

# Telecommunications in India

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## Chapter II

### India's Telecommunications

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#### 2.1 The Beginnings

As nation-states go, independent India is only 50 years young. As a result of Mongol invasions from the 1200s, and British economic and political expansion from the 1500s, India today is comprised of once distinct kingdoms and ethno-linguistic groups spread over 3 million square kilometers. Steamships, railways, and telegraphy allowed India's British colonizers to consolidate, control, and extract resources from the jewel in the crown of their extensive empire. This chapter examines the ability of independent India to develop a telecom industry from its origin as a one-time law-and-order maintenance tool of the British Empire. Will service to the ill-served rural public be the next focus, or will it be value-added services for business and commerce? Or will the future bring some innovative combination balanced with myriad other interests?

#### 2.2 After Independence in 1947

In quantitative terms, there have been major strides since India gained

independence. As of January 4, 1996, there are 12 million<sup>1</sup> access lines for a population of 900 million, more than 150 times as many lines as in colonial India. The goal is to increase the number of telephones to more than 20 million by the year 2000. The waiting list for a telephone, at about 2.2 million, is 150 times longer than at the time of Independence in 1947.

Since 1991, there has been strident talk of the need for demonopolization of the government administered telecom industry, threat that spurred the Department of Telecommunication (DOT) to step up expansion. In 1993-94, a record number of 1.25 million lines were made available as new connections. In 1994-95, 1.7 million lines were added, with an additional 2.2 million lines in 1996. In April 1996, 1.3 telephones were available for every 100 people. In spite of talk about rural development, telecom service continues to be 85% urban--only 40% of India's 550,000 villages have telegraph and telephone facilities. Yet the quality of urban service is still bad at 18 faults per 100 phone calls a month. Operations and customer service facilities are being computerized. Switching equipment is a mix of electromechanical crossbar, SPC analog and (predominantly) electronic digital. In 1985 SPC digital electronic equipment was also introduced, and today about 70% of the exchange capacity of about 14 million lines is digital electronic. Analog equipment production ceased in 1992

and old equipment is rapidly being retired.

Local exchange access networks are mainly copper wire. The long distance network uses coaxial cable, microwave and UHF radio, and satellite and fiber optics links. The government monopoly of equipment production ended totally by 1991, and the private sector began to manufacture the whole range of telecom equipment and cables. Nearly 100 new companies sprang up in the private sector.

India's telecom system shares certain characteristics with those of other developing economies: a poorly developed infrastructure, inadequate policy and policy-making systems, underinvestment, and organization and management typical of a public sector monopoly with centralized control of policy, regulation, and operations. A unique underlying characteristic of India telecom system is its laudable attempt at technological self-reliance. Nationalist political ideology after decades of colonial domination, combined with good human resources, led independent India to want to develop local technology or adapt foreign technology rather than continue a neocolonial technological dependency. In the case of telecommunications, limited participation, and even exclusion, of the national private sector and foreign investment, led to less success than was

expected. A lack of sector leadership similar to that provided by pioneering scientists like Homi Bhabha and Vikram Sarabhai is evident. The ability to strategically pick and choose areas of comparative advantage for indigenous internationally competitive technology development requires imagination and creativity alongside technology assessment and environmental impact assessment characteristics that are hard to find in procedure-bound administrative hierarchies. DOT produced obsolescent technology and bought it at incredibly high prices in its own market, closed to competitive ideas and products. Domestic competitors (non-DOT government and private) capable of indigenization were not allowed by the monopoly to emerge, making a travesty of national self-reliance. Incredibly, while, in the name of socialism, DOT did not allow its own national private sector companies to produce telecom equipment and cables, it periodically imported them from foreign multinationals. In the mid 1980s, under leadership of the Department of Electronics, the monopoly of telecom equipment production by the DOT's company units was progressively diluted. The foreign exchange crisis of 1991 and the collapse of the Soviet Union, provider of much of the ideological inspiration, led to a dramatic discarding of state monopoly and total liberalization of Indian industrial economic policies, including those relating to telecommunications.

