CHAPTER – IV

Public Sector telecom companies

How they changed the life styles

Centre for Development of Telematics (C-DoT) is one of the most enduring success stories in Telecom sector. Away from the madding crowd, a fierce battle of nerves was on between the foreign multinationals such as Alcatel and Ericssons and the fledgling C-DoT in the eighties. The brainchild of none other than Sam Pitroda, the then boss of the DoT, C-DoT started effectively challenging the monopoly of multinationals. It was a nationalistic phase. Backed by his young, enthusiastic and brilliant team of engineers in C-DoT, Pitroda was ready to take on the might of the MNCs.

The DoT preferred that India should use indigenous technology for switching systems, which are used for providing telephone lines and call routing. C-DoT openly announced that such a technology would be more robust and much cheaper than the imported switching systems. C-DoT was infact formed with this mission of developing large switching systems which could even be exported to other countries. Pitroda also said that foreigners were fleecing the country by overcharging and wanted to break the cosy cartel.

C-DoT, developed advanced digital switching and transmission systems, specific to the needs of the nation. It has successfully designed a family of digital SPC stored programme controlled switching systems from small to main automatic exchanges upto 10000 lines. These are already being produced by a large number of manufacturers in the country. C-DoT technology has made significant forays into other countries. It made a big dent when it designed and developed a 30,000 lines main automatic
exchange. C-DoT is also working on the development of V-SAT equipment based on its technology.

Simultaneously as C-DoT kept coming up with breakthroughs, the rural automatic exchange which enabled communication links with most villages, the small switching exchange was being expanded into larger ones.

Convergence creates new demand for services

The telecommunication sector is at the heart of a much larger Industry-information and communication technology, or ‘infocommunications’ -- which was worth some $1370 billion in 1995. The convergence of the telecommunication sector with the computer and the broadcasting world is creating new synergies, most evident in the exponential growth of the Internet which continues to double in size every year. At the start of 1997, there were some 16 million host computers connected to the Internet and more than 50 million users. The significance of the Internet lies perhaps not so much in what it is, but what it will become. It can best be regarded as the prototype of a ‘global information infrastructure’ which will lay the platform for the electronic commerce of the 21st century. Estimates of the value of transactions carried out via the Internet in 1996 ranged between $ one to three billion.

As on 1998 DoT Report

C-DoT will soon provide India with a speech capability on VSAT. New Mobile Satellite System on S-Band is the latest invention at C-DoT. C-DoT is trying to upgrade the switch and incorporate all the facilities so that it becomes state of the art switch. C-DoT has about 2000 (SBM and MAX) exchanges working in the urban areas as compared to 16000 exchanges working in rural areas. More than 60 per cent lines provided by C-DoT are in the rural areas and around 30 per cent in the urban areas.
C-DoT was the first to develop the indigenous VSAT. C-DoT was the first R&D centre to give a speech capability to VSAT in India and that network is already in operation with Department of Science and Technology. For DECT as well C-DoT is working closely with National Semiconductor using their chip and developing own DECT system. C-DoT hopes to exploit the falling trend in the cost of handset. DECT is now a widely accepted standard in Europe. C-DoT 8/8 ATM switch will be ready very soon and put up for the field trial under the DoT which will provide a backbone network for the data services. By providing voice communications ATM will be able to reduce per line cost to roughly about $30. Having said that one has to look at the employee profile.

C-DoT has about 1100 workforce today out of which 800 are engineers and 300 non-engineers. Majority of these 300 are diploma holders for manning pilot projects. This public sector has drawn up ambitious plans for the next five years. It is working to make its existing switch the most modern, current and comparable to any one in the world. It is also working on SDS in the transmission and on the Mobile Satellite System (MSS). C-DoT is trying the MSS on S-Band for the first time in the world. This is a briefcase type terminal weighing about 5 kgs. which one can carry anywhere in India to have the communication facility.

The trend throughout is to convert the design into ASICs (Application Specific Integrated Circuits). Fortunately with the help of German government C-DoT has established an ASIC design centre in Delhi and it is one of the most up-to-date centre. The C-DoT design its ASIC there, getting it fabricated from the US and sometimes in India through HCL and implement it in own design to make it more cost effective. 1

C-DoT knows only one Mantra, “India can do it.” It came into existence in 1984 when most people thought India cannot develop its own digital switch. In 1989, C-DoT went for a major expansion when it also got the responsibility of developing the transmission systems in addition to switching.
With the production of most cost effective products with built-in qualities of frequent upgradation, C-DoT produces tough systems to withstand any kind of weather hazard. Thus it has now become the synonym to the rural telecommunications development.

