Chapter 3

Development of Telecommunication Sector in India

3.1 Introduction

Social and economic development, without telecommunication services, is not possible, at the same time; telecommunication development is not possible without social and economic development. Both are interdependent on each other.

The concept of communication today is not confined to phone, fax or tele printers only, it is much more and beyond that. Liberalization of Indian telecommunications has no precedent or parallels anywhere in the entire world. The growth of telecommunication sector was undertaken with the goal of delivering low cost apparition telephony to the largest possible number of consumers. A technically minded politician, working closely with visionary technologists, started telecommunication revolution in India. The opening of the sector was greeted with a lot of optimism about the potential and spread of telecommunication services. As a result of this optimistic attitude towards growth of the sector, mobile phone telephony is one of the fastest growing segments of the Indian telecommunication industry. Today modern innovative services of mobile phones have fast moved from being a class service to a mass service for the common man. Affordability and increased coverage has made these services a key plank for economic development.

The present chapter is divided in five sections. Second section discusses the growth of telecommunication sector in India during the pre and post economic reform. Section three highlights the major policies laid down by the authorities, which are important for the growth of the telecommunication sector. The evolution of mobile phones around the world, followed with its entry into the Indian infrastructure environment is examined in section four. Section five analyzes the present state of affairs of the telecommunication sector in Gujarat circle and within the nation, along with an international comparison and its future revelation, with special emphasis on mobile phone services.

3.2 Brief History of Telecommunications Development in India

Telecommunication sector as a part of infrastructure was looked as profanity five decades ago, a charade four decades ago, a dream mania three decades ago, a case of urgency two decades ago and coercion a decade ago. Today it is a do or die situation as far as infrastructure is concerned.[1] Before the introduction of economic reforms, the telecommunication sector was recognized as monopolist market. The present section discusses the telecommunication sector in the pre-liberalization era. Some of the important organizational formations along with their objectives are discussed in brief.

The first telephone exchange was commissioned at Bombay on January 30, 1882 and the British Government laid the first operational fixed landline phone in India in 1885. In 1943, the government took over the Plain Old Telephone (POT) and its operation and to maintain the regulation, Indian Telegraph Act of 1885 and Indian Wireless Act of 1933 was formed. After independence the Government of free India took charge of the same. There were only 82,000 consumers in 321 switching exchanges with a total capacity of 1,00,000 as on April 1, 1948.[2]

Telecommunication sector was a state monopoly until mid eighties. Government was the planning commission, the apex level body, allocating funds for the development of telecommunication sector from government resources.[3] The sector therefore, competed with other developmental priorities of the government for a share in resource allocation. Till 1985, only 2 or 3 percent of the national plan outlay was allocated to the telecommunication sector, as the priority sectors were roads, power, education, health etc.

The telephone utility entertained long waiting list, and never installed enough telephones. The official explanation for the endless waiting list was that within the triple constraints of domestic equipment making capacity, foreign exchange, and the government budget, it was impossible to produce or buy enough equipment to meet the demand.

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[1] Bhargava, A.K (2001) "Infrastructure Development in Indian Telecom Sector", Indian Journal of Public Administration, Vol. XLVII, No. 3, July-September.

[2] Dossani Rafiq (ed.) (2003) "Telecommunications Reforms in India", Viva Books Pvt. Ltd., New Delhi.

[3] Jain, R. (2002) "Cellular Licensing in India", Paper presented in the International Telecommunication Society Conference held at Madrid, Spain, September 10-14, 2002.

In the 1980s, the government opened the manufacturing of telecommunication equipment for the private sector, with the foreign collaboration in a phased manner. As the telecommunication sector needs rapid growth and massive funds, the policy of protecting telecommunication equipment market was forgone. As a result in 1983, foreign technology for digital switching exchange was introduced through a manufacturing tie up with the government owned Indian Telephone Industries Ltd. (ITI) and in 1984; manufacturing of consumer terminal equipment was opened to the private sector.

Until the sixth five year plan, precedence was given to the primary needs of the people i.e. food, water and shelter and the telecommunication sector was placed last. The telecommunication service was classified as luxury and assigned very low priority. Also the development of telecommunication infrastructure has tended to intensify the migration of population from rural to urban areas.

In 1980, the mission "better communication" was launched by the visionary Prime Minister Mr. Rajiv Gandhi, with the help of Pitroda, S., the expatriate who returned to India, in order to revolutionize telecommunication services. A set of devoted, wellbeing oriented, and sound focused programs were then implemented at national level.[4] The government started the Center for Development of Telematics (C-DOT) in 1984, a Research and Development organization to develop electronic switches. Today C-Dot is a premier telecom research organization, develops advanced digital switching and transmission system specific to needs of the developing nations.

On April 1, 1986 i.e. during the seventh five-year plan, DOT was formed within the MOC and thus telecommunications crossed subsidy to postal services ended. DOT was formed to undertake the operation, maintenance, and development of telecommunications in the country as an exclusive domestic and long distance service provider organization.

[4] Singhal, A, Rogers, E. M. (2001) "India's Communication Revolution - From Bullock Carts to Cyber Marts", Sage Publications Pvt. Ltd., New Delhi

In 1986, DOT was segmented into two new corporations MTNL and VSNL.[5] Beside these in 1988, PABX (Private Automated Branch Exchange) service was opened to private service providers.

A Telecom Board headed the government's telecommunications business. Since the board was an internal committee of DOT, it was ineffective in dealing with inter-ministerial problems of DOT and Department of Electronics. Pitroda got it replaced in 1989 by a Telecom Commission, which he headed. It had to accelerate development of telecommunication technology, equipment, and services. It was authorized to take administrative and financial decisions.

As a result of political involvement in telecom sector, the growth rate of telephone connections increased modestly - though not so fast as to make a difference to the waiting list. Table 3.1 shows the telephone addition and waiting list for the year 1982-1992. DEL stands for Direct Exchange Lines. The calculation for waiting list on month's basis is the waiting list at the end of the year divided by average monthly additions to DELs in that year. During the year 1982, additional telephone connections distributed were 2.30 million but the waiting list for the same counted to 0.59 million. Before the formation of MOC, direct exchange line connections for the year 1985 were 2.90 million with the waiting list of 0.84 million. Growth of DEL in 1985 was 8.6 percent. At the end of the era i.e. 1990, DELs were 4.59 million and the waiting list stood at 1.71 million, increased by 0.29 million from the year 1989 (2.42 million). Growth of DEL during the same time was 10.1 percent. In 1992, DELs were 5.81 and waiting list was 2.29 million. Waiting list (months) was 37.1. Thus, the growth of DELs and waiting list (months) during the year 1986, 1987, and 1988 were 9.3, 10.1, 8.9, and 45.8, 42.0, 49.9 respectively. The telephone department contended that this was because it did not get enough money to invest in expansion.

[5] Nigam, A, Nigam, A. (2001) "Pull Policy for Growth of Telecommunications in Rural Areas-A Case Study of Indian Telecom", Telecom Policy Research Conference, Belgium, China.

Table 3.1

Telephone Additions and Waiting List, 1982-1992

Year	DELs (Million)	Waiting List (Million)	Growth of DELs (% / year)	Waiting List (Months)
1982	2.30	0.59	7.0	47.2
1983	2.47	0.66	7.4	46.6
1984	2.67	0.74	8.1	44.4
1985	2.90	0.84	8.6	43.8
1986	3.17	1.03	9.3	45.8
1987	3.49	1.12	10.1	42.0
1988	3.80	1.29	8.9	49.9
1989	4.17	1.42	9.7	46.1
1990	4.59	1.71	10.1	48.9
1991	5.07	1.96	10.5	49.0
1992	5.81	2.29	14.6	37.1

Source: Desai, A. V., 2006

As a result of deregulation of the economy, the entire telecommunication equipment manufacturing industry has been delicensed and dereserved, since the year 1991. The MOC set up a committee under M.B. Athreya, an outside management experts, on the reorganization of DOT. Committee formation took place when the government was into the serious payment crises and the World Bank and International Monetary Fund (IMF) involved conditionality. The committee was unanimous on

- Creation of MTNL as a separate organization.
- Separation of operational and policy making role of DOT.
- Private participation of enterprises and cooperatives through Value Added Services (VAS).
- Decentralized structure of the organization where management will be professionalized and workers are retained.

In the end, the proposals by the committee came to be seen as subversive ideas coming from outside experts and were buried by the DOT.

In 1991, D. N. Nanda committee was formed to review the whole Information Technology Act and proposed a new forward-looking legislation. Thus, no priority was dispensed to the sector. Main reasons for the poor performance of the sector as emphasized by Atherya in 1996 include:

- A formal opinion that telephones was a luxury rather than a necessity.
- Prevailing state monopoly of the sector with no competitive, pressures for innovation and expansion.
- Unaccounted shareholders pressure for efficiency, profitability, sales growth, and market capitalization.
- Over staffed structure of the employees in the sector with ineffective job challenges and training.
- Strong unions of workers with considerable political influence resulting in the ignoring of the benefits of telecommunication policies for consumers but only including the well being of employees.
- Dependence of the sector on another state owned monopoly, Indian Telephone Industries (ITI) for procurement of assets.

World Bank paves the way for a loan for the telecommunication sector only if the sector opens entry to private companies. With sheer pressure from the finance ministry and the Athreya committee recommendations, MOC allowed private and cooperative enterprises into VAS, electronic and voice mail, data, audio, and video text messages, video conferencing, radio paging and mobile phones. In 1992, proposals were invited for the introduction of mobile phone services in four metros along with the radio paging services in 27 cities. And in 1993, private network was allowed in industrial areas. The cookie cutter solutions derived from the developed countries experience do not always work for all and this can be better understood by the results of NTP 94.