Reform in the capital-intensive telecommunications sector cannot be implemented in isolation from India's longterm economic problems. International donor agencies and the Planning Commission recommended the public sector approach to economic development in the 1950s and 1960s, a strategy that produced a DOT that has not responded to the public interest in adequate measure. In the 1990s, after decades of neglect, the Planning Commission, the Department of Electronics, and telecom users recognize telecommunications as a strategic infrastructure that could stimulate the economy to higher rates of output, export, employment and earnings, and could increase the efficiency of government. What needs to be done? The long and short term agendas of the Telecommunication Mission under Rajiv Gandhi (1987), and early Telecommunication Commission documentation (1989) listed objectives, challenges, and plans of action. Regrettably, the Department of Telecommunication, and many other agencies of the State, in the world's largest democracy seem to demonstrate increasing incapacity to promote national development and simultaneously accommodate diverse interests in the present day context. This is what political analysts call India's growing crisis of governability. Telecommunication direction in India is stuck in an obsolescent groove, partly because it was mistakenly entrusted to a government department

that has turned into a neofeudal bureaucracy, immune to the public interest it is expected to serve, and partly because of the deterioration of the Congress party into an interventionist personality-based political machinery that has deprived the civil service of strong, stable direction.

### 2.3 Institutional Structure

The Indian Telegraph Act of 1885 and the Wireless Telegraph Act of 1932 have been interpreted to provide the legal basis of the central government's telecommunication monopoly. At the time of writing (June 1996) telecommunication services continue to be a federal government responsibility under the Ministry of Communication. Posts and Telecommunications used to be one combined department of P&T under the Ministry of Communications. Telecommunications were separated from Posts into a separate Department of Telecommunications (DOT) under the Ministry of Communications in 1985. The Ministry is headed by a Minister of State who is a member of the publicly elected ruling political party. The DOT reports to the Minister through a Secretary who is also the Director General and Chairman of the Telecom Commission (a body formed in 1989 by reconstitution of the Telecom Board). The Ministries of Economic Development, Electronics, Finance and Industry, all concerned about

telecommunication planning, are represented by part-time members of the Telecommunication Commission which also includes an additional four full-time DOT officers as members (including the Director General as Chair) and a large support staff of engineers and accountants. The Telecom Commission is the decision-making unit of the DOT for policy, regulation, planning, and service operations. The field organization consists of Circles (every state or a group of States), districts and sub-divisions. The total staff of approx. 470,000 is managed from New Delhi through circulars, directives, orders, and 14 volumes of rule books. The work culture emphasizes hierarchy, procedures, precedents, and audit requirements rather than the client service, openness, accessibility, and connectivity characteristic of the very technology telecom service is supposed to provide.

In the late 1970s and early 1980s protests against poor telecom service by politicians, industrialists and businesses coincided with global and national pressures for liberalization and a new emphasis on developing microelectronic technologies. The result was an establishment of a parliamentary committee in 1981, a bifurcation of the Ministry of Posts and Telegraphs in 1985, and the promotion of a new culture through the creation, in 1986, of a supposedly autonomous public sector undertaking to expand, develop, and manage crucial

segments of the Indian telecommunications system. The Mahanagar Telephone Nigam Limited (MTNL) was set up to run services in Delhi (the nation's capital) and Bombay (the nation's commercial center). Which together have 25% of India's phones. Telecommunications in the rest of the country continue to be run as a government department because of the resistance of staff to be corporatized. Videsh Sanchar Nigam Limited (VSNL) was set up to run international services. The DOT bureaucracy resisted the high-level political initiative (reported to have come from then Prime Minister Rajiv Gandhi himself) for the creation of VSNL and MTNL as they would restrict the DOT's freedom. Nevertheless, both units have been very successful in introducing new technology, tapping capital markets, increasing profitability, and creating a new management culture basic to public service. Problems created by the dual structure of wages and promotions between DOT and its Services Corporations, MTNL and VSNL, led to the appointment by the Government of India of the Athreya Committee for restructuring the DOT in 1990. The Committee recommended the creation of five public sector corporations, one for each region and one for domestic, interstate long distance telecoms. The Committee's majority report said that the MTNL should be concerned with raising finances for telecom projects, and the DOT should function as an independent policy-making and regulatory body. The most

significant recommendation was that private sector companies be allowed to provide all value-added services, including new services like cellular mobile radio telephones and radio paging. A minority of the Athreya Committee members opposed corporatization. In the end, however, the fall of the Janata party government and the rise of a dissenter member of the Athreya Committee to the Chairmanship of the Telecommunication Commission led to the consignment of the Committee Report to the archives.