The major reason for C-DoT’s success story is its comprehensive approach to the critical network requirements. A galaxy of experts are engaged in the research and development. Their willingness for working on projects to become a major global software developing centre has given C-DoT its cutting edge.

C-DoT has also developed a wide range of modular technologies. The switching systems developed by C-DoT, which come in a wide range from 100 lines to 40,000 lines, are designed so as to work effectively in the non-air-conditioned environment. In the field of transmission, C-DoT has invented low capacity digital radio technologies for interconnecting rural and urban exchanges, satellite systems for integrated voice and data communication, digital multiplexes and optical communication systems.

**MTNL & VSNL**

For the Mahanagar Telephone Nigam Ltd (MTNL) -- hi-tech is fast track. An exotic brew of user-friendly services like telemedicine, distance education, telebanking, video conferencing are going to be the latest offerings of the company. MTNL between Mumbai and Delhi has over three million clients.

Though basic service would continue to be the major emphasis of MTNL, it wants to establish a strong presence in all services, particularly value added ones, paging, mobile, Internet, Intelligent Networks, invading the niche market with an aggressive strategy.
The right environment for this is to be created because Government is giving autonomy to MTNL. Already MTNL has been allowed to make its own purchases and soon it is likely to get complete freedom for making its own investment decisions and company reorganisation.

MTNL is going for the jugular. It is planning a total reorganisation making it a flat corporation. This is being done to make the consumer feel that he need not go to different people for different jobs. This will shift it from numerous functional divisions into empowered people all along the line, the empowering going to lowest possible level, says the MTNL chief. According to the new plans, for the customer it should look like a flat organisation. That meant when the customer reaches out to any point in the organisation he gets complete service. This would make it consumer oriented.

In the bid to make MTNL a total consumer friendly organisation, it is planning massive investment in improving billing and accounting system. MTNL is introducing integrated billing and accounting system. By March 1998, all customer service and management service centres would be integrated. This integration would enable customer to get all his information or pay bills at any point in the network, even Delhi customers getting service in Mumbai. “Pay at any point” would be the new slogan. All, even from customer computer, would be linked to the integrated system.

Innovative ideas like payment by credit card and special services for bulk customers like business organisations which are the largest customers, are being considered in the expectation that MTNL would be allowed to take this independent line once its autonomy in full is conceded.

MTNL has made ambitious future plans. The key areas identified for the ninth five Year Plan (1998-2003) are expansion of telecom network for providing telephone on demand. The waiting period will not exceed three months if its plans work and demands satisfy technical feasibility. The accessibility of services will be considerably
increased by providing with telecom services of international standard. Scrapping of all the remaining electro-mechanical and analogue electronic exchanges by digital exchanges is another plan. The potentials of new technology switches is being exploited to provide ISDN services.

Carved out of the Department of Telecommunications in 1986, the MTNL has positioned itself as a technology friendly company. It inducted the latest techniques encompassing optical fibres, voice mail and digital microwaves to provide value added services to its over three million customers in the two prime metros of the country.

MTNL has plans also to invest Rs.20 billion to catapult corporation’s three million strong network into a world class one. The latest network management techniques are on the anvil along with wireless local loop, ISDN and Intelligent networks.

From Screws to Chips

The Indian Telephone Industries Limited (ITI Ltd.) was established in July 1948, as a departmental undertaking of the Government of India. It was formed into a Company in January 1950 with an authorised capital of Rs. 25 million. By the end of March 1996, the authorised capital stood at Rs. 1000 million and the paid up capital at Rs. 880 million. The Company has seven manufacturing units located at Bangalore in Karnataka, Naini, Rae Bareli and Mankapur in Uttar Pradesh, Palakkad in Kerala and Srinagar in Jammu and Kashmir.

The Company started with the production of step-by-step strowger switching equipment and telephone instruments with foreign collaboration in 1950-51. Presently, telephone instruments are produced at Bangalore, Naini and Srinagar. Transmission equipment at Bangalore, Naini and Rae Bareli and Small Electronic and Digital Trunk Automatic Exchanges and Switching Exchange Equipment at Palakkad. Electronic
Switching System (ESS) and special products are produced at Bangalore and Electronic Digital Switching Equipment at Mankapur and Bangalore.²

ITI is the flag-bearer of the DoT. It has made a historic contribution in the growth of telephony in the country because for so many years it was the principal supplier of telecom equipment to the DoT. It has also a very proud record of making profits every year of its existence, except in 1994-95. Therefore, the Government has a very heavy stake in the successful working of this undertaking and its financial health. ITI is back on the rail and it is in good health and continues to serve not only the Department of Telecommunications but the whole telecom industry.