After the announcement of the NTP 94, a regulatory authority was brought into existence TRAI, in 1997. TRAI 1997 was further reviewed in the year 2000. In order to separate the activities of the operator and the licensor, The Department of Telecommunications Services (DTS) came into existence in the year 1999. DTS now looks after the execution of work including purchase and acquisition of land, all matters other than policy and licensing related to services of telephones, wireless, data, facsimile and telematics, MTNL, C-DOT etc. Telecom commission was the bridge between DTS and DOT. But this partition is just on paper as the same employees of telecommunication department works for both DTS and DOT till date.[6] Efforts to expand the telecommunication network were continued in 1999-2000.

As a part of modern global network, access to countries around the world, making a concept of global economy and single world market place, on October 1, 2000 the Department of Telecom operations, Government of India (GOI) became a corporation and was christened BSNL.[7] DOT, as corporation with GOI resulted in largest public sector undertaking in the country.

Since last two to three decades the telecommunication sector was moving at a slow pace but, the direction and moves were very clear towards the destination. As a result, today it is one of the largest telecom operator in Asia and eighth largest telecommunication network in the world.[8] India's telecommunication sector stands as one of the prime movers of the economy. It has witnessed rapid changes and growth in the last few years. Huge fall in tariffs of all the services along with market competition has resulted in making telecommunication a necessity for the layman in the country. All these changes in the telecommunication sector are the result of proper policy formulation and implementation. As a result of all these changes, today an affluent household is going from one fixed landline phone per family to one mobile phone per person.[9]

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[6] Srivastava, L, Sinha, S. (2001) "TP Case Study" Fixed - Mobile Interconnection in India", Telecommunication Policy 25.

[7] www.bsnl.gov.in, 2006.

[8] Ministry of Commerce and industry (2000) "Telecommunication", Investment Promotion and Infrastructure Development Cell, Department of Industrial Policy and Promotion, , GOI, New Delhi.

[9] Ministry of Finance (2004-2005), "Economic Survey", GOI, New Delhi.

3.3 Policy Development in the Country

World-class telecommunications infrastructure and information is the key to rapid economic and social development of the country. It is critical not only for the development of the IT industry, but also has widespread implication on the entire economy. The sector is being looked not only as a necessity but also as a major contributor to the Gross Domestic Product (GDP). The process of liberalization during early 1990s was supported by the policy formulation and for the development of telecommunication sector. Telecommunication policies are of vital importance in the development of the industry, economy, and can be considered as milestone in the development process. The proceeding section discusses various policies of the sector such as NTP 94, NTP 99, Communication Convergence Bill 2001 (CCB 2001), and TRAI.

3.3.1 National Telecom Policy 1994

NTP 94 was the first major policy in the development process of the telecommunication sector. After the encouragement of the policy growth this policy was at the peak in the Indian telecommunication sector. NTP 94 was announced during the month of May with the following objectives

- Telecommunications for all and within the reach of all.
- Covering all villages as early as possible to achieve universal service.
- Excellent telecom services as per world standard.
- India to emerge as a major manufacturing base and a major exporter of telecom equipment.
- Defense and security interest to be protected.

To achieve these objectives, the authorities issued the target in pursuance of the above objectives

- Telephone on demand by 1997.
- All villages to be covered by 1997.

- A PCO for every 500 population in urban areas.
- All VAS available internationally to be introduced in India, well within eighth plan period.

From the very beginning, target achievement was considered as a major goal. Thus Indian telecommunication sector is target oriented and the trend follows till date. India's tele-density as against the world average of 10 per hundred person was about 0.8 per hundred person the following are the achievements of the policy.

- 8.73 million telephone lines were laid down against the eighth five year plan covering a target of 7.5 million lines.
- Telephone coverage of around 3.1 lakhs villages out of total 6 lakhs.
- Urban penetration of 1 Public Call Offices (PCO) per 522.

Resources required to fulfill the objectives of the policy are[10]

- 10 million lines required for providing telephone on demand.
- Rs. 4,000 crore required for the resources to achieve the rural connectivity.
- Rs. 56,750 crore is essential to meet the future plan objectives.
- Total Rs. 75,000 crore is estimated to meet the policy targets.

As a step towards revolution, pagers and mobile phone services were introduced in the Indian economy during the year 1995, resulting in an increase in the number of consumers opting for telecommunication services. A number of supplementary services were introduced under the sector, depicting development and innovation as an ongoing process till today.

In addition to the objectives not being fulfilled and to realize the goals of New Economic Policy 1991, it was necessary to have world-class telecommunication infrastructure. After a long time and considerable debate, NTP 99 was announced. Within the infrastructure

[10] Jain, R. (2002) "Review of Policy Changes in the Indian Telecom Policy", India Infrastructure Report 2002: Governance Issues for Commercialization, Oxford University Press, New Delhi.

sector, highest priority was given to the telecommunication sector, as it was understood that to achieve the challenging task of realizing goal for the economic policy, proper environmental growth to basic infrastructure sector is needed. Mobile phone services were commenced in few areas of the country but high license fee bids, tariff distortions, unattractive interconnection, and revenue sharing arrangements between DOT and new private licenses resulted in most service providers finding themselves in unviable financial situations.

3.3.2 New Telecom Policy 1999

Government realized the need of additional resources to achieve the target results of policy formed and so the private sector involvement was required to bridge the resource gap. From 1991 onwards, private sector participation was invited in a phased manner, to assist India's vision of becoming an IT super power along with the development of consumer electronics, and media industry worldwide. Therefore various VAS were unlocked. Objectives of NTP 99 included the following;

- In-depth objective, not only to have telecommunication facility within every citizen's reach and affordability but to be an impressive one.
- The policy emphasized on the standard facilities competent enough to meet the needs of the economy including uncovered areas (especially rural).
- Proper development of opportunity to cover the remote, hilly and tribal areas.
- To become an IT superpower - innovative and efficacious development of the sector taking convergence of media, telecommunication and consumer electronics into consideration.
- Introduce multimedia like, Integrated Services Digital Network (ISDN services), remote data base access, government and community information systems and documents etc. to all, by converting PCO (where ever vindicatory) into Public Tele info Centers.
- Introducing equal opportunities and level playing field for all service providers with greater competitive environment in rural as well as urban areas, but in a time bound manner.

- To have world class manufacturing possibilities, research and development process to be strengthened.
- To have clear and efficient spectrum management.
- To consider defense and security interest of the country as an important point.
- To encourage and make local telecommunication service providers as global players.

In line with the above objectives, the specific targets that the policy seeks to achieve are

- Availability of telephone on demand by 2002 and there after resulting in tele-density of 7 by the year 2005 and 15 by the year 2010.
- Satisfactory tariff structures were introduced to increase the affordability and availability of telecommunication in rural areas; also making rural communication mandatory for all fixed landline phone service providers.
- Facilitate reliable transmission media in all rural areas and increasing rural tele-density to 4 by the year 2010 from the current level of 0.4.
- Widespread telecommunication coverage within the country and have reliable media to all exchanges by the year 2002.
- All district headquarters to have Internet access by the year 2000.
- Provide high-speed data and multimedia capability using latest technologies to cover towns with greater than two lakhs of population by the year 2002.

Along with the policy goals and targets, new policy framework describing all the service segments under which the telecommunication sector will operate was laid down. In the end, telecommunication sector would have following services for layman.

- Cellular mobile service providers, fixed service providers and cable service providers, connectivity referred as access providers.
- Radio paging service providers.
- Public mobile radio trunking service providers.
- National Long Distance (NLD) Operators.
- International Long Distance (ILD) Operators.

- Other Service Providers.
- Global Mobile Personal Communication by Satellite (GMPCS) Service Providers.
- V-SAT based service providers.

NTP 99 was made by the Group of Telecommunications (GOT) constituted by the Prime Minister Vajpayee, A. B., headed by leading Industrialist Tata, R. Though not as first step in the process of liberalization but as a U-turn in the sector development was made; leading to opening up not only the basic services but also the various services, this had never been thought of, at the beginning of the process.

NTP 99 has been set with the targets to be achieved by 2010. But due to technological advancement in the communication sector all over the world, need was felt for fresh policy guidelines. As a result besides the above targets for telecommunication sector CCB 2001 was introduced.

3.3.3 Communication Convergence Bill 2001

CCB 2001 had been issued to tackle the technological upgradation going around the world in communication sector with special emphasis on the telecommunication environment. Inspired by the emergence of super regulator in several countries like U.K. and Malaysia, Government of India introduced CCB 2001, on August 2002 after several drafts. Silent features of the bill include

- Technological impartial license.
- Proposed Communication Commission of India (CCI) to supercede the power of licensing by Government, TRAI and Telecom Dispute Settlement Appellate Tribunal (TDSAT).
- Framework for the information-based society and to access the same.
- Invitation to the further mobile phone service provider for all the circles.
- Unification in license except with the restriction of spectrum availability.

Besides the above-mentioned features, rules were laid down for Internet facility and cable service providers. Also the percentage of Foreign Direct Investment (FDI), infrastructure providers, call centers, hardware technology, NLD and ILD service providers was made to follow the instructions of the authority as laid down from time to time.

CCB 2001 aims at promoting, facilitating and developing carriage and content of communications (including broadcasting, telecommunications and multimedia) in view of the necessity to facilitate development of a national infrastructure for an information based society, and to provide a choice of services to the people with a view to promoting plurality of news, views and information. The bill, inter alia, envisages the setting up of a regulatory and licensing authority known as CCI. The Standing Committee on Communications and IT laid its report in Parliament in 2002.[11] In early 2004, government granted TRAI limited mobility in the cable television industry, asking it to resolve the confusion over a new payment system. Till date all the rules and regulations for these services are been looked after by the telecommunication sector authority and are to be followed by all the service providers.