The development and production of telecommunications equipment were made the government's exclusive monopoly under the Industrial Policy Resolutions of 1948 and 1956. Until recently the sole suppliers of equipment to the DOT have been the DOT's own three factories and, in the public sector, the Indian Telephone Industries, Hindustan Teleprinters and Hindustan Cables (with at least 8,000 surplus workers between them). Their bureaucratic organizational structure and total control by the DOT has militated against realization of the national ideal of indigenous technology development. In an attempt to further progress toward this ideal, the Center for Development of Telematics (CDOT), was set up in 1984 to develop indigenous switching systems as an autonomous Research and Development society, jointly funded by the DOT and the Department of Electronics at the initiative of the latter body. The CDOT

undertook the design, development, production and commercial deployment in the telephone network of a series of digital electronic switches--PBXs, rural automatic exchanges of sizes ranging from 128 to 2024 lines, and larger exchanges of 10,000 line capacity for use in urban centers. Despite delays, the CDOT has done an extremely good job demonstrating India's telecom Research and Development capability. Most significantly, the CDOT saw to it that, for the first time, private sector companies were given licences to produce switches to its designs and standards. Thus was laid the foundation for India's private sector production of telecom equipment. Over 30 companies and over 400 vendors of components emerged. Produced by the thousands, the CDOT's rural automatic exchanges, eminently suitable for unairconditioned environments, have revolutionized rural telephony, enabling nationwide direct dialing to be extended to village subscribers.

The Telecommunications Research Center of the DOT has been merged with the CDOT. Standards continue to be set by the DOT's Telecom Engineering Center, an organization created in 1991, but no simple, impartial and rapid approval process is in place to help private sector manufacturers secure contracts with the DOT which continues to be their major buyer. All equipment to be connected to or forming part of the public switched (government or private)

telecom network (PSTN) must be validated, i.e. tested to be compatible with and satisfying the requirements of services offered, by the T.E.C.

The separation of ownership (DOT) and management of services, provisioned by autonomous corporations, and the creation of the Telecommunications Commission in the 1980s liberated the potential of underachieving in parts of the DOT, leading to impressive change in performance. While the benefits of autonomous responsibility outside the confines of a government bureaucracy may seem obvious, it is understandable that in actual practice the parent organization has been fighting many attempts at decentralization since it is a reduction of its power base.

#### 2.4 Regulation

The Telegraph and Wireless Acts of colonial vintage (1885 and 1932, respectively), are the only legal basis of the telecommunication system in India. Section 4 of the Telegraph Act of 1885 gives the federal government the privilege to establish, maintain, and operate a telegraph system in India, and empowers the government to grant a license, under such conditions and in consideration of such payments as it sees fit, to any person to establish, maintain, or work a telegraph within any part of India. The term "telegraph" was defined to include all wireless

forms of communication such as telephones, telex, or radio. Section 8 empowers the government to revoke any license for breach of any of the agreed-to conditions. In accordance with this Act in British colonial India, private firms were licensed to operate international services and the local phone services in the cities of Bombay, Calcutta, Madras, Karachi (now in Pakistan), and Ahmedabad. Under this Act, private firms may continue to be licensed to operate services in India today. Private telephone service in the Tata town of Jamshedpur continued until the mid-1960s. The phone system in the rest of the country was, by then, run by the central government.

The Indian Telegraph Act of 1885 stipulated that any dispute between subscribers and the service provider (which could be units of the DOT) would be resolved by an arbitrator appointed by government which in effect meant the Director General of the service itself. This worked against the spirit of a modern democracy (of, by, and for the people) in that civil services were given authoritarian power that reduced the citizen-consumer to a non-entity. In a hearing in 1972, the Indian courts rebuked the telecommunications authority, i.e., the Director General, P&T, for taking action against a subscriber without a hearing; the Court told the P&T that a public authority ought to act in a manner consonant with the rule of natural justice. It was similarly reminded, in 1976, that

the lack of opportunity for representation by subscribers vitiated the principle of natural justice. The Consumer Protection Act of 1984 has given considerable power to the Consumer Redressal Courts constituted under the Act to discipline suppliers of goods and services found wanting. In the last ten years, several hundred telephone users have been awarded damages by the DOT's service units for erroneous charges and poor service. Clearly, a body of updated rules and regulations are required to govern the behavior of the telecommunication service provider. The only Act related to telecommunications passed in independent India (1950) is limited to "unlawful possession of copper telegraph wires." Given recent decisions to allow private sector participation in the provision of cellular mobile radio telephony, radio paging, audio and video conferencing and many value-added services, it is clear that there is a need for a new legislation to take into account the end of monopoly, competition, consumer justice and proper regulation of the sector.