Telecom Department has a double relationship with ITI. Unlike other Ministries which only have a governmental role in relation to their public sector undertakings, DoT has also the distinction of being the principal customer of the produce of the ITI. Ministry is the parent department, on the one hand and the principal customer of the ITI on the other.

With the telecom in the country poised for a massive growth, the ITI is certain to push up its production range. The services sector is going to register very large growth in the coming decade. There will be massive requirement of telecom equipment. In this background, the ITI should certainly welcome the appearance of competitors. The appearance of a large number of operators, both of basic services and of value-added services, are a very big historic opportunity for selling its equipment. For producing more and for selling more.

It has been for so many years as the single seller, as having a single purchaser, as having a captive customer, being the sole supplier to the DoT. The times have changed. The competitive environment in the last five years has grown in a very big way. With this the telecom industry too has grown. It has gone up from a level of production worth Rs. 3000 million four years ago to more than Rs. 7000 million now.
This kind of growth is unprecedented. Instead of being the sole player, ITI is now one of the many players. It still remains the key player in telecom equipment today. But things are changing and therefore, the management is trying to stand on its own and learn to compete on equal terms. It is now one of the largest public sector undertakings and with its competitive price and product is marching ahead.

The new priorities to turn around the company are:

(a) to ensure customer satisfaction and competitiveness through quality, delivery & cost.

(b) To ensure optimum use of the resources for manufacture of the Telecom equipment and diversity into related areas in Telecom Network operations and value added services.

(c) To generate and exploit the export potential for Telecom Equipment Services.

(d) To strengthen technology scanning capabilities to benchmark its products and services against global standards, identify new products, enable better make or buy decisions and identify potential partners.

(e) To build company-wide efficient information structure to assist all functional groups in achieving corporate objectives all goals.

(f) To gear HRD activities to improve quality of work life in the organisation.

Prior to 1991-92, only the budget estimates of the company were prepared and submitted to the government. From 1991-92 onwards, specifics have been drawn up in the form of MoU spelling out the objectives, targets and everything. The ITI has been rated ‘excellent’ in the MoU evaluation.

**TCIL: India Goes Global**

Set up in 1978, the Telecommunications Consultants India Ltd. (TCIL) has carved out a niche for itself in the highly lucrative global telecom turnkey projects market. From concept to completion this public sector company undertakes challenging
jobs in telecom abroad. Its record has been “excellent” for the past seven consecutive years. TCIL has received many accolades. It has to its credit a record of successful completion of a number of contracts with single responsibility in Africa, West Asia and South Asia providing appropriate technology at competitive cost. TCIL is all set to establish a Networking Centre for engineering and installation in India and in several developing countries.

Largely working on telecom projects abroad, TCIL is now marketing the excellent ratings it has gained there to set up competitive facilities in India. In fact, there is a two pronged drive. For domestic and foreign projections. TCIL teamed up with Shyam Telecom and others in the cellular venture in Rajasthan. This has already started its service in Jaipur. TCIL is even planning to enter basic services. “We are seeking an alliance for sustained income from domestic operations also,” says a top TCIL official. The projected alliance could be with any one of the PSUs like ITI, VSNL or MTNL. TCIL would venture into different value added services like cellular.

A Telecom Export Development Fund was set up to promote export of telecom equipment. The export of telecom equipment rose from about Rs.2700 million in 1991-92 to about Rs. 9360 million in 1994-95 and to over Rs.15000 million in 1996-97.

Besides administering hi-tech telecom services at par with the international standards, India offers a wide spectrum of high tech consultancy services in the international arena. The strength of providing such services to a host of countries stems from the professional excellence and sophistication achieved in the Indian Telematics field. The TCIL’s turn over has increased from Rs. 1020 million in 1991-92 to Rs. 3620 million in 1994-95. Its turnover during 1996-97 was Rs 4720 million and its profit before tax stood at Rs 436 million. The foreign exchange earning during the year was Rs 2640 million. During this period TCIL earned commendations from different governments. It is tapping the new installation and turnkey job markets in basic services
with three companies for which three MoUs have been signed. The objective is to build
the company image as an important domestic player as well.