3.3.4 Telecom Regulatory Authority of India

A National Regulatory Authority is one of the important government agencies in any country, especially in the context of information society reforms. It is responsible for the healthy growth of telecommunications services to the public at all levels. It serves a large group of stakeholders, varying from citizens to business and prospective investor to incumbent telecom operator.

The regulatory body of the Indian telecommunication sector TRAI came into existence when Supreme Court in a dispute regarding private service providers' entry in the Indian telecommunication sector market recommended the existence of the telecom regulatory authority with the appropriate power to achieve plurality in the telecommunication sector. Since the private sector will have to contribute more to the development of the telecom

[11] Bagchi, P. (2000) "Telecommunications Reforms and the State in India: The Contradiction of Private Control and Government Competition" CASI, University of Pennsylvania, Philadelphia.

network than DOT/MTNL in the next few years, the role of an independent telecom regulatory authority with appropriate powers need not be impressed.[12]

With a view to provide a level playing field in the competitive environment, in 1997 GOI made the TRAI, under TRAI Act, 1997. Major policy framework of TRAI is to emphasize on a transparent, participatory, predictable and equitable expansion of telecommunication sector. The TRAI is holding open house sessions with the consumers, service providers, and other organizations to solicit their views on the consultation papers relating to telecommunication pricing and the quality of services. After the powers laid by CCB, 2001 TRAI also deals with the cable service providers.

Further, with a view to strengthen the role of the regulator, The TRAI Act, 1997 was amended in the year 2000 and separate body i.e., TDSAT was constituted for resolving disputes in the telecommunication sector. The TRAI Act is now to be referred as TRAI (Amendment) Ordinance, 2000 in future with the same positive landmark that will change the communication landscape of the country. TRAI is attempting to rebalance the tariff structure in a transparent manner and to ensure that the consumers get a better quality of services from the service providers. Main roles and the differences in the TRAI 1997 and TRAI (new) 2000 are being discussed briefly in Table 3.2.

Besides the above-mentioned features, regulation of financial matters (license fee, revenue share etc.), settlement of disputes and technological issues are some of the important ones to be looked into. TRAI introduced IUC regulation, 2003 where origination, transit, and termination in a multi-operator environment were looked into. IUC covers arrangements among service providers for payment of IUC for telecommunication services, covering basic services including Wireless in Local Loop for Mobile Services (WLL (M)), mobile phone service providers and long distance service providers throughout the nation. TRAI has a proven record of maintaining neutrality. It had challenged several decisions of DOT.

[12] Kathuria R (2004) "Trade in Telecommunication Services: Opportunities and Constraints", working Paper No. 149, ICRIER, New Delhi.

TRAI's mission is to create and nurture conditions for the growth of the telecommunications, including broadcasting and cable services in the country, in a manner and at a pace which will enable the nation to play a leading role in the emerging global information society.[13]

Table 3.2

Comparison of Old and New TRAI Act

Particulars	Old TRAI	New TRAI
Constitution	Seven member team i.e. chairman and six members.	Five members including one chairman, two permanent members and two part-time.
Powers and functions	• Ensure interrelationship between all the service providers. • Regulate revenue share. • Arrangements between service providers. • Ensure compliance with license condition. • Settle dispute between service providers. • Fix tariffs.	The TRAI decision would be mandatory for the government in the areas of tariff fixation, interconnectivity including tariffs and technology and laying down quality standards. In the case of granting and revoking licenses, the recommendations of the TRAI would not be binding. Settlement of disputes would be under a newly constructed dispute settlement tribunal.
Appeals	Appeals against TRAI orders can be made within 30 days.	Appeals would be made to the appellant authority.
Settlement of disputes	Though it could settle disputes between service providers, it has no jurisdiction over disputes between private service providers and the DOT (now DTS) relating to terms and conditions of a license. This was TRAIs basic adequacy.	Appellate authority known as TDSAT has been set up to adjudicate any dispute between a licensor and a licensee, between two or more license providers and between a service providers and consumers. Also disposal of appeals against any decision or order of TRAI will be taken care of by the new appellate authority.

[13] www.trai.gov.in, 2006

Government policies are one of the most significant factors in the speed of innovations in telecommunications. Government determines the level of competition, allocation, access to airwaves (spectrum), and has the resources to promote research and development in the sector. To have continuous and rapid growth, policy formulation with high reachable target plans is a must and the policy formulation process should be ongoing. Not only suggesting the target but also a close monitoring process should be followed by the authorities at the same time along with the public and private service providers. Wholehearted acceptance of the policies has resulted in an unprecedented growth of the sector, especially in last 8-10 years beside up and down phases. As a visionary leader of India's telecommunication revolution Sam Pitroda stated, in India, to touch the roof, one needs to aim at the moon.

3.4 Evaluation of Mobile Phones and its Market

This section discusses the modern technology i.e. mobile phone. Mobile phones were the hottest phenomenon in the last decade, showing tremendous advances in its evolution. Mobile phone handsets have become small and light with high computational power built into it. Future mobile phone handsets will have all five human senses in its network and may be worn around wrist as a watch instead of carrying it in hand.

Today every language and behavior is being reordered by mobile phone services. It is a major ingredient of making the network society in information age. Researchers have pointed out that like cigarettes, mobile phones keeps the hand, mouth and weekly allowance well occupied. Also both satisfy the desire to appear mature, worldly, indifferent, fashionable and fully peer-bonded.[14]

One of the most visible changes that the India telecommunication landscape has undergone in the past couple of years has been the emergence of mobile phone services in the industry. The surge of mobile phones has been so fast that in just a decade of their arrival in India; they have outclassed the plain old fixed landline phones in terms of number of consumers.

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[14] Chakraborty, P. (2005) "Awareness about Cell phones Amongst Youth - A Study", Masters thesis I Communication Studies, Faculty of Journalism and Communication, M. S. University of Baroda, Vadodara.

Evaluation and acceptance of mobile phones around the world has been discussed in this section. Appraisal of mobile phone handset is also discussed here. Introduction of mobile phone services in Indian telecommunication sector in a phased manner and the acceptance of new technologies along with licensing facilities within the nation have also been highlighted. Major mobile phone service providers within the nation along with their area of operation have been listed out. Here an attempt is made to emphasis on the mobile phone market in India over a period of time.

3.4.1 Emergence of Mobile Phones

The emergence of mobile phone starts from the year 1843, when Michael Faraday started an important research to test whether space could conduct electricity? Technical aspect of his work had too a great effect on mobile phone development.

In 1865, the first person to communicate through wireless via the atmosphere was Dr. Mahlon Loomis of Virginia. During 1866-1973 it was possible to send messages between the top of Cohocton and Beorse Deer mountains, Virginia, 18 miles away from each other.

The first attempts at true mobile date back to the early 1920s. In the USA in 1921, the Detroit Police Department made the first experiments with mobile radio. Here one-way communication system was widely used. A few years later proper two-way communication features were put in place.[15]

Dr. Martin Cooper, in the year 1973 is considered to be the inventor of the first portable mobile phone handset. He was a former General Manager in Motorola, system division.
In the year 1977, with the introduction of technology invented by Dr. Cooper and Motorola to the city of New York, mobile phones went to public. The city of Chicago witnessed 2,000 customers having the first trial, followed by Baltimore, Washington D.C. and in 1979 Japan began testing this most innovative instrument within its boundaries. In 1988 due to technological changes taking place all over the world, the Cellular Technology Industry Association (CTIA) was formed, which laid down practical goals

[15] Noble, D. (1962) "The History of Land Mobile Communications", Proceedings of the IER, Vehicular Communications.

for mobile phone operators. In 1991 with the introduction of TDMA technology (Time Division Multiple Access), new standards were set by the CTIA.

There is a controversy on the early innovation process of mobile phones. Some historians believe that first mobile phone service started as early as 1946 in St. Louis, Missouri, U.S.A., where the help of an operator was needed to put mobile phones of few lucky ones as the manually operated services had restricted service area. Mobile phone handsets at this stage were portable handsets weighing a couple of kilograms. With the introduction of semi-conductor technology during 1950 to 1970, costs started declining but still it remained as a luxury product.

In relation with the development of mobile phone handsets, in the year 1983 the Motorola Dyna TAC 8000x is the first handheld portable mobile phone handset to be sold commercially. It had a dimension of 13x1.75x3.5 inches, with the talk time of 30 minutes. It used to take 10 hours to recharge and stored 30 dialing locations. Its introductory price was $3,995. Today, it is sold as a collector's item for $ 110.

During early 1990s, technology shifted from analog to digital-second generation (2G) technologies like GSM, Time Division Multiple Access (TDMA), and CDMA. Mobile phone handsets started becoming smaller and lighter. In late 1990s mobile phone data technologies like Short Messaging Services (SMS), Wireless Access Protocol (WAP), and General Pocket Radio Services (GPRS), opened the doors for data and web-based applications.

In December 2000, the J-SH04 - the world first mobile phone handset with camera was launched. It was made by Sharp for J-Phone and it was introduced in Japan. In 2003 MP3 mobile phone and PDAs hit the market. As a result mobile phones are now more than just a multimedia experience. Currently all over the world 3G, 4G, and 5G technology built up is going around. The market predictor believes that by 2010, mobile phones will be working as credit cards, health monitor, TV etc.

