Fibre optics equipment and systems.
15. Specialized systems and software for value added and enhanced services, principally for integrated office systems.

This is by no means an exhaustive list. The majority of the above areas are receptive to foreign technology and investment. At same time these areas offer local partners with strong technical, marketing and management capabilities, allowing the Canadian companies a more gradual exposure to the market and its risks.

The Canadian Consulate General in Sao Paulo can provide up-to-date information on the Brazilian market.

PROGRAMMED SECTORAL ACTIVITIES:

The Consulate General in Sao Paulo will be participating with a Stand in two trade events during 1993:

TELEXPO'93 - 3rd International Telecommunications, Broadcasting and Teleinformatics Exhibition, to be held in Sao Paulo from 13 to 16 April 1993.

COMDEX SUCESU SP SOUTH AMERICA '93 To be held in Sao Paulo from 23-27 August 1993. Covering computer hardware, software, systems and supplies as well as telecommunications.

Companies interested in participating in either of the above events, or interested in obtaining further information on the Brazilian market, should contact either the Consulate General in Sao Paulo or the Department of External Affairs and International Trade in Ottawa.

Canadian Consulate General
Avenida Paulista 854, 5th floor
01310-913 Sao Paulo - SP., Brazil
Tel: (55 11) 287 2122
Fax: (55 11) 251 5057

Department of External Affairs & International Trade
Latin America and Caribbean
Caribbean & Central America Trade Development Division
Tel: (613) 996-5549
Fax: (613) 943-8806

4. APPENDIX:

4.1 TELECOMMUNICATION REGULATORY ENVIRONMENT

A.1 HISTORICAL BACKGROUND

This chapter is a summary presentation and analysis of the legal and regulatory scenario of Brazilian telecommunications prior to the present government (March, 1990). Focusing on the regulatory issues that defined industrial procurement, international trade and technology policies for the Telebras system and for the private sector participants in telecommunications, the study will try to provide the basis to understand the present situation and expected short term evolution in this field.

After over 20 years of debates in the National Congress, the first formal law directed to telecommunications in Brazil, the Brazilian Code of Telecommunication - Law No. 4.177 - was issued in August 27, 1962. Still not revoked, this law defined, for the first time, the directives, the tariffs, and the regulatory structure. CONTEL created a national fund for telecommunications (FNT) and, specially of importance for the future, the first categorization of telecommunications services.

The services defined by Law 4177, classified by use, are the following:

- a. Public Services
- b. Public - Restricted Services
- c. Limited Services
- d. Broadcast
- e. Amateur Radio-Communication
- f. Special Services

Expecting the Public Services, all other five classes of services are defined as not "open to public correspondence", i.e. services directed to a group of users (Amateur Radio, Private companies) differentiated from the common citizen by a special requirement in term of terminal equipment (TV set, cellular phone, data access terminals) or means of transportation used (boats, automobiles, airplanes).

The modern age telecommunications began in Brazil only in 1972 with the formation of the Telebras system, benefiting from a concession granted by the Federal Government of a virtual monopoly for the public telecommunications services in Brazil. The terms of the Telebras concession are described in Law No. 5792 of July 11, 1972 and Decree No. 74.379 of August 8, 1974. These define that Telebras must provide telecommunications services to all areas of Brazil, under a rate structure determined and supervised by the Executive Branch, through the Ministry of Communications and in conjunction with policies determined by the Ministry of Economy.

The Telebras holding company has incorporated and gradually replaced the more than 600 then privately owned operating companies, existing at that time, by 28 state owned subsidiaries, one for each of the existing federal states and territories, and one long distance operator, Embratel.