Recently, TCIL has scored contracts in providing consultancy in network
planning to Zimbabwe and training to governments of Nigeria and Sri Lanka. In addition
to communications, in Information technology, the company secured Year 2000 software
solutions contract for the Netherlands PTT. The well earned reputation for reliability has
taken TCIL to new heights. In 1997, it obtained consultancy job with RASCOM, the
regional African satellite communication system. TCIL is to advice on building of
Africa’s own satellite for communication meteorology.

CPE: India-specific issues

FOR a country, like India, there are several matters to be considered
for Customer Premises Equipment (CPE) selection. It is quite likely
that newer equipment may originate from the developed countries, at
least in the early stages of its introduction. It may not be possible for
all CPE that users require, to be produced in the country. The limited
availability of foreign exchange might then make it necessary to
prioritize its use. In view of this, it would be crucial for the country to
evolve policies that marry strategic interests of the country with
the need to ensure access of users to appropriate CPE.
It bears repeating that long-term competitiveness of our industry will
be increasingly dependent on the availability of and exploitation of
information technology products. This process would be helped if
environments are created, where there are incentives to set up
manufacture of CPR in the country and venues for innovation in this
area.

-- DoT Study, 1998
The company has been granted ISO 9001 certification for consultancy, engineering and project execution in the areas of Telecommunications and Information Technology.

TCIL has worked in over 40 countries including Saudi Arabia, Oman, Kuwait, Yemen, United Arab Emirates, Iraq, Syria, Mauritius, Zimbabwe, Botswana, Mozambique, Tanzania, Nigeria, Benin, Ghana and Indonesia. A number of major telephone cable network projects have been won by TCIL in West Asia against stiff international competition. It also takes up turnkey projects for bulk users in India belonging to various sectors like banking, petroleum, transport, irrigation, power, fertilizers, mining, health and public utility, defence and security.

VSNL: A star in the orbit

When Overseas Communications Service (OCS) was born on the nationalisation of India’s external Telecommunication services in 1947, it operated two gateway centres, one at Bombay and the other at Madras. Through these two gateways, OCS provided International Public Telegram Service. In the beginning it provided International Telephone Service through manual operation. In that era, London being the new centre for international communications, both the above services were operated to other countries through London.

During the early 50s, both the Telegraph and Telephone services were expanded progressively to cover other destinations of Afghanistan, Indonesia, Iran and Japan. During the same period, “Radio photo Service” to transmit black and white photographs over the radio links was also started with London. This service became very popular during the course of the decade. Many international destinations were connected in between this period. To meet the demands of the Press and Radio, OCS introduced “Press Broadcast Service” for conveying news items over a radio broadcast to be picked
up by foreign destinations. This also had the facility to receive such broadcasts from foreign points for publications in India.

The early 60s witnessed the dawn of 50 band teleprinter service over High Frequency Radio. By this time, the use of the telegraph cables which used Morse for transmitting telegrams had become obsolete. To counter-act this decline and to make use of the available submarine cable, OCS adopted a new technique. This was to transmit teleprinter signals over the existing cables. The teleprinter services thus replaced the Morse working of telegraph operations. Printed messages could be directly received over the communication medium and delivered to the customers easily. During this period, India’s connectivity on the Telegraph and Telephone covered most of the major countries in the West and the East.

With the advent of the teleprinters, a new service Telex (teleprinter exchange) came into force. India introduced “International Telex Service” in the early 60s on a manual basis. In the middle of the 60s, the telegraph operations which were purely manual, were redesigned for semi-automatic operations. This effort was wholly indigenous and developed entirely by OCS expertise. The first such system was tried in Bombay and later on expanded to Delhi and Calcutta. A lot of technical refinements like Automatic Error Correction (ARQ) System were introduced during the late 60s to provide better quality to these services.

The volume and quality of international telecommunication services really increased in the early 70s. Clearly the sea change with the advent of the satellite communications in the world revolutionised the whole system. OCS put up the first earth-station in 1971 and thereafter quickly introduced automatic operations for Telephone and Telex. This made it easy to meet the ever growing demands for international telecommunications. At this same sequence, OCS brought to India International Television through satellite. This service brought important international events of political, cultural and sports activities for the viewing public of India. A lot of
emphasis and attention was paid to the standards and quality of service being provided to the customer during this period. OCS made the necessary technical upgradation to bring its services in line with the international standards. This was monitored through the Consultative Committee of International Telecommunications Union.