3.4.2 Mobile Phone Services in India

The evolution of mobile phone services in India is not long back. Mobile phone services were introduced in early 1990s and the GOI announced the awarding of license to private mobile phone service providers in all four metropolitan cities on May 1, 1991. Grant of franchise for CMTS was made for Delhi, Mumbai, Calcutta, and Chennai. There was an enthusiastic response by the mobile phone service providers and finally thirty bidders submitted the technical bids by March 31, 1992 along with the tender documents issued by DOT in January 1992.

Eligibility criteria were laid down including the following

- Use of technology - GSM 900 MHz band.
- License period - 10 years extendable to one or more year.
- Funding - Minimum dependence on national financial institutions.
- Debt-equity ratio - 2:1 not to exceed this limit.
- Foreign equity - Not exceeding 49 percent of total equity and government approval for the same to be shown.
- Experience - An important qualification.
- Indian company - Bidder has to be an Indian company.
- Foreign exchange - Is to be borne completely by the foreign collaborator etc.

Selection process where parameters for the evolution were set as rental (i.e. the monthly subscription fees) was given around fifty percent of weightage and the remaining fifty percent was shared by the other factors, including above mentioned.

After facing the legal war, eight bidders were selected (two in each area) and the agreement for the operation was signed on November 30, 1994. Annual license fee for first three years was set. From fourth year onwards license fee was fixed as Rs. 5,000 per consumer (based on unit call rate of Rs. 1.10), subject to minimum total amount.

Main point of discussion is the tariffs, as per the original agreement stating the maximum monthly rental charge of Rs. 156 per month in addition to activation charges of Rs. 1,200

and refundable security deposit of Rs. 3,000. The off peak airtime charges was Rs. 4.20 per minute, with standard hour rates double i.e. Rs. 8.40 and the peak time rates again double to Rs. 16.80. The charges applied on the basis of Receiving Party Pays (RPP) system meaning both incoming and outgoing calls were charged to the mobile phone user. After the announcement, acceptance, and license agreement, beside proper connectivity facilities, India's first mobile phone service commenced operation after four years of long awaited procedure i.e. on August 15, 1995.

3.4.2.1 Mobile Phone Services in 20 Circles

Following the acceptance of mobile phones in metropolitan cities government decided to make the new technology available all over the country. DOT divided the whole country into 20 circles categorized as circle A, B, and C (roughly corresponding to state boundaries, population size and importance in the share of economic development of the nation) excluding the metropolitan cities. Current broad bifurcation of circles is shown in Table 3.3. Separate and special treatment to all four metropolitan cities had been available from the time of development of mobile phone market in India. Andaman and Nicobar Island and Jammu and Kashmir State have been added lately as compared to all other states.

Table 3.3

Circles for Telecommunication Services

Metros	Circle A	Circle B	Circle C
Delhi, Mumbai, Calcutta, Chennai	Maharashtra, Gujarat, Andhra Pradesh, Karnataka, Tamil Nadu	Kerala, Punjab, Haryana, Uttar Pradesh (East), Uttar Pradesh (West), Madhya Pradesh, Rajasthan, West Bengal	Himachal Pradesh, Bihar, Orissa, Assam, North Eastern states, Andaman and Nicobar Island, Jammu and Kashmir.

Source: Cellular Operator Association of India, 2006

On the basis of the first experience, rules of the game were changed and the tariff rates for all the mobile phone services were kept at par and all the license fees was the amount quoted by the highest bidder for that particular agreement. The eligibility criteria were kept constant as in the metro circles, but the other important conditions added were - earnest money amount and the number of foreign companies as part of collaboration.

Net worth requirement for mobile phone service provider in all circles - A, B, and C was Rs. 100 crore; for two circles i.e. B and C was Rs. 50 crore and for circle C was fixed as Rs. 30 crore. The important point was that a successful bidder in all three areas could be awarded if its net worth is equal to or more than the total of Rs.100 crore, Rs. 50 crore, and Rs. 30 crore. The two mobile phone service providers were to be selected for the particular area and the second one has to match the license fee payable by the first mobile phone service provider. As a result, 42 groups of mobile phone service providers were awarded license for operating their services in 18 circles except for Jammu and Kashmir and Andaman and Nicobar.

Results of the same were declared in August 1995. The highest total license fee of Rs. 1,794.10 crore was for Gujarat state in circle A and first year license fee of Rs. 161.3 crore by Birla - AT&T and Fascel was to be paid, whereas the second highest bidder was also for circle A, Birla - AT&T and BPL - US West for Maharashtra state, was supposed to pay Rs. 1,657.70 crore and first year license fee for the same is Rs. 150.7 crore. The lowest fee was Rs. 1.32 crore for Assam in circle C by Reliance with first year license fee of Rs. 0.1 crore only. In service areas like Bihar, West-Bengal, and Orissa only one service provider was awarded the license.[16]

Soon after the commencement of the mobile phone services, prospective service providers realized that the committed license fees is an over optimistic assessment. With the slow consumer built up in the initial years they were not able to achieve even half of the estimated returns. This resulted in the negativity in mobile phone service providers' profitability and cash flow position. Also the second bidders were not able to meet the

[16] Gupta, N. (2000) "The Business of Telecommunication", Tata McGraw-Hill Publishing Company Limited, New Delhi.

highest bid and thus major part of the license fees were due before the market potential, resulting in high-risk profile. Both the service providers ended with the heavy license obligation. They could not obtain the financial closure and by July 1999 license of six mobile phone service providers were terminated on account of non-payment of license fees.

Main reason for the slow take off of mobile phone services encouraged the interconnection terms to be worked out between mobile phone service provider and DOT with the respective circle authority. Thus the framework was made by DOT and TRAI to make the market environment friendly for private mobile phone service providers and for the competition, by making license terms less burdensome.

In response, the government constituted the GOT to find a way out of the high license fee problem and also address the shortcomings of NTP 94. The recommendations of the group lead to the formation of NTP 99, which not only provided specific proposal for remedying past mistakes but also lead in other positive developments.

3.4.2.2 Third Mobile Phone Service Provider

Beside the introduction of NTP 99 to enhance the confidence of private sector mobile phone service providers to regroup their efforts and embark on the next phase of growth, public sector service providers - DOT/BSNL/MTNL were introduced as the third mobile phone service provider in each circle including the metropolitan cities, where MTNL holds the license to provide service not only as mobile phone service provider but also as the basic service provider (fixed landline phone connection). During February 2001, public sector mobile phone services were commenced and as a result of it by 2003 BSNL started its mobile phone services all over the nation (as already divided into 20 circles), including Calcutta and Chennai but excluding Delhi and Mumbai as MTNL started its own mobile phone services in these areas during the same period.

This marked the sudden increase in the number of mobile phone users all over India. Main reason was the difference in the tariff structure of first two-service providers and the third one. Not long ago, majority of the hoardings displayed in urban and rural areas

were about Fast Moving Consumer Goods (FMCG). But the widespread development of telecommunication services in the country has changed the story and the picture. The advertising hoardings and point of scale advertising with the commencement of mobile phone services edged out the FMCGs in urban as well as rural areas.[17]

In 1999, private mobile phone service providers shifted to the new revised telecommunication policy. The reforms had a positive impact, which enabled the service providers to widen their area of operation, and also allow for the use of new and better technologies.

3.4.2.3 Fourth Mobile Phone Service Provider

With the increasing acceptance of mobile phone services, the threat of monopoly power made the communication ministry to restrict the number of mobile phone service providers up to three as maximum number of license. During 2001, as per the recommendations of TRAI, bids were invited for the issue of license to fourth mobile phone service provider in all 23 circles across the nation and also in metropolitan cities. As a result of multi stage ascending order process, in August 2001, license was issued and the successful bidders made the payment of entry fee of Rs. 16.34 billion. They were given spectrum in 1800 MHz band. All the mobile phone service providers started their services by 2002.

As competition warms up in the Indian telecommunication sector, one by one, all the barriers to mobility like high charges for incoming calls and roaming facilities are being removed.[18] Major mobile phone service providers (both public and private) in different circles as in December 2002 are shown in Table 3.4. BSNL is yet to start its services in Chennai, Assam and North Eastern states, but it is the only mobile phone service provider available in all the states of circle A and B. Bharti Cellular has its presence in nine states of the nation following the BSNL presence in 17 states. Reliance Telecom is available in all the states of circle C. None of the service provider is available in all the metropolitan cities.

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[17] Singh A. (2005) "Telecom: The New FMCG", Voice & Data Vol 11 Issue 8, New Delhi.
[18] Rastogi A. B. (2003) "The Infrastructure Sector in India 2001-2002", India Infrastructure Report 2003, Oxford, New Delhi.