The opening up of the economy initiated by the Rajiv Gandhi administration in the mid-1980s led to changes in the industrial policy resolutions of the 1950s. The DOT is no longer the monopoly producer of customer premise equipment. However, as a major buyer of equipment produced by competitive manufacturers, it is necessary that DOT sets interface and type standards, and an

impartial third party accords approvals. DOT competitors seeking to provide value-added services will need to be given timely specifications for interface for interconnection with basic service if they are to stand a fair chance.

## 2.5 Vested Interests

Opposing interests evident in the telecommunication sector in India are the DOT bureaucracy versus the private sector; the older DOT engineers versus younger research and development groups like CDOT, VSNL, and MTNL that have proved more efficient; the rhetoric of indigenization versus the reality of imports; and the reality of competitive egos associated with all of the above. What has become abundantly clear over the last four decades is that an inefficient bureaucracy like the DOT cannot hide behind claims of representing the national and public interest, based on its poor record. It is inconceivable that a public bureaucracy that claims to implement government policy in favor of the poor would resort to revenue generation measures that include periodic rises in rentals and call charges, including calls from public telephones, the most widespread form of telephone service available to the majority in India.

It must be acknowledged that CDOT has done pioneering Research and Development on small switching systems in India in a short time, but that its

leadership has been less than fair in claiming that it has developed the full range of exchanges and features in the time promised. It must also be acknowledged that the evidence of up-to-date technology transfer from transnational corporations to Third World countries is rare. Alcatel's agreement to manufacture the older E-10B with ITI in 1982 is a case in point. It is the competition from several foreign switch manufacturers (Siemens, Ericsson, Fujitsu, AT&T) that made the difference in 1992 when Alcatel agreed to transfer OCB-283 know-how, a strategy that India might be in a position to use profitably in future transactions, given the recent liberalization of industrial policy.

There has always been a conflict of interest between the expansion of services for urban users versus the provision of plain old telephone service for the masses. The creation of VSNL, MTNL helped to provide business users and middle and upper classes with better services. In spite of political and bureaucratic rhetoric in favor of developing rural areas, the fact is that the DOT's rural outlays in the five-year plans have not been adequate. CDOT's development of the rural automatic exchange has been the only significant rurally focussed activity. Beginning in 1992 spirited action was taken by the DOT to install public telephones in large numbers in the villages. Helped by the indigenously developed and produced CDOT rural switches and analog multi-access rural radio

equipment, the DOT, in a highly directed and monitored program, provided over 200,000 of India's over 500,000 villages with modern public telephones capable of nationwide dialing.

The national resolve is to link all villages by telephone by 1997. This goal is likely to be delayed until the year 2000 because private sector entry into basic telephone services envisaged by the 1994 national telecom policy is still mired in some difficulties as of this writing (June 1996). The private-sector licensees were obligated to provide a specified number of telephones to villages under the conditions of license.

The term "universal" holds no meaning in India except in the infinitely long term. Colonial India had one telephone for every 400 people. After 40 years of DOT dedication and more than a doubling of the population, independent India still has a little more than one telephone per 100 people.

In 1996 there are over 12 million access lines for 900 millions people. It is estimated that there is a demand for 12 million more lines, even though the annual price for a modest basket of services is 150 % of the average Indian's per capita annual income, in contrast to about 4% in the developed countries. Nine cities account for over 50% of the access lines. Under 7% of the subscribers generate seventy percent of the telephone revenue. International telecoms

generate about 30% of the total revenues in contrast to the 10% in developed countries. In the developed world, prices are closer to actual costs and are driven down by competition and regulation. Public telephones in cities like Mumbai are produced in quantities 10 to 20 times the average of private telephones.

The Indian telecommunications system reaches out to 20,000 different geographic locations, each with its own central office, with telegrams, telex, and plain old telephone services. Long distance calling is available to 85% of the access lines. Over 75% of the overall network is switched digitally. Digital transmission takes place over 40% of the inter-city links while impaired local cable and predominantly analog inter-city transmission restricts data communication to 2.4 to 4.8 kilobits (KBPs) per second. A remote area business network of over 600 very small aperture terminals (VSATs) was initiated in 1993. The beginning of a packet-switched network for high volume data customers was also created to cover over 80 cities.