In the 70s, OCS introduced another service for the media called the “Press Bulletin Service.” With the reliability and quality of telephone circuits improving the All India Radio began use of the service called “International voicecast.” This brought the Indian Radio live commentaries of important international events.

During the first part of the 80s, there was tremendous growth and improvement in the international telecommunication services through the use of computers. This decade could be called the “Information Era.” The outlook of the services took an entirely different shape and the demands grew by leaps and bounds. The communication became more efficient and less costly. OCS introduced Fully Automatic Telephone, Telex and Telegraph services during the first half of the 80s. Many refinements like “Store and Forward Telex,” International Subscriber Dialing for both Telephony and Telex and International Bureaufax service for handling speedy transmission of documents were implemented very quickly. In line with the introduction of such service in the international arena India started keeping pace. A very rapid expansion of the facilities like additional earthstations, automatic exchanges and submarine cables were planned and installed to cater to the volume of international traffic generated from and to India. These were the foundations on which later Videsh Sanchar Nigam Limited (VSNL) was formed in 1986.

VSNL is firmly positioned to meet demands of the emerging Indian multimedia society to become a part of the global cyberspace. Described as “India’s Gateway to the World” VSNL has grown from a mere international traffic carrier to provide a whole range of services for its high demanding clientele. This level of customer satisfaction reflects its performance.
Since its inception VSNL has shown a consistent growth. Today it is possible to have International Direct Dialing (IDD) to 236 destinations worldwide from over 6246 towns and cities of India as on 31st July, 1997. In fact one can pick a telephone virtually anywhere in India and make an IDD call. Against around 1000 simultaneous telephone conversations possible in 1986, by 1998 it is possible to have over 14,000 simultaneous telephone conversations at any time to various destinations worldwide.

VSNL has 28,999 employees in its offices all over India. VSNL signed a fresh memorandum of understanding with DoT seeking to strengthen its hands against excessive bureaucratic control. This will allow VSNL freedom to decide on the choice of transmission medium and to establish its own links for inter-connecting its gateways to earthstations. Against a turnover of Rs. 1931.6 million in 1986, the company’s turnover has grown to Rs. 52.85 billion in 1996-97. In terms of sales figures, paid minutes have grown from around 129 million minutes in 1986-87 to 1384.93 million minutes for the year 1996-97. VSNL has established four additional roof-top antennas in the cities of Mumbai, Calcutta, New Delhi and Chennai, in addition to its major gateways at Arvi (near Pune) and Dehradun.

In the past, the ratio of international telephone lines to national telephone lines had been one international line for every 2,200 domestic lines. Today, this ratio is improved to one international line for every 1000 domestic lines, thereby substantially improving call connectivity. About 90 per cent of the network operated by VSNL now is state-of-the-art digital network.

VSNL which is also a nodal point for all overseas telecommunications has set up extensive infrastructure of earthstations, optical fibre multimedia submarine cables and multi media data switches. VSNL has positioned itself now to provide bandwidth on demand, global virtual private networks, Integrated Service Digital Network (ISDN), Very Small Aperture Terminals (VSATs), INMARSAT and hand held personal communications.
In its endeavour for accomplishing sleek tasks Mini-M phone, the latest offering of INMARSAT (International Maritime Satellite Organisation), was launched on May 5, 1997 by VSNL. Its sole motto was to develop world-wide mobile communication. The system also has fax and data facility, as computer could be attached. Unlike other satellite phones, the Mini-M weighs two kg and is the size of a laptop computer. The Subscriber Identification Module (SIM) card of this phone helps users to have security and personalised information. This card also helps the user in phone sharing and itemisation of the information with other subscribers of this service.

"The Mini-M service has come as a big relief to people constantly on the move, as 90 per cent of the world surface is still inaccessible by conventional telecommunication," said a senior engineer working for VSNL.

The VSNL will be setting up full-fledged gateways in Ernakulam, Jalandhar and Ahmedabad. These gateways are expected to be functional in. Top officials of VSNL said that the approval for gateways were in the final stages.