Table 3.4

Major Mobile Phone Service Providers in Different Circles (As in December 2002)

Area of Operation	Service Providers
Metros	
Delhi	Bharti Cellular, Hutch, MTNL, Idea Cellular
Mumbai	BPL Mobile, Hutchinson Max, MTNL, Bharti Cellular
Chennai	RPG Cellular, Bharti Mobinet, Hutch
Calcutta	Bharti Mobinet, Hutchinson Telecom, BSNL
Circle A	
Maharashtra	BPL Cellular, Idea Cellular, Bharti Cellular, BSNL
Gujarat	Fascel, Idea Cellular, Bharti Cellular, BSNL
Andhra Pradesh	Idea Cellular, Bharti Mobile, Hutch, BSNL
Karnataka	Bharti Mobile, Spice Comm., Hutch, BSNL
Tamil Nadu	BPL Cellular, Aircel Ltd., Bharti Cellular, BSNL
Circle B	
Kerala	Escotel Mobile, BPL Cellular, Bharti Cellular, BSNL
Punjab	Spice Comm., Bharti Mobile, BSNL
Haryana	Escotel Mobile, Aircel Digilink, Bharti Cellular, BSNL
Uttar Pradesh (West)	Escotel Mobile, Koshika, Bharti Cellular, BSNL
Uttar Pradesh (East)	Aircel Digilink, Koshika, BSNL
Rajasthan	Aircel Digilink, Hexacom, BSNL
Madhya Pradesh	Idea Cellular, Reliance Telecom, Bharti Cellular, BSNL
West Bengal	Reliance Telecom, BSNL
Circle C	
Himachal Pradesh	Bharti Telenet, Reliance Telecom, BSNL
Bihar	Koshika, Reliance Telecom, BSNL
Orissa	Koshika, Reliance Telecom, BSNL
Assam	Reliance Telecom
North Eastern States	Reliance Telecom, Hexacom

Source: Cellular Operators Association of India, 2006

3.4.3 Introduction of CDMA Technology in Indian Telecom Sector

It has been suggested that privatization works better in competition. Increase in the number of mobile phone services providers in each circle has led to increased competition. Privatization of telecommunication sector with strict use of technology - GSM 900 MHz band (Groupe Speciale mobile) based on TDMA by all mobile phone service providers was challenged by MTNL and the same made the introduction of new heights in the telecommunication sector.

The Government on September 13, 1999, introduced a major policy in the CMTS to be provided with any digital technology, including CDMA technology.[19]

Tariff request for CDMA WLL (Code Division Multiple Access with Wireless in Local Loop) technology with limited mobility was made by MTNL. Thus the introduction of technology neutrality in the country started after a long process of exchanging information like

- Definition of service for which the tariff request submitted.
- Standard quality of equipment.
- Costing details (Rental, call charges - incoming and outgoing) of the proposal.
- Parameters for quality services.

Necessary background was made in this regard in the press note (F. No. 842-304/99 - VAS dated October 1, 1999) issued by the authority. After September 13, 1999, MTNL was in a legal position to offer CMTS with CDMA technology. On paper details were sent in continuation to TRAI .by MTNL related to every query, especially the cost structure. TRAIs positive view to allow new technology application made the sector more competitive.

[19] Telecom Regulatory Authority of India (1999) "MTNL's Tariff Proposal for Cellular Mobile Services Using CDMA Technology and Related Issues", Consultation Paper No. 99/5, New Delhi.

3.4.4 Unified Licensing Regime

Telecommunication business had originally been a monopoly, but with the introduction of competition in this industry, the mobile phone communication market has been developed as duopoly and later under the oligopolistic competition system.[20]

Basic reason for the introduction of public sector undertaking (DOT/BSNL/MTNL) in any sector is to make the optimum utilization of the resources shared by infrastructure and to achieve the equilibrium point in relation to resources available and utilize their capacity. Unified (constant) license in telecommunication sector was the starting step for reducing the cost of services and thus benefiting the customers in the country.

With the introduction of NTP 99 all private fixed landline phone service providers and mobile phone service providers were invited to shift from fixed license fee to revenue share arrangement, after considering the important terms and conditions as formalities. Single license was issued for mobile phone services and fixed landline phone services. Following the international general trend of move towards convergence of licenses and technology neutrality, mobile phone service providers can now deploy CDMA 2000 1X technology, previously employed in local loop by BSNL and other fixed landline service providers. As a result, supportive regulatory regimes where benefit flows down to the consumers is open in future also and all the service providers will be competing directly with each other.

Until late 2003, continual litigation between GSM and CDMA service providers around the issue of full versus limited mobility franchise rights had stalled market progress. With the ending of litigation and the adoption of a unified licensing regime, all service providers can now concentrate on rolling out networks, attracting consumers and improving services instead of fighting battles in the press and court. Though competition in technology adoption has been accepted but the tariff regimes have different conditions. The definition of market is to be redefined at this point of discussion - complete single unit for fixed landline and mobile phone service providers. As per the detail guidelines of

[20] Telecom Regulatory Authority of India (2003) "Unified Licensing for Basic and Cellular Services", Consultation Paper No. 3/2003, New Delhi.

TRAI, there could be up to eight service providers offering mutually fixed landline phone and mobile phone services in any service area, the number could even be higher, suggesting no boundaries for the number of service providers in near future. The service providers are free to charge any alternative package with different rentals and airtime charges, resulting in a sudden boom in the overall number of consumers. Table 3.5 presents the list of mobile phone, fixed landline phone and unified access service providers as on operating circle basis, specified by TRAI during 2006.

Table 3.5

List of Mobile phone, Fixed landline Phone and Unified Access Service Providers

Circle	**Service Provider**		
	Mobile Phone Services		
	Mobile Phone Services	**Unified Access**	**Fixed Landline Phone Services**
Delhi	Hutch	Reliance Infocomm	MTNL
	MTNL	Tata Teleservices	
	Idea Cellular	Airtel	
Mumbai	BPL	Reliance Infocomm	MTNL
	Hutch	Tata Teleservices	
	MTNL	Airtel	
Chennai	Aircel Cellular	Reliance Infocomm	BSNL
	BSNL	Tata Teleservices	
	Hutchison South	Airtel	
Kolkata	Hutchison East	Reliance Infocomm	BSNL
	BSNL	Tata Teleservices	
	Reliable Internet Services Ltd.	Airtel	
Circle A			
Maharashtra	BPL (Hutch)	Reliance Infocomm	BSNL
	Idea Cellular	Tata Teleservices	

	BSNL	Bharti Airtel Ltd.	
Gujarat	Fascel (Hutch)	Reliance Infocomm	BSNL
	Idea Cellular	Tata Teleservices	
	BSNL	Airtel	
Andhra Pradesh	Idea Cellular	Reliance Infocomm	BSNL
	Hutchison South	Tata Teleservices	
	BSNL	Airtel	
Karnataka	BSNL	Spice	BSNL
	Hutch South	Reliance Infocomm	
		Tata Teleservices	
		Airtel	
Tamilnadu	BPL	Reliance Infocomm	BSNL
	Aircel	Tata Teleservices	
	BSNL	Airtel	
Circle B			
Kerala	Idea Communications	Reliance Infocomm	BSNL
	BPL (Hutch)	Tata Teleservices	
	BSNL	Airtel	
Punjab	BSNL	Reliance Infocomm	BSNL
	Hutchison South	Tata Teleservices	
		Airtel	
		HFCL Infocom	
		Spice Communication	
Haryana	Idea Communications	Reliance Infocomm	BSNL
	ADIL (Hutch)	Tata Teleservices	
	BSNL	Airtel	
Uttar Pradesh (West)	Idea Communications	Reliance Infocomm	BSNL
	BSNL	Tata Teleservices	
		Bharti Airtel Ltd.	

		Hutchison Essar South Ltd.	
Uttar Pradesh (East)	ADIL (Hutch)	Reliance Infocomm	BSNL
	BSNL	Tata Teleservices	
	Escorts Communications	Airtel	
Rajasthan	ADIL (Hutch)	Tata Teleservices	BSNL
	Bharti Hexacom Ltd.	Shyam Telelink	
	BSNL	Reliance Infocom	
	Escorts Communications		
Madhya Pradesh	Idea	Reliance Infocomm	BSNL
	BSNL	Tata Teleservices	
	Reliance Telecom	Airtel	
West Bengal and Andaman & Nicobar	BSNL	Reliance Infocomm	BSNL
	Reliance Telecom	Tata Teleservices	
		Airtel	
		Hutchison Essar South Ltd.	
		Dishnet Wireless Ltd.	
Circle C			
Himachal Pradesh	BSNL	Reliance Infocomm	BSNL
	Reliance Telecom	Tata Teleservices	
	Escorts Communication	Airtel	
		Dishnet Wireless Ltd.	
Bihar	BSNL	Reliance Infocomm	BSNL
	Reliance Telecom	Tata Teleservices	
		Airtel	
		Dishnet Wireless Ltd.	
Orissa	BSNL	Reliance Infocomm	BSNL
	Reliance Telecom	Tata Teleservices	
		Airtel	

Assam	BSNL	Reliance Infocomm	BSNL
	Reliance Telecom	Tata Teleservices	
		Airtel	
		Dishnet Wireless Ltd.	
North East	Reliance Telecom	Dishnet Wireless Ltd.	BSNL
	BSNL		
	Bharti Hexacom Ltd.		
Jammu & Kashmir	BSNL	Reliance Infocomm	BSNL
		Dishnet Wireless Ltd.	
		Airtel	

Source: Telecom Regulatory Authority of India, 2006

The growth of mobile phones during these years was accelerated by the introduction of the CPP regime in May 2003. According to the CPP arrangement, the calling party would pay for the calls that terminate on mobile phones. CPP resulted in a growth in mobile phone consumers all over the nation, which have shifted from the RPP arrangement. CPP resulted in an increase in the minutes of usage by marginal consumers.

In this regard Bhaskar Menon, President, Mphasis BPO said that, any player who wants to grow big will have to offer a range of diversified services under one umbrella.[21] Indian telecommunication sector is now among the most deregulated in the world and presents potentially lucrative opportunities for service providers and equipment vendors. Appendix 3.1 shows the milestone achievements for mobile phone services in Indian telecommunication sector. It starts from the year 1992 with the entry of private mobile phone service providers and includes all the important landmarks for mobile phone services till the present date.