The VSNL is the investor/owner of three submarine cable systems and provides numerous different types of international telecom services. India's international telecommunications has grown markedly since it was spun off from its DOT parent: international telephone circuits increased from 1100 in 1986 to over 14,000 in 1996. There is one INMARSAT-C earth station, and four digital

gateway exchanges with Intelsat-A earth stations. There are five competitive carriers from the United States to India, two competitive carriers from the United Kingdom and India, and competitive carriers from Japan to India. The VSNL provides electronic mail, electronic data interchange, packet-switched data, video-conferencing, and high speed (64 KBP and upwards) intercontinental data circuits.

## 2.6 Financing

India's planners have given very low priority to telecommunications development in its five-year plans, with investments varying between 1.47 percent and 3.07 percent. The proportion of the GNP invested in telecommunications has been consistently lower than comparably-sized Third World countries (e.g. Brazil). Given the level of underinvestment, unmet telephone demand, and the poor quality of service, it is probably surprising to find that the finances of the DOT are in good shape. This is because tariffs are not based on costs but on revenues, including capital needed by the service providers. Under this regime, it is expected that the DOT will generate 80% of the capital needed for system expansion. The customer, unknowingly contributes the needed capital through the payment of telephone bills, resulting in a per capita telephone service price of

about 1.6 times the per capita national income in comparison to 0.05 in industrialized countries. Revenue collection is merciless and service is often disconnected once the DOT claims a bill was mailed and not paid. The DOT appoints one of its own staff to arbitrate billing disputes against itself, but the contested bill must first be paid at least in part. Applications for telephone service require the payment of deposits, which have been periodically increased, even though the waiting period for service is generally longer than a year. Rentals have to be paid in advance and may be waived in part only if the customers can prove that the service was deficient beyond a fortnight. Reforms in India must also address the continuing treatment of telecom subscribers as subjects by its own civil service in the post-colonial era, and the inability of tariff-paying consumers to get responsible service from the monopoly provider. There is no foreign or private profit-maximizing villain to blame.

The DOT has excellent engineering talent which is deployed abroad through the state-owned Telecommunications Consultants of India, Limited. The TCIL has carried out a number of consultations and construction works in West Asia and Africa, winning them in global bids. Since the late 1980s, the DOT has been raising money through its service corporation, MTNL. The amount, frequency, and terms of the bond offerings have been determined by the

government's overall borrowing policy. The DOT decides on the proportion of the loans that it needs to keep for itself, and what it will charge for use of its network for long distance and international calls. This practice ensures its units high profits and are hence only liable to pay the least income tax as corporations.

The telecommunications sector in India has also been financed, to a small extent, by the World Bank and Asian Development Bank loans and tied-aid from donor countries like France and Japan which support the sales of equipment produced by their own manufacturers.

## 2.7 International Cooperation

India is a member of the International Telecommunications Union (ITU), the Commonwealth Telecommunications Organization, Intelsat, Inmarsat, Asia-Pacific Telecoms, and The South Asia Association for Regional Cooperation (SARC) Telecoms Committee. Unlike lending agencies whose interests are financial, each of these agencies is primarily concerned with running of good telecommunications operations. There is a strong need for impartial technical assistance from these agencies in the establishment of a national telecommunication policy, a policy analysis unit, an independent regulatory mechanism, and a set of workable regulation prior to the introduction of

competition and/or further substantial private sector participation. India is the third largest supplier of telecom experts in engineering, planning and traffic areas for the ITU and its technical assistance programs in developing countries.

## 2.8 Technology

India's attitude toward technology was formed with the goal of self-reliance to avoid perpetuation of its dependence on foreign countries. In the post-independence years, the lack of a private sector capable of producing telecommunications technology, combined with advice from international agencies and the apparent success of Soviet industrialization, caused India to invest in R & D in government departments and large public sector undertakings. The Departments of Atomic Energy, Space and Electronics have demonstrated the successes of this approach; the DOT has not.

The P&T set up in-house factories and separate public-sector undertakings to produce the equipment it needed. The Telecommunication Research Center was set up to conduct R&D to adapt and/or develop equipment for local production. TRC research and ITI production were a good team in several areas, such as the development of open wire carrier systems, and coaxial and microwave radio transmission equipment. In some cases, the lack of intellectual and