Mini-M, VSNL's portable satellite phone has the capacity to make telephone an integral part of your travel kit. This satellite-based phone can be used anytime, anywhere in the world.4

**Telecom to Rural Sector**

The importance of rural telecom as a means of social and economic uplift of vast majority of people in the country has been well appreciated by the government. Opening of telephone exchanges in rural areas has now become a major plank of telecom planning. By the end of 1995, nearly 195,000 villages were covered with telephone facility. All the villages were to have phone facility by 1997 under National Telecom Policy. Now that target has been extended to the 9th plan.
A rural telecom package was announced in November 1995 to benefit rural subscribers. It proposed reduced tariffs, reduction in registration fee and telephone rental, subsidised installation charges, increase in free calls for rural subscriber and increase in commission to the franchisees of STD, ISD and PCO in rural areas. The department has found that the villagers were ready to pay market rate for the phones. The element of subsidy is slowly coming down.

Department of Telecommunication (DoT) provided STD connectivity to all the district sub-divisional and tehsil headquarters by 1996. All the manual telephone exchanges have been replaced with modern automatic exchanges by March 1994. The Indian telecom network is now fully automatic with the local switching capacity being electronic and most of the long distance transmission media being digital. This has paved the way for telecom services of world standards.

A rural area is defined as a human settlement which is non-urban. The definition of urban settlement envisages a minimum population of 5000, a population density of at least 400 persons per square km and employment of at least 75% of male population in non-agricultural occupation.

India has a land mass of 3,300,000 sq.kms. and comprises 26 states spread over the plains and hills, deserts and forests coastal and lowland areas. There are more than 3000 towns and 609306 villages as per the 1991 census. Thus in essence, the country really lives in its villages. The establishment of a quick and effective communication facility has been a long standing priority. The plans for weaving the villages intimately to the mainstream of our national life and providing basic infrastructural support for implementation and monitoring of various development programmes for their socio-economic uplift has taken long strides. This need was recognised soon after the country gained independence and it found eloquent expression in the successive Five Year Plans.
To provide rural inhabitants access to telecommunication facilities, all of the inhabited area of the country was sub-divided into hexagonal cells of five km. size. Then the villages falling under a hexagon were grouped together. Initially it was envisaged that the individual cells would be provided with at least one Long Distance Public Telephone (LDPT) for immediate accessibility and with potential for future development as a local exchange area. The number of such hexagons, covering the whole country was 49,096. Till 1966 March, 39,836 hexagons had been provided with telecom facilities. Since the technology used for providing the LDPTs was predominantly wire based, the reliability and the performance of these systems were to be improved to offer quality service.\(^5\)

For the Eighth Five Year Plan (1992-97), it was decided to increase the penetration of telecommunication facilities further. In the initial stages it was planned to provide at least one telephone per Panchayat Village (Panchayat Village is a village which has a judiciary of the lowest hierarchy). Now the government adopted a policy to provide public telephone facility to every village.

By 31st March, 1997, the villages covered with VPT was 268,000 against a total of 600,000. The total number of villages covered under VPTs in the beginning of 1998 was over 279,000. DoT plan is to provide 83,000 VPT during 1997\(^9\)98. It is planned that all the villages will have at least one Public Telephone by end of the Ninth Plan. This will be done also with the help of the private sector who were given licence for Basic Telecom Services. Most of the Village Public Telephones will hence forth be provided through wireless, says P.S. Saran, Member, Telecom Commission.

The village public telephones are being provided at suitable public places like post offices, panchayat headquarters, grocer shops, community centre and other places which are easily accessible to the common man. To encourage the use of such Public Telephones, the local calls have been subsidized by 50 per cent. Wherever there is a demand, STD facility is also being provided on these telephones. The STD charges are at
par with the normal charges. These public telephones are being provided mostly through the most modern and sophisticated and reliable radio systems employing the use of Solar Power Panels which requires very little maintenance efforts and are suited to India’s rustic environment. The number of PCOs provided by the end of 1997-98 was 484,000.

The “Task Force for Development of Rural Telecom” 1981 said, for physical access within a distance of about five km from any inhabitation, the country be divided into clusters of such radius with hexagonal grid which would provide for perfect intermeshing leaving no area of the country uncovered. A central village in each of these hexagons could be provided with a long distance public telephone, it said. The Task Force felt that the consideration of returns should not stand in the way to provide infrastructural support for rural development.