3.5 Present Scenarios and Future Vision of Telecommunication Sector

Not long ago, telecommunication network stayed in place for decades. Today with the pace at which technology in telecommunication environment is blurring, rules of the

[21] BpOrbit (2004) "Debate on - Consolidation is the only Way Ahead for the Indian BPO Industry", Voice & Data Vol 11 Issue 3, New Delhi.

business are being written every day. As spectators to a revolution, our lives are changing. Telecommunication sector in India has witnessed rapid changes and growth in the last few years, especially after the acceptance of mobile phone technology by common man.

Challenges for mobile phone service providers in the beginning of the era is emphasized as high cost structure, entry fee, annual license fee, spectrum management, access deficit charges, and the revenue from mobile phone handset sales included in revenue definition for license payment.[22] But the optimistic factors for present high mobile phone potential are high GDP growth rate, rising income levels, increased urbanization, booming knowledge.[23]

Economic growth suggests that there is a positive correlation between infrastructure and economic development. Telecommunication is one of the most important types of infrastructure. Communication is said to be the lifeblood of economic activity. Notion represents one of the most exciting opportunities for mobile phone services in the coming decade. Spectrum allocated by DOT to mobile phone service providers as per January 2006 was 4.4 MHZ for GSM and 2.5 MHZ for CDMA technology service providers.

Future success and dominance can be analyzed by the present coverage of the mobile phone network. By 2003-2004 as per area, 1,700 out of 5,200 towns were covered, making the population coverage of 200 million. The mobile phone service providers cover approximately 30 percent of the land area. Number of mobile phone consumers surpasses not only the number of fixed landline phone consumers but also the figure has reached to one billion during September 2004. Now for the first time revenue generated from mobile phone surpasses the fixed landline phone during financial year 2005-2006. Astonishing current growth rate along with the future market expansion of mobile phones in the country can be clearly taken up with the support of facts and figures. This section deals with the present scenario of the Indian telecommunication sector specifically of the

[22] Ramachandran, T. V. (2004) "Demand for the World's Second Largest Market - Prospects and Challenges", September 28, 2004@ Singapore, COAI, New Delhi.
[23] Ramachandran, T. V. (2005) "The Indian Cellular Industry-An Overview", September 20, 2005@ India Mobile Day 2005, COAI, New Delhi.

mobile phone sector and its status in Gujarat circle. Also a comparative picture of mobile phone connection in China and India is highlighted. China is the fastest developing economy in terms of telecommunication sector.

3.5.1 Present Scenario

Strong and competitive telecommunication sector requires a significant share in national play outlay. Prior to post liberalization period, telecommunication sector was under emphasized and therefore the share in national plan outlay was very insignificant. But with the passage of time and optimistic acceptance to the open market storyline share of telecommunication sector has not only increased but it also contributes in the development of the nation. Telecommunication sector share in GDP at Factor cost for the year 2004-2005 was 2.52 percent whereas for the year 2005-2006 (upto January 2006) the percentage share is 2.71. Table 3.6 shows the increasing share of the telecommunication sector in terms of national plan total outlay by the government. Allocation of the telecommunication sector outlay has increased from 2.40 percent to 11.9 percent within a period of 38 years. The trend was increasing at somewhat the same pace year by year but started to take off only after third five-plan period i.e. 1961-1966. Presently in tenth five-year plan period (2002-2007) 5.50 percent (47,280 crore) share of total national plan outlay (8,59,000 crore) was allotted for telecommunication sector development.

Table 3.6

Share of Telecommunication Sector in National Plan Outlay

Plan Period	Period	Total Outlay	Telecom Outlay	
		Rs. In Crore	Value (Rs. In Crore)	Total (%)
First	1951-56	1,960	47	2.40
Second	1956-61	4,672	66	1.41
Third	1961-66	8,577	164	1.91
Annual	1966-69	6,624	159	2.40
Fourth	1969-74	15,779	415	2.63
Fifth	1974-78	28,653	781	2.73

Annual	1978-80	22,950	519	2.26
Sixth	1980-85	1,09,646	2,722	2.48
Seventh	1985-90	2,25,010	8,123	3.60
Annual	1990-92	61,518	3,040	4.90
Eighth	1992-97	65,856	3,632	5.50
Ninth	1997	4,34,100	25,110	5.80
Tenth	2002-2007	8,59,200	47,280	5.50

Source: Indian Telecommunication Statistics 1999, MOC.

Indian telecommunication sector can be categorized as

- Product segment, and
- Service segment

Product segment of the telecommunication sector further comprises of services of equipment providers consisting of: broadband equipment, telecom software. Other important product segment category is enterprise equipment group constitutes of network integration, routers, switches, voice solutions, WLAN, structured cabling, network security services, network storage, NMS, audio video conferencing, and modems. Besides this, carrier equipment includes wireless infrastructure, telecom cables, transmission equipment, and telecom turkey, VSAT, T&M. Handset manufacturing equipment includes: mobile handsets, CDMA handsets, fixed landline phones, and fixed wireless phones. Top equipment providers for the year 2005-2006 are Nokia, LG, Cisco, Wipro, and Erosion, TCS, ITI, Nortel, Infosys, and Motorola.

With the increase in competition, all the private service providers are working hard to be on the top position among the telecommunication service industry. Leading companies in respective service segments during the year 2005-2006, as per the revenue generated by them are shown in Table 3.7. Service category includes fixed landline phone services, mobile phone services, NLD services, ILD services, Internet access, VSAT, and radio trunking. Table shows that Bharti Airtel is the leading mobile phone service provider in terms of revenue followed by Hutch, Reliance Communication, BSNL, and Idea cellular. Similarly in case of fixed landline phone services, public sector monopoly i.e. BSNL and

MTNL are the leading service providers followed by the others. In other important service segments i.e. Internet and broadband, ILD, and NLD services also public sector domination can be traced. Important private service providers beside mentioned above includes-Protocol, Arvind Mills, HCL Coment, and Hughes Communications. Overall market for the telecommunication service segment has been captured by BSNL with highest revenue generated of Rs. 39,500 crore followed by Bharti Airtel, Reliance Communication, Hutch, and MTNL.

Table 3.7

Leading Companies in respective Services Segment in 2005-2006

Services and Service Providers	Rank	Revenue (Rs. Crore)
Mobile Phone Services		
Airtel	1	7,928
Hutch	2	6,837
Reliance Communications	3	6,673
BSNL	4	6,574
Idea Cellular	5	2,966
Fixed Landline Phone Services		
BSNL	1	25,195
MTNL	2	4,417
Bharti Airtel	3	1,320
TTSL	4	1,081
TTML	5	713
Radio Trunking		
Protocol	1	8,507
Arvind Mills	2	7,828
Quickcall	3	4,509
United Liner	4	2,027
Smart Talk	5	1,562
Internet and Broadband		
BSNL	1	439

VSNL	2	313
MTNL	3	235
Sify	4	161
VSAT		
HCL Coment	1	136
Hughes Communications	2	96
TATA Indicom VSAT Services	3	60
Essel Shyam	4	54
ILD		
VSNL	1	3,579
Reliance Communications	2	2,714
Bharti Airtel	3	958
NLD		
BSNL	1	6,792
Bharti Airtel	2	801
Reliance Communication	3	689
VSNL	4	595
Rail Tel	5	62
OVERALL		
BSNL	1	39,500
Bharti Airtel	2	11,663
Reliance Communications	3	11,288
Hutch	4	6,837
MTNL	5	5,786

Source: Voice & Data, Vol. 13, Issue 1, July 2006

Overall service industry revenue for the sector for the year 2004-2005 and 2005-2006 along with the growth percentage is revealed in Table 3.8. The ILD services have shown a tremendous growth of 89 percent within the year whereas Internet access service shows only 2 percent increase. Overall total service revenue has increased to 30 percent with revenue of Rs. 87,962 crore for the year 2005-2006 than Rs. 67,523 crore for the year 2004-2005.

Table 3.8

Telecommunication Service Industry (2005-2006)

Service Category	Revenue (in Rs. Crore)		Growth (in percentage)
	2004-2005	**2005-2006**	
Fixed access	32,684	33,715	3
Mobile Phones	22,787	35,879	57
National Long Distance	6,231	9,017	45
International Long Distance	3,830	7,251	89
Internet Access	1,592	1,619	2
VSAT	369	443	20
Radio Trunking	30	38	27
Total Service Revenue	**67,523**	**87,962**	**30**

Source: Voice & Data, July 2006

The drives of telecommunication growth have undergone a significant change in terms of public versus private service providers. Best way to judge both the service providers capabilities is the revenue figures generated by both. Table 3.9 shows the figures for the year 2005-2006. The table depicts that the public sector service provider's revenue for fixed landline phone services is Rs. 29,612 crore as compared to private sector service provider (Rs. 4,103 crore). Besides this, in mobile phone service segment, private sector is the main service provider with revenue of Rs. 28,706 crore as compared to public sector service provider. It is found from the table that in case of mobile phone services private sector plays a leading role and in case of fixed landline phone connection public sector leads. In all other service segment except NLD services, private sector players are leading in the market.

Table 3.9

Public Vs Private Service Providers (2005-2006)

Service Category	Revenue (Rs. Crore)		Total
	Public	**Private**	
Fixed access	29,612	4,103	33,715
Mobile Phones	7,173	28,706	35,879

National Long Distance	6,912	2,105	9,017
International Long Distance	-	7,251	7,251
Internet Access	674	945	1,619
VSAT	-	443	443
Radio Trunking	-	38	38
Total Service Revenue	**44,371**	**43,591**	**87,962**

Source: Voice & Data, July 2006

Revenue of the top ten service providers for the year 2004-2005 and 2005-2006 along with the service category and growth is shown clearly in Table 3.10. Revenue growth of BSNL, top service provider for the year 2005-2006 is 9.4 percent when compared with the year 2004-2005. Service categories serve by BSNL includes - fixed landline phone, mobile phone, NLD, ILD, Internet service provider, International service provider, and VSAT. Hutch, Idea, and Aircel having rank of 4^{th}, 7^{th}, and 10^{th} provides only mobile phone services whereas VSNL is the only service provider not involve in fixed landline phone or mobile phone sector, still ranked in top ten service providers of the telecommunication sector. It deals with NLD, ILD, and ISP services and is ranked as top sixth service provider in terms of the revenue.