commercial competition led to the selection of inappropriate technologies for local adaptation, obsolete design, research and the poor quality and quantity of manufactured equipment. Switching technology was one such case. The government went from manufacturing manual local and trunk exchanges, electromechanical switches based on technology that was outdated, to buying equipment from abroad. In the mid-1960s when AT&T developed its first electronic switch, Indian telecommunications chose to buy the outdated electro-mechanical, Penta Conta cross bar switching technology, from the Bell Telephone Manufacturing Company of Belgium. ITI set up two special factories to manufacture the equipment and then found the product to be inappropriate for Indian conditions. TRC then redesigned the cross bar and set up another factory to produce its own version. Further research by TRC led to the development of an indigenous analog electronic switching system that was field-tested in the late 1970's but never went into production because it was already a decade behind world technology. In 1982 the DOT decided to buy the (by then) 10-year-old E-10B CIT Alcatel digital switching technology and set up a plant to produce it in Mankapur. It is hard to understand why local needs and global technologies were not matched better before. None of the three cases of switching technology lived up to India's self-reliance rhetoric: the technology was not indigenously

developed; it was obsolete by world standards when it was produced and deployed; and it was inappropriate for Indian heat, dust, and high-use conditions.

The first family of digital switches to be designed and produced in India for Indian conditions was developed by the Center for the Development of Telematics (CDOT), a research center set up outside the government with funding from the departments of electronics and telecommunications. CDOT digital PABX and rural automatic exchanges up to 40,000 lines were being produced in 1996. Indigenous CDOT design research continues while the government has already permitted transnational corporations to manufacture their own large digital exchanges in India. Siemens, Alcatel, Fujitsu, Ericsson and AT&T are all setting up large capacity switch manufacturing while the ITI and C-DOT licenced manufacturers between them have installed capacity of 1.5 to 2 million indigenous technology, mainly low capacity (below 10,000 lines) switches. India now has abundant production capacity for switches up to 5 to 7 million lines per year.

In the transmission sector, the DOT is adding intracity junctions and long-haul trunk systems with microwave radio, fiber-optic cable, and satellite links. The Department of Space gets the credit for launching India's national satellite system (INSAT) which provides transponders for domestic telecommunications and broadcasting services, among others. The government also leases space

segments from INTELSAT to support the Planning Commission's NICNET (National Informatics Center's Network based on over 1000 VSATs, growing to 6000 by 1998). India has enough productive capacity in jelly filled, copper conductor telephone cables for connecting customers to central offices. Fiber optic cables are being produced through joint ventures with foreign firms. The interconnection of new rural digital switches over reliable media has become an acute problem in the absence of indigenous production in desired quantities. But this capacity is being rapidly built up.

One of the major bottlenecks in domestic production of telecommunication equipment is the insufficient production of electronic components in the country. Microelectronics are the basic building blocks of the new telecom systems. The rapid growth of telecom services, broadcasting, home appliances and PCs promises to require huge quantities of electronic components that justify economic production of sufficient volumes of components. The mid-1990s change in industrial policy could help attract new investments in this area.

## 2.9 Services

Plain old telephone service is the predominant telecommunications service in India, currently earning about 95 percent of revenues. The vastness of the country

and lack of alternatives are responsible for the still considerable volume of telegrams (about 60 million a year) and telexes (about 58,000 subscribers), though the use of both is declining significantly. It is estimated that there are over 200,000 fax machines in India. Before the growth could peak, electronic-mail services have been introduced by about ten competing private sector companies.

Leased lines are very expensive, hard to get, and are poorly managed by the DOT but the public network is worse. Voice and data circuits are leased to large public and private sector concerns, e.g., the Steel Authority of India, the Oil and Natural Gas Commission, the nationalized banking system, the nationalized coal mining sector, and many private firms. A large number of India-wide operations companies have their own VSAT-based data communications networks for speeds of up to 64 KBPS. These networks are designed, built and operated by a number of competing private sector companies who have shared hubs. The space segment is leased mostly from domestic satellite INSAT of the Government's Indian Space Research Organization (ISRO). The Planning Commission's National Informatics Center (NIC) uses a 1000 site VSAT based data network to connect several government offices throughout the country to the national capital in Delhi in a system called NICNET. The police and paramilitary forces have set up their own private networks. VSNL provides Intelsat

International Business Service facilities as network bypass systems exporters.

The Department of Electronics (DOE) initiated the practice of setting up Software Technology Parks (STPs) which provide high speed digital data circuits to all the continents both by the DOE and VSNL through communication satellites and undersea cables. The set-up of these Parks is now continued by private sector companies. Satyam Computers Services in Madras and Hyderabad, Texas Instruments in Bangalore, Datamatics Consultants in Santa Cruz, Electronics Export Processing Zone in Bombay, and Tala Consulting Services in Bombay, Madras, and Delhi are the early starters. A 600 site VSAT-based Remote Area Business Messages Network (telex, fax, e-mail and data) and an 80-city urban packet switched data network have been launched by the DOT since 1991. The VSNL introduced telex mail boxes, electronic mail and store-and-forward fax service for international telecommunications in the late 1980s alone. More extensive domestic value-added services such as voice mail, electronic mail, video conferencing, and video text are being provided by private sector companies..