In the almost 20 years of existence, Telebras accomplishments are quite impressive. Promoting extraordinary growth of telecommunications, Telebras has accounted for several relevant achievements: Installed telephone lines increased from 1.4 million in 1972 to 9.3 million in 1991; The number of localities served by telephone service has increased from 2,200 to more than 13,990 in the same period. Telex services increased from 3,200 lines to 142,990, also in the same period. The monopoly served the Government's objectives to standardize operational procedures and technical standards, reduce costs of services and equipment and increase the industrial park, up to the present annual capacity of more than 2 million lines of switching systems, cables and peripherals. The telecommunications sector has followed the overall performance of the Brazilian economy, entering, in the second half of 80's, into a crisis period, which in turn lead to poor quality of service, backlog for installation of telephone lines, and the consequent low performance its of the industrial segment.

A.2 - PUBLIC TELEPHONE SYSTEMS

The legal and regulatory environment supporting this period of accelerated development with relatively conflicting performance, has several aspects discussed hereafter. Industrial development and procurement policies have jointly privileged the local Brazilian industry and equipment suppliers.

The Ministry of Communications issued two major Resolutions ("Portarias"), which had the global procurement as primary objective. In fact, these acted more as indirectly enforced industrial and technological policies, instigating local industry to invest in R&D and increasing local content for all telecommunications products:

4. APPENDIX
- Resolution No. 662 of June 19, 1978

Defined rules for equipment procurement for the state-owned companies, using the weight of the Telebras system purchases, to indirectly enforce industrial and technological policies to the telecommunications industry. This Resolution introduced the concept of "Brazilian manufacturer", defines market protection for them and imposes several limitations to imports and companies with foreign capital. It also institutes the Telebras Research and Development Center in Campinas (CPqD) and defines its objectives - the development of a family of switching system baptized "TROPICO", designated for use in the digitalization of the Telebras system. The regulation provoked higher local content of the telecommunications products and consequently import substitution.

- Resolution No. 215 of November 3, 1981

Complements former protectionist policies by reserving 50% of the total switching market for the TROPICO systems. The local manufacturers utilizing foreign technologies are entitled to compete for the rest of the market (public systems with final capacity of over 4000 lines), participation conditioned to minimum level of locally integrated content and exports of same products to international markets.

Besides the Ministry of Communication regulating actions, the National Security Council constituted, in 1980, the Special Secretariat of Informatics - SEI - with the mission to develop and protect the nascent Brazilian informatics and telematics industrial and service complex. This new, protectionist, science and technology, policy maker government agency, has enforced additional limiting conditions for foreign capital to participate in the so called Electronic Complex, (data processing, industrial process control and telecommunications equipment and technologies). As first decisions regarding telecommunications, Private Switching Office Systems equipment (PBX and Key Systems), modems and data communications devices and voice and data terminals, were exclusively produced by 100% owned Brazilian companies. Later, also public switching, transmission and external plant equipment were included in this market reservation practice. The combined action of both Telecommunication and Informatics Authorities has led the Telecommunication industrial segment to cartel practices, resulting in higher prices for Telebras supplies and also to the accelerated technological degradation of their products.

As already mentioned, another relevant legal impact on telecommunications is the approval of the 1988 Constitution which further strengthened the state monopoly for telecommunication services. The former Constitution and the Law No. 4177, gave the federal government monopoly on "basic telephone services" by means of a state owned company, but the new constitution in Article 21 states the Union's competence in telecommunications as: "XI - explore, directly or by concession to companies under state control, the telephone services, telegraphic and data transmission services and other telecommunication services, assured to entities of private right the provision of information services through the Union explored public telecommunications network. XII - Explore, directly or by means of authorization, concession or permission: a) the radio broadcasting of sounds and images and other telecommunications services,..."

The interpretation of this double use of the term "other telecommunications services" was at the time result of both broadcast and information service lobbies, giving today ground to a legal controversy about the constitutionality of privatization of services at the Federal Supreme Court.