Table 3.10

Top 10 Service Providers for the Year 2005-2006

Rank	Service Provider	Revenue (Rs. Crore)		Growth (%)	Category
		2004-05	2005-06		
1	BSNL	36,090	39,500	9.4	Fixed landline, mobile, NLD, ISP
2	Airtel	8,003	11,663	45.7	Fixed landline, mobile, NLD, ISP, ILD, VSAT
3	Reliance	5,387	11,288	109.5	Fixed landline, mobile, NLD, ISP, ILD
4	Hutch	4,365	6,837	56.6	Mobile phone
5	MTNL	6,084	5,786	-4.9	Fixed landline, mobile, NLD, ISP
6	VSNL	3,413	4,799	40.6	NLD, ILD, ISP

7	Idea	2,262	2,966	31.1	Mobile phone
8	TTSL	1,347	2,575	91.2	Fixed landline phone, mobile phone
9	TTML	836	1,097	31.2	Fixed landline phone, mobile phone
10	Aircel	561	880	56.9	Mobile phone
	Total	**68,348**	**87,391**	**27.9**	

Source: Voice & Data, July 2006

Table 3.11 highlights the number of fixed landline phone (basic and WLL) along with the mobile phones from the period 1999 to 2006. Within seven years, number of mobile phones has grown from 1.20 million to 92.52 million. Fixed landline and WLL phone was 21.61 million in the year 1999 and in 2006 they were 49.57. Thus, the growth can be analyzed in the number of both the telecommunication services but the growth rate of mobile phone services is much higher than the fixed landline and WLL phone connections.

Table 3.11

Number of Basic and Mobile Phone in India (1999 to 2006)

Year (End of March)	Number of telephones (in millions)	
	Fixed Landline Phone+ WLL	**Mobile Phone**
1999	21.61	1.20
2000	26.65	1.80
2001	32.70	3.58
2002	38.53	6.43
2003	41.93	12.69
2004	42.84	33.70
2005	46.85	51.53
2006	49.57	92.52

Source: www.indiastat.com, 2007

The allocation of resources and the growth process of the telecommunication sector can be understood better with the comparison of tele-density rate-national tele-density is the relationship between a country's population and the number of main telephone lines i.e. number of phone lines per 100 persons of the population. The Indian telecommunication sector has been tele-density target oriented.[24] Tele-density can be studied separately for all states/circles in rural and urban areas of India. Table 3.12 shows the rate of tele-density for both the areas and also overall growth percentage of the same. The drivers of telecommunication have undergone a significant change in terms of mobile versus fixed landline phones. In the year 1991, only fixed landline phone services were in existence as a result total tele-density of the country constituted only of fixed landline phone. After 1991, with the passage of time mobile phones surpassed the fixed landline phone connection and as a result during September 2004 mobile phone tele-density was higher than the fixed landline phone. Current tele-density has risen to 14.10 percent in July 2006.[25]

Table 3.12

Tele-density Rate

Year	Fixed Landline Phone Tele-density (%)	Mobile Phone Tele-density (%)	Total Tele-density (%)
1991	0.6	-	0.6
2002	3.83	0.65	4.48
2004	4.01	3.16	7.17
2005	4.25	4.83	9.08

Source: www.neoncarrot.co.uk, 2006

State-wise rural and urban tele-density of the country (2004-2005) is shown in Table 3.13. The highest tele-density rate in the year 2004-2005 is in the metros. Punjab state has the highest tele-density rate of 21.94 percent (5.33 percent for rural areas and 49.21

[24] Asian CERC Information Technology ltd. (2003) "Insight - Telecom-Basic Telephony", Industry Research Report, In-depth Research from RAD, Research and Advisory Division Bangalore.

[25] Telecom Regulatory Authority of India (2007) "The Indian Telecom Services Performance Indicators, July - September 2006", New Delhi.

percent for urban areas), followed by Kerala with 18.77 percent (9.74 percent for rural areas and 44.74 percent for urban areas). Gujarat state has the third highest tele-density rate for the year 2004-2005 i.e. 12.73 percent (2.63 percent for rural areas and 28.88 percent for urban areas). In the year 2005-06 highest tele-density rates persisted in metros only. Gujarat is ranked as fourth highest in terms of tele-density rate with 13.24 percent (2.63 percent for rural areas and 30.12 percent for urban areas). Punjab, Kerala, and Andaman and Nicobar Island are ahead of Gujarat state. Rural tele-density for 2006 (March 31st) for Gujarat state is 2.69 percent, showing an increase of 0.06 percent from the year 2005-2006. Total tele-density of the nation for the year 2004-2005 and 2005-2006 stood as 8.95 percent (1.73 percent for rural and 26.88 percent for urban areas) and 9.37 percent (1.74 percent for rural areas and 28.25 percent for urban areas) respectively.

Table 3.13

State/Circle wise Tele-Density in Rural and Urban Areas of India

State/ Circle	2004-2005			2005-2006			2006 (March 31st)
	Urban	Rural	Overall	Urban	Rural	Overall	Rural
Andaman & Nicobar Island	19.12	9.07	12.63	22.49	9.15	13.89	8.8
Andhra Pradesh	28.53	2.39	9.48	30.19	2.37	9.92	2.34
Assam	16.75	0.63	2.79	18.22	0.67	3.04	1.00
Bihar	17.63	0.57	2.36	19.71	0.57	2.58	0.66
Chhastishgarh	6.5	0.54	1.8	7.18	0.46	1.9	0.51
Gujarat	28.88	2.63	12.73	30.12	2.63	13.24	2.69
Haryana	28.78	2.8	10.83	29.21	2.9	11.06	3.10
Himachal Pradesh	68.36	6.79	13.12	78.11	6.82	14.17	7.25
Jammu & Kashmir	17.58	0.76	5.09	19.87	0.78	5.17	0.85
Jharkhand	8.42	0.5	2.3	8.56	0.51	2.34	0.58

Karnataka	29.98	2.49	12.19	31.26	2.49	12.66	2.63
Kerala	44.74	9.74	18.77	47.61	9.74	19.5	10.63
Madhya Pradesh	17.36	0.66	5.21	17.15	0.67	5.16	0.79
Maharashtra (-) Mumbai	25.23	2.56	9.96	27.71	2.59	10.71	2.80
North East – I	14.63	1.22	4.33	15.93	1.24	4.65	1.29
North East – II	12.83	1.2	3.66	14.21	1.21	3.97	1.26
Orissa	19.68	1.04	3.96	21.35	1.05	4.24	1.16
Punjab	49.21	5.33	21.94	51.57	5.34	22.89	5.29
Rajasthan	21.27	1.44	6.12	22.94	1.45	6.52	1.67
Tamil Nadu (-) Chennai	22.96	2.73	11.21	23.1	2.86	11.48	2.99
Uttranchal	17.08	1.63	5.74	17.05	1.68	5.78	1.84
Uttar Pradesh	17.15	0.52	4.06	18.89	0.52	4.43	0.55
West Bengal (-) Kolkata	14.85	1.04	2.98	17.14	1.05	3.26	1.13
Kolkata	24.22	0	24.22	25.09	0	25.09	0
Chennai	47.56	0	47.56	48.03	0	48.03	0
Delhi	50.94	0	50.94	52.09	0	52.09	0
Mumbai	45.43	0	45.43	45.81	0	45.81	0
Total	**26.88**	**1.73**	**8.95**	**28.25**	**1.74**	**9.37**	**1.86**

Source: www.indiastat.com, 2007

It has been said that one percent growth in telecommunication sector leads to three percent growth in GDP of the nation. Therefore, it is important to focus on speedy development of telecommunication sector to initiate the economy.[26] One of the important sources for investment within the telecommunication sector for the growth of tele-density is the FDI. In absolute terms, the highest inflow of FDI into the telecommunication sector in the world is in India.[27] From August 1991 to August 1994 number of proposals

[26] Gupta, N. (2000) "The Business of Telecommunication", Tata McGraw-Hill Publishing Company Limited, New Delhi.
[27] Opcit (2003)

approved is 926, which made the flow of approximately Rs. 41,368 crore. Actual FDI flow for the period January 2001 to August 2004 constitutes around Rs. 5,763 crore, i.e. 56 percent of total FDI received from 1991. These figures make the telecommunication sector second largest sector for receiving FDI. Main reason for continuous inflow of investment in telecommunication projects is to match the consumers growing demand. Major change in the FDI flow occurred when the ceiling was enhanced from 49 percent to 74 percent during the year 2004 in certain areas-fixed landline phone services, mobile phone services, unified access services, NLD/ILD, very small aperture terminal, public mobile radio trunk services, GMPCS, and other VAS. Total 74 percent FDI ceiling includes direct and indirect foreign holding in the licensees company. 100 percent FDI is also permitted in the area of telecommunication equipment manufacturing and provision of IT enabled services. FDI approvals till September 2005 were Rs. 41,551 crore. Total inflow of FDI in the nation for the year 2005-2006 (upto January 2006) is Rs. 19,356 crore, whereas in telecommunication sector it is Rs. 905 crore. Percentage of telecommunication FDI to total FDI is 4.68 percent for the year 2005-2006 (upto January 2006).