“The theoretical maximum number of LDPTs calculated on this basis comes to about 47000. The actual number, which may be determined by a study, which is proposed to be assigned to NCAER, may be less than this number, since many areas like lakes, deserts, mountainous regions where there is no inhabitation, would be excluded. The number of existing LDPTs is 13,830 and 20,000 more LDPTs are proposed to be provided during the Sixth Plan period. It is, therefore, likely that the goal of providing physical access to a telecommunication facility within 5 km from most inhabitation’s may be achieved by a marginal increase over the number planned during 1980-85 period,” the Task Force said.

On the technology to be employed for providing long distance public telephones from the reliability, maintainability and availability angles, the multi-access rural radio systems were found to be superior than open wire lines. They were also cost effective in most practical situations. In the hilly, desert, coastal and forest regions and areas where the open wire alignments were subject to high power induction, the multi-access rural radio systems were recommended.
Initially the long distance public telephones (LDPTs) were located at block offices which had restricted hours of working. This further reduced its availability. Some experiments of providing extension of LDPT to a grocer’s shop were found to be successful in providing telephone facility over extended hours to the rural public. The Task Force suggested various alternatives like Gram Panchayat Office/Village Sarpanch/Health Care Centre, Member of SC or ST where the LDPT can be maintained properly. Cooperative outlets envisaged by the government, non-departmental handicapped agent etc. were also suggested with the actual selection being left to the discretion of the local field organisation.

For rural connectivity in addition to the conventional landlines, copper cables and radio systems, optical fibre with drop, insert circuits from national, regional transmission systems are also being utilised. Satellite based systems though expensive are the only means available for providing reliable communication to some of the remote areas. At present four INSAT satellites are operational. About 170 MCPC-VSAT terminals are operational and a proposal is there to add another 200 such terminals in the next five years.

The DoT has been exerting its entire energy to expand the telecommunications facilities to cover the rural areas. Prior to 1970s the available technologies to connect the village subscribers were only wired systems such as over head wire and under ground cables using copper pair of wires. In the rural, hilly and remote areas of the country where access was tough, it was always difficult to install and maintain the wired connections. This was causing major delays. It was not possible practically to connect a large number of population of the country to the Telecom Network because of this problem. As much as 99 per cent of the rural population did not have any access to the Telecom Network until late 1970s.

With the improvement in the technologies in electronic and radio equipment and switching the DoT started probing the possibilities of connecting the remote areas using
them. Thus began the use of modern technologies such as Wireless Radio Systems. In 1979, a Task Force was set up to examine the possibilities of various technologies for rural network. This Task Force suggested the introduction of Shared Radio System. Information was collected from various countries like China, Japan and Korea to find out the relevant technologies being used there in such areas. In 1981, the Task Force submitted its report on such systems. On the basis of this, ITI was permitted to import these equipment from countries like Italy and Japan. Trial equipment was first imported from Kokushai of Japan. These systems were commissioned in the DoT network. Some of them are still working although the spare components are not easily available.

On seeing the performance of these equipment, the then Telecom Research Center (TRC) of DoT desired to develop an indigenous model of similar Radio Based Systems. Thus a project for the development of indigenous MARR was taken up.

**Morse to Mouse**

Telegram is a common man’s communication need. The first telegraph message was transmitted live on Morse through electrical signals between Calcutta and Diamond Harbour on 5th November, 1850.

The Telegraph Services were open to public during February, 1855 and as the Telegraph technologies developed in the world, India also had the benefit of incorporating such technologies, like Baudot System (1906), Radio Telegraph (1927), Devanagari Telegram (1949) and Electromechanical Teleprinter System (1954). The concept of providing telegraph facility through a Post Office came up during the British time as a measure of economy in the early 1900.

After India got independence, the Telegraph Offices both as dedicated offices as well as on an agency basis through the Post Offices remained as the focal point communication centres for the public. The public call facilities for telephone users were basically provided through these Telegraph Offices. Since the Posts and Telegraphs were an integral part, the Telegraph Offices catered some of the Postal facilities through their
counters. At the time of independence the number of Telegrams booked stood at 13.97 million as compared to the present status of 54.45 million in 1996-97. Today Telegraph Services as well as basket of other Telecom Services are provided through 953 dedicated Central and other Telegraph Offices, 977 Telecom Centres and 43543 Combined P&T Offices.