Specifically regarding data communication services, Resolution 109 issued in 1979, granted a virtual monopoly over these services to Embratel, within and outside the Telebras System, imposing restrictions on the formation of data communication networks within telcos, on the use of bandwidth-optimizing devices, and the resale of data access circuits by information and data processing service providers. In the mid to late 80's, discontent with the burden generated by providing local access lines to Embratel and with unequal revenue division, some telcos put pressure on Telebras and the Ministry of Communications, for the decentralization of the data communications services. Although packet-switched services were already available at that time, Resolution 525/88 was then issued, allowing the Telco's to build and commercialize their own dedicated-circuit services, and encouraging them to sign operational agreements with Embratel for the take-over of the respective inter-state operations.

The above panorama prevails to date. The negative effects of performance on the Telebras systems and the retraction international investments has started to revert to less protectionist and interventionist market practices, favouring fair competition and technologically updated products.

A.3 DEREGULATION AND PRIVATIZATION PROCESS

This chapter briefly focuses the changes of legal and regulatory policies during the present government with special emphasis for the legal controversy around the extinction of the telecommunications monopoly, and the consequences on the local industry.

The present government assumed office facing both recession, hyper inflation, and consequently a massive fiscal deficit. A drastic economic plan (Plano Collor) was announced, the cornerstone of which was a freeze on virtually all financial assets for a period of 18 months, after which the funds would be released in 12 equal monthly installments. Additional measures included an 45 days wage-price freeze, higher taxes and cuts in government spending. An ambitious privatization plan (13 state-owned companies up to the present date) and a move toward freely floating foreign exchange rate completed this audacious plan.

This striking strategy is based on the belief that with economy free from state intervention and active public participation, economic growth will be steady and have a sustained behaviour. Historically, the government has been unable to cope with capital spending to maintain adequate growth of the infra-structure of energy, transportation and telecommunications, reason for which the government defined privatization of these areas as the most relevant points for revitalization of economic growth.

The convenience of and strategy for privatization of telecommunications are still under discussion in Congress, and will probably take several months for final decisions to be reached. National Communications Secretariat understands that the Brazilian Telecommunication Code (Law No. 4177 of August 1962) is legally valid and totally covered by the 1988 Constitution. Moreover considering Congress' inability to regulate Constitution invoked monopoly on Telecommunications for over more than four years, by means of laws, the Administration has to evaluate article No. 21 of the new Constitution.

Taking the categorization of services in Law No. 4177, and Decree No. 96.618 of August 31, 1988 on the concession of restricted public telecommunications services, the administration issued Decree No. 177 on July 17, 1991 which approves a new limited service code with the following main guidelines.

- a) The Union is allowed to explore private services directly or by concession to Brazilian persons or companies;
- b) The private services can be authorized, on a non exclusive basis, by means of public tender, for the use of the concessionaries or to be commercially offered to third parties, not open to "public correspondence", for national or international services;
- c) Concessions requiring use of frequency spectrum, will be conditioned to availability of frequencies;

d) Concessions are granted for a variable time period (to be decided on a case-by-case basis by the Communications Secretariat) and are renewable for an additional period upon request;

e) The type of services considered as Limited Services are:

- I - Limited services for security, regularity...
- II - Limited multiple destination services.
- III - Limited rural services.
- IV - Limited private services.
- V - Limited dedicated services.

National Communication Secretariat - (NCS) has detailed the presidential decrees by means of the following Resolutions:

1. For Public-Restricted Services (Decree No. 96.618)

Cellular mobile services have drawn special attention from several operating companies from the U.S.A. and other countries, supported by international equipment suppliers installed in Brazil, with possibilities of investments of over 2 billion dollars. This interest demonstrated the urgency with which the cellular mobile communication services should be regulated. As consequence the Government also decided to use these regulations as a guide for the privatization process of public-restricted services. A series of Resolutions related to this matter were initiated in February 1991 and are still under study by NSC and final versions are still to be issued.

Based in the North American model, the exploration of cellular services calls for dual service providers, one being the public service Telco (A Band) and the other a private-owned authorized service concessionaire (B Band), to be chosen by public auction. For the private service, the concession will be granted to the company or consortium which complies to certain technical and economic criteria, and also presents the best bid to the State.