## 2.10 Rates

A comparison of telephone tariffs with the wholesale price index from 1960 to

1981 shows that telephone rates have been consistently lower but, beginning in 1981, when the DOT was almost cut off from the budgetary support and was required to generate capital funds internally, prices were periodically raised. Consequently, the telephone price index has been rising faster than the wholesale price index.<sup>2</sup> As mentioned earlier, the per telephone wage expense in India, in relation to per capita income, is much higher than in more developed countries. Several factors have influenced the rate structure. These include the large payroll of the DOT and its inefficiency, the pressure on DOT to raise over 80-90% of the capital needed for investment in network expansion from subscribers themselves, and the perception by the socialist planners that telephones are mainly for the rich.

The proportion of per telephone revenue to per capita income which is of the order of 0.05 in the Organization for Cooperation and Economic Development (OECD) countries was 2.5 in India in 1951 and in the last 44 years has come down to 1.5 times. This points to the fact that telephone service is 30 times more unaffordable for the average Indian compared to people in developed countries. Similarly, the charge for a one minute call from India to the US is more than twice that of a call going from the US to India. On an exchange parity basis, in terms of per capita income, it is 100 times more costly for the average

Indian to call the U.S. than for an American to call an Indian. The leased circuits and services cost even more, having been priced far above cost. Left with little choice, customers are hoping that with the onset of competition, prices will fall and not increase year after year. Meanwhile, telegraph service remains an underpriced means of communication often used by the masses, especially in small towns and rural areas.

#### 2.11 Post-1991 Changes

This essay on Indian telecommunications would fall short without discussion of the fundamental changes that have been taking place in the telecom sector since 1991. A few years ago, the DOE started making inroads into the DOT's domain as telephone switches and customer premise equipment (CPEs) (PBXs, telephones, fax machines, cordless telephones, and answering machines) came to be electronics-based. The DOE started licensing the state government's Electronics Development Corporations to produce the CPEs for which it negotiated technology transfers from several foreign companies, technology to be shared by many Indian enterprises. Then came the CDOTs products--the rural switches and radio systems, etc. Production of equipments, using technologies developed by CDOT was licensed mainly to private companies. These actions

undermined the DOT's orthodox view that telecom equipment production should be done solely by its own public sector enterprises and factories. In 1991, this orthodoxy was abandoned and private sector companies were liberally allowed to enter into technical collaborations for all varieties of transmission equipment - radio, fiber optics, and satellites. Foreign multinationals were allowed to tender for all the DOT's purchases of switches with capacities of 10,000 lines and above. Consequently, AT&T, Siemens, Ericsson, and Fujitsu offered their switches at about forty percent of the price charged by the DOT's former monopoly, state-owned ITI. After validating their switches for use in the Indian network, the companies delivered imported equipment and have quickly proceeded to set up manufacturing facilities in India. For transmission equipment, more than 20 Indian companies have gone into production in collaboration with foreign companies. The ending of the DOT's monopoly over production has had extraordinarily beneficial effects.

- Over seventy private sector companies sprang up in a matter of two to three years. They put US\$300 million as investments in manufacturing, compared to US\$140 million in 47 years by the PSUs.

- The equipment and cable shortage has disappeared. In fact, the production is limited by the sole buyer i.e., "...DOT's ability to allocate money from its budget to buy the equipment."
- Competition has brought down prices by as much as 25% to 75%.
- The product quality and delivery periods have dramatically improved.