The growth of the Telegraph Services in the independent India has been very slow. Being a non-real time service, the demand for the service was confined only to emergency purposes. As the Indian economy grew, more and more consumers used the Telegraph facility for the business purposes also. Being a labour intensive service of manually booking the telegrams, transmission and reception of telegrams and delivery of telegrams, the Telegraph Services had its own operational management problems for a long time. With the changing scenario of technology in the western world, the Indian Telegraph network tried to imbibe the same in the form of introduction of Tape Relay Exchanges (TRX) in the early 1950s and subsequently a Strowger type Gentex Switching Systems in the mid 1970s. However, the technology induction in the first three and a half decades remained half-hearted and confined to experimentations only. One of the reasons as to why good technological inputs were not given to the Service is the advent of Telex and the general impression that with telex available in the country the demand for telegraphs will go down in no time. Since such predictions did not hold water for the decade of 1970s and 1980s efforts were made to modernise the Telegraph Services by induction of contemporary technology. Automatic Message Switching Systems based on Micro-processors and terminal devices were developed and inducted into the telegraph network in order to rejuvenate the telegraph services.

The first Store & Forward Telegraph System was commissioned in CTO, Madras, on 31st March, 1982. The telegraph network never looked back in the induction of technology from then on. A National Message Switching Network Plan was prepared in 1986 for implementation of the modern technology in the Telegraph network based on the recommendations of Committee on Telecommunications. This project was executed
at a cost of Rs. 1100 million. By 1998 the Telegraph network acquired 52 major electronic and processor-based systems working in the fully developed automated network. The Message Switching Systems have full redundancy to provide integrity and security for the telegrams under transmission. Rural Telegraph Services in several places have been upgraded by providing Processor based Electronic Key Board terminals and lower end concentrators. Computerisation of booking and transmission of telegrams, operational management functions etc., has been the hallmark of modernisation of Telegraph Network.

The Telegraph Services are however under decline from late 80s onwards, owing to the Impact of other non-voice services and Improvement in density of telephones.

To begin with, it was the quality of Telegraph Services which was not upto the mark and on account of that new demands could not be generated. In the first thirty years of independence, there was no alternative to telegram, the telephone density being very low. There was a sustaining demand with a small annual average growth at the rate of two per cent.

Some attempts have been made in the past few years to diversity the activities in the Telegraph Offices owing to decline in demand for the telegrams. New Services like Express Money Transfer Service, which was introduced in Andhra Pradesh for the first time on 14 March, 1994, taking care for the money transfer facilities within six hours time, collection of telephone revenue bills, experimental Bureaucom Service, Bureaufax Service have been attempted.

**Express Money Service**

The Service is now available in Andhra Pradesh (1994), Tamilnadu (1996) and Maharashtra (1997) Telecom Circles. The Service will be shortly introduced in Kerala, Karnataka and New Delhi.
The Service has won number of appreciation and the tariff is so conveniently positioned that it becomes cheaper to send through Express Money Service as compared to Money Order, Telegram Money Order, Demand Draft etc. The Express Money Service works on EDI principle imbibing the latest technology.

**Bureaufax Service**

Bureaufax Service was introduced for the first time in 1988, and facility is available in 1248 Centres throughout the country.

The Telegraph Tariff has remained the same without any change over the last 33 years for Press Telegrams and over 15 years for Non-Press Telegrams.

Because of the characteristic features of the Telegraph Service, it has not grown to the desired extent. The Telegraph network had the first electronic switch as early as in 1981-1982. The telegraph network provided on the line management information facilities in Electronic Message Switching System in the beginning of 1990s itself. Though there is a decline in demand, the service has social relevance and historical importance.

**WLL Has the Way**

With the spread of capacity and density the DoT is now trying various Cordless Telephone Systems and Digital Cellular Mobile Systems. These, options being adopted for Fixed Cordless Systems are Personal Handyphone System (PHS), Digital Enhanced Cordless Telecommunications (DECT) and Cellular Systems like Global System for Mobile (GSM), Extended Time Division Multiple Access (ETDMA) and Code Division Multiple Access (CDMA). DoT has now decided to introduce only digital systems. Technology options now available can be categorised as: Digital Cellular Mobile
Technologies (Macro Cell), Cordless Technologies (Micro Cell) and Multi Access Technologies.

The DoT has been analysing and evaluating all these technology options to ensure best performance on its network. Its endeavour was that Indian system should not lag behind for want of the latest and the most modern technology. The same philosophy was evident when DoT decided to go for wireless in local loop (WLL) in a big way. India was one of the first countries which decided to go for a trial run of CDMA system on commercial basis. Such bold initiatives have made India’s telecommunication network one of the best and most vibrant in the world. Quality, capacity, reach and penetration were the guiding principles in the selection of a technology.

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