The main regulations issued by National Communication Secretariat are:

- Resolutions No. 31 of February 1991 and No. 308 of December 2, 1991 are both consecutive versions of the Brazilian Telecommunications Standards (NET), defining guidelines for public-restricted services; another resolution related to this matter is expected for September of 1992 as consequence of laws being prepared in the Congress;

- Resolution No. 182 of June 11, 1992 approves the NET No. 05/92 - Interconnection of Cellular Mobile Public-Restricted Service to Public Telephone Service;

- Resolution No. 191 of June 23, 1992 approves the NET No. 04/92 - Cellular Mobile Public - Restricted Service rendering general conditions;

- Resolution No. 193 of June 24, 1992 approves the NET No. 06/92 - Cellular Mobile Public - Restricted Service tariff application criteria;

- Resolution No. 1165 of June 165, 1992 approves the NET No. 07/92; - Telecommunications Services Price and Tariff readjustment Procedures;

No other type of Public-Restricted service regulation were issued.

2. Limited Services (Decree No. 177)

No further relevant Resolution were issued by Collor Government on Limited Services due to the legal controversy installed about the constitutionality of both liberalized Decrees No. 177 and No. 96.618.

5. GLOSSARY OF TERMS AND ACRONYMS:

TELEBRAS	Federal holding of all State telephone operators and Embratel.
EMBRATEL	Monopolistic Long Distance and International Carrier.
MERCOSUL	Southern Cone free trade market agreement in negotiation between Argentina, Brazil, Paraguay and Uruguay.
TELEMIG	Minas Gerais State telephone company.
CTBC	Privately owned Central Brazil Telephone company (Southern Minas Gerais State) - .
CRT	Privately owned Rio Grande do Sul Telephone Company.
CETERP	Privately owned city of Ribeirao Preto Telephone company (State of Sao Paulo).
SERCOMTEL	Privately owned city of Londrina Telephone company (Parana State).
CTMBV	Privately owned Vale Telephone Company.
SPC	Stored Program Control.
CTP	Community Telephone Program.
BNDES	Brazilian National Social & Economic Development Bank.
TELEBRASILIA	Federal District (Capital Region) Telephone Company.
TELESP	Sao Paulo State Telephone Company.
VAN	Value Added Network(s).
PBX	Private Branch Exchange.
KS	Key Systems.
mPBX	Micro PBX systems with analog technology.
IOS	Integrated Office Systems.
ACD	Automatic Call Distributors.
SEI	Special Secretariat for Informatics (Now extinct).
DC	Data Communications.
EDI	Electronic Data Interchange.
CPqD	Telebras R & D Centre, Campinas, SP.



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GLOSSARY OF TERMS AND ACRONYMS

Resolution No. 282 of June 11, 1992
Cellular Mobile Public-Restricted Service

- TELEBRAS Federal holding of all state telephone operators and Empresa Brasileira de Telecomunicações S.A. (Embratel)
- EMBRATEL Monopolistic Long Distance and International Carrier
- MERCOSUL Southern Cone free trade market agreement in negotiation between Argentina, Brazil, Paraguay and Uruguay
- TELEMIG Minas Gerais State telephone company
- CTBC Privately owned Central Brazil telephone company
- CTEPRP Privately owned city of Ribeirão Preto telephone company (State of São Paulo)
- SERCOMTEL Privately owned city of Londrina telephone company (Paraná State)
- CTMBV Privately owned Vale telephone company (Mines Gerais State)
- SFC Stored Program Control
- TELEBRASILIA Federal District (Capital Region) Telephone Company
- TELESP São Paulo State Telephone Company
- VAN Value Added Network(s)
- PBX Private Branch Exchange
- K2 Key Systems
- MPBX Micro PBX systems with analog technology
- IOS Integrated Office Systems
- ACD Automatic Call Distributors
- SEI Special Secretariat for Informatics (Now extinct)
- DC Data Communications
- EDI Electronic Data Interchange
- CEPD Telebras R & D Centre, Campinas, SP