The foreign exchange crisis in 1991 and the collapse of the USSR, India's ideological inspiration, led the Government of India to give up the orthodoxy of the public sector occupying the commanding heights of the economy through state monopolies and the exclusion of the private sector from many industries. Liberalization and private sector participation have now become elements of respectable state policy. After largely unsuccessful moves to involve private sector companies in telecom network and service provision, the government has at least written and presented what has come to be known as the National Telecom Policy (NTP) in May 1994. The NTP is an historic document which for the first time (without saying as much plainly), envisaged, among other things, the provision of basic telephone service by private sector companies, the

setting up of an independent regulatory body, and the separation of operational, policy, and ministerial functions in the DOT. In September 1994, guidelines were issued for the entry of private sector companies into basic telephone networks and services. In January 1995, separate bids were invited for licenses to provide basic and mobile telephone services. The salient points of the NTP are:

- The corporatization of the DOT is a non-issue. It would be left as it is. The labor unions have, therefore, no big issue to fight.
- Private sector companies will be issued licenses for state-wide operations in competition with the DOT for basic telephones. There would thus be a duo-poly system for fifteen years (there are 21 state-wide service areas).
- Mobile telephone services will be offered solely by non-DOT private sector companies, at least two in each service area. The initial license period is ten years, extendable by five years at a time thereafter.
- It is essential to have foreign equity participation from public telephone operators of at least 500,000 basic telephone customers and 100,000

mobile phone customers as of January 1, 1995.

- Foreign equity participation must be a minimum of ten percent and maximum of 49% in the bidding for joint ventures, each of which must be registered as Indian companies.
- The Government has laid down roll-out and public service obligations like rural area coverage and public telephones.
- Prices charged should not exceed those charged by the DOT.
- Interstate and international telecoms will be the exclusive monopoly of the DOT and its company, the Videsh Sanchar Nigam, Ltd. (VSNL).  
Competition in local and monopoly of long distance telecoms has no parallel in the world.
- Only companies with a certain minimum net-worth are eligible to bid.
- Government , i.e. Public sector, undertakings, are ineligible to bid.

In the implementation of this NTP, the government invited bids for the awarding of operating licenses for cellular, mobile, radio telephone, and basic telephone services. There would be two private companies for mobile phones in each state competing with one another and one private company for basic telephony competing with the DOT.

The DOT is not corporatized into one or more units, like the MTNL and VSNL, because the technical bureaucracy and workers are opposed to the loss of civil service status that corporatization means. The labor unions have many more reasons to oppose corporatization--loss of civil service status, retrenchment (as the DOT is grossly overstaffed at 24 telephones per employee compared to 200 to 300 in the OECD countries), promotion based on seniority, extensive welfare benefits, and ideology. They also think that corporatization is the first step to privatization. As elsewhere in the world (France, Germany, the UK, etc.) they held demonstrations and waged strikes. There was not enough political will to proceed with corporatization. The government appointed a committee to suggest amendments to the ITA of 1885. The Committee suggested, in 1992, that a separate regulatory body must be set up, that customers must have certain rights and that the telecoms must be linearalized. Even these mild changes were not

acceptable to the technocracy in the DOT and this report also, like the Athreya committee report to corporatize, was consigned to the dust-bin.

In the light of the NTP, the DOT accepted from private companies, bids for licenses to construct networks and provide cellular mobile radio telephones in four metro cities and 21 states for mobile telephones and 27 large cities and 21 states for radio paging. The award of licenses, the interconnection terms, the license conditions, and the fees payable were all seen as arbitrary, and aggrieved parties went to courts. The final awards took 33 months to be given and some of the services are beginning to be rolled out since the middle of 1995. Eight private radio paging companies are licensed in 27 cities. Half a dozen companies have been licensed to provide electronic-mail service. Forty-two licences had been given to build, operate and provide mobile telephone services in all the states of India.

The award of licenses for basic telephone services has run into trouble because of the expectation of high license fees by the DOT. Bids were called thrice with the number of bidders decreasing every time, and there are no takers for some states. Meanwhile, (June 1996) some companies which got letters of intent to give licenses from the DOT are withdrawing the bids because of unacceptable license conditions.

On the whole what one could see is a great de-monopolization move in the Indian telecoms. While the DOT continues to step up the rate of network expansion and add new lines (it gave 2.2 million new lines in 1996, 1.7 million in 1995, in contrast to 250,000 ten years ago), the country would soon be witnessing dozens of private sector companies also providing a variety of new networks and services, some in competition among themselves and some in competition with the DOT.

The main problem will be that of telecom regulation. No independent regulatory authority has been created as yet (June 1996) and the DOT itself acts as a the policy-maker, Ministry operator and regulator of its competitors. The government hopes to introduce a bill in India's new Parliament to create a Statutory Telecom Regulatory Authority of India.

## ENDNOTES

1. DOT'S Annual Statistics

2."Financing and Pricing of Telecommunications," *Journal of the CTMS*, T.H. Chowdary, ed., July 1992, No. 7, pp.5-6.