According to Maran, D., MOC and IT, India is the major destination for investment in software and hardware, and Chennai, in particular, for telecom-related activities. Chennai is the only city, which has got Rs. 100 crore of FDI, 19 projects and recognition as the telecommunication hub in India.[28]

With increased competition and an urge to capture the market by private service providers, tariff rates are declining day by day. All the people have accepted telecommunication sector has been accepted as part of there daily life, as the affordability rate is increasing because of declining tariffs. The tariffs for local calls, particularly for mobile phones have fallen considerably in recent years (Table 3.14, minimum effective charges derived for an outgoing usage of 250 minutes per month). Call charges from fixed landline phones have been reduced from Rs. 1.39 in 2003 to Rs. 0.85 by the year 2005. Mobile phone call charges have also been reduced from Rs. 2.37 in 2003 to Rs. 1.20 in 2005. Long distance tariffs and international call charges have also come down

[28] Voice & Data (2006) "Chennai Calling", Vol. 13, Issue 3.

drastically. Introduction of new tariff plans every fortnight by private service providers has enabled the consumers to call any time of the day with minimum call charges.

Table 3.14

Minimum effective charge for local calls

Services	June 2003	June 2004	June 2005	September 2005
Fixed landline phone (Rs. Per minute)	1.39	1.00	0.85	0.85
Mobile phone (Rs. Per minute)	2.37	1.90	1.20	1.20

Source: Economic Survey, 2005-2006.

Growth of mobile phone services within the telecommunication sector shows surprising figures which makes the presence of mobile phones to be everywhere within the country. Compound annual growth rate of mobile phone consumers since 1999 has increased by 85 percent and also the addition of 4 million consumers per month is calculated. Table 3.15 presents the market structure and present position of mobile phone market. It highlights the increasing growth rate of acceptance of mobile phone services.

Table 3.15

Increasing Acceptance of Mobile Phone Services

Number of total new mobile phone connections	52.22 million (March 2005) 90.14 million (March 2006) 112.15 million (June 2006)
Minutes of Usage - MOU (Per month per consumer)	
GSM	Rs. 344 (March 2005) Rs. 395 (March 2006) Rs. 414 (June 2006)
CDMA	Rs. 462 (December 2005) Rs. 550 (March 2006) Rs. 443 (June 2006)

Average Revenue Per User - ARPU (Per month per consumer)	
GSM	Rs. 394 (March 2005) Rs. 366 (March 2006) Rs. 352 (June 2006)
CDMA	Rs. 256 (December 2005) Rs. 256 (March 2006) Rs. 228 (June 2006)
Number of Outgoing Short Messaging Services - SMS (April-June 2006)	
GSM	54-Metro 62-Circle A 36-Circle B 17-Circle C 47-Total
CDMA	29-Metro 28-Circle A 25-Circle B 14-Circle C 27-Total
Government target for mobile phone subscriptions	200 million by 2007 (BSNL January 2006)
Indian population owning a mobile phone	8 percent (January 2006)

Source: www.neoncarrot.co.uk and Telecom Regulatory Authority of India, 2006

Percentage growth over March 2005 to March 2006 in relation to addition to consumer base for mobile phones is 95.49 percent, whereas for MOU traffic, the growth percentage over June 2005 to June 2006 is 15.64 percent for GSM mobile phones and ARPU is -7.61 percent. For CDMA mobile phones, growth percentage of MOU over December 2005 to June 2006 is -4.11 percent and ARPU is -10.94 percent.

MOU is calculated as the total minutes carried over the network. Whereas ARPU is calculated with total service revenue for the period divided by the weighted average number of activated consumers for the period. Inspite of higher MOU the ARPU is lower

and the reason is lower tariff rates. Two factors accounted for much of the fall in the ARPU. First, increased pressure on voice tariffs, as voice still accounts for 90 percent of the traffic and second the high rate of prepaid consumers across almost all mobile phone service providers. While dropping ARPU is a concern for every carrier, if the drop is accompanied by a 50 percent growth in consumers' base, the overall results are bound to be positive, considering the increased revenue.

SMS is the most popular VAS of mobile phones. Both GSM and CDMA technology based mobile phone consumers are using SMS very frequently. Its popularity can be judged by its usage pattern by the consumers. Around 100 million SMSs are made in a day, During the year 2005, daily downloads of around one million paid ringtones (average cost of Rs. 9 per ring tone) was made.[29]

Growth of mobile phone market during 2000-2005 is almost 2,700 percent. With the same increasing trend, the growth target set by BSNL of 200 million mobile phone consumers by 2007 will be achieved before the target period.

One of the important factors to be considered while taking mobile phone development into account is mobile phone handset cost. Various relaxations in customs and excise duties have lead to a drop into mobile phone handset prices. Also union budget 2005-2006 made the mobile phone consumers free from filing their return, if their income is below the minimum amount chargeable to tax.

To understand the importance and growth of telecommunication sector the total number of consumer base for mobile phone service providers is the best alternative available. Number of mobile phone consumers in India has already crossed the billion figures during September 2004. Mobile phone services were introduced in different phases and the nation was divided into different circles (refer Table 3.3). Number of consumers as per all the circles and metros from the year 1997-2006 is shown in Table 3.16. Number of mobile phone consumers has shown an increasing trend year after year. But 2000 onwards the rate of growth has been very high. Total number of mobile phone consumers

[29] Opcit (2005)

during the year 2000 is 18,84,311 whereas in 2006 the figure stands as 6,91,93,321. All the circles and metro cities are showing a similar increasing trend along with the passage of time. Highest number of consumers in the year 2006 is in circle B i.e. 2,27,25,419 consumers. About five million consumers are being added every month since December 2005.[30]

Table 3.16

Number of mobile phone consumers

Year	All Metros	Circle A	Circle B	Circle C	All India
1997	3,25,967	9,698	3,000	366	3,39,031
1998	5,51,757	1,76,954	1,38,309	15,296	8,82,316
1999	5,19,543	3,54,799	2,88,321	36,915	11,99,578
2000	7,95,931	5,85,653	4,60,094	42,633	18,84,311
2001	13,62,592	11,65,778	9,32,685	1,16,040	35,77,095
2002	25,67,757	21,34,333	15,01,151	2,27,573	64,30,814
2003	44,39,524	43,64,943	33,74,538	5,08,632	1,26,87,637
2004	79,41,766	96,98,299	74,02,067	11,12,273	2,61,54,405
2005	1,10,07,125	1,48,95,720	1,26,33,833	24,89,262	4,10,25,940
2006	1,58,59,874	2,43,32,549	2,27,25,419	62,75,479	6,91,93,321

Source: Cellular Operators Association of India, 2006

Table 3.17 shows different mobile phone service providers with their consumer base for the year 2000 to 2006.

Table 3.17

Mobile Phone Service Providers with Consumer Base (2000 to 2006) (in million)

Service Providers	March 2000	March 2001	March 2002	March 2003	March 2004	June 2005	June 2006
Reliance	0.07	0.19	0.38	0.54	7.26	11.65	22.56
Bharti	0.36	0.69	1.35	3.07	6.5	12.26	23.09

[30] www.convergenceindia.com, 2006

BSNL	-	-	0.04	2.29	5.53	10.69	21.02
Hutch	0.45	0.71	1.27	2.16	5.15	8.44	17.54
Idea	0.16	0.34	0.81	1.28	2.73	5.55	8.54
BPL Group	0.34	0.64	0.9	1.13	1.88	2.63	1.30
Spice	0.17	0.27	0.47	0.64	1.21	1.47	2.05
Escotel	0.14	0.31	0.5	0.59	0.99	-	-
Tata/Hughes	-	-	0.05	0.16	0.63	1.43	10.36
MTNL	-	0.02	0.22	0.35	0.46	1.29	2.31
HFCL	-	-	0.01	0.03	0.03	0.06	0.15
Shyam	-	-	0.004	0.03	0.03	0.03	0.06
Others	0.21	0.41	0.54	0.73	1.29	1.87	3.20
Total	**1.9**	**3.58**	**6.54**	**13**	**33.69**	**57.37**	**95.49**

Source: Telecom Regulatory Authority of India, 2006

The World Bank estimates that 80 percent of the world's population lives within range of mobile phone network, at least 1.3 billion are currently using it and a million or more soon too follow.[31] In India only 8 percent of the population owns the mobile phone thus the future market scope and growth can be anticipated easily. The upward trend is expected to continue in the long run all over the world. Clear picture of mobile phone consumers can be understood by considering the technological difference among the mobile phone services. Issues in relation to the technologies were used to be considered by the TDSAT. Currently GSM and CDMA technologies are available within the nation and the numbers of consumer within these categories are presented in Table 3.18.

Mobile phone service providers are using GSM technology in India from the beginning of the mobile phone services. During the initial years of launch of mobile phone services consumers had no other option than to adopt the available technology. But with the acceptance of all possible available technology, acceptance of alternatives for the benefit of consumers, by the authority showed a sudden upward trend in the number of mobile phone consumers. In the first year of its introduction, CDMA technology mobile phone

[31] Donner. J, (2005) "The Use of Mobile Phones by Micro entrepreneurs in Kigali, Rwanda: Changes to Social and Business Networks", International Communication Workshop on Wireless Communication and Development: A Global Perspective, Annenberg Research Network, 7- 8 October 2005.

consumers were 0.76 million and during 2004 it was 8.21 million. Though GSM technology enabled mobile phone consumers were only 5.64 million, even after four years of its existence in the market. The present scenario shows the presence of 69.19 million GSM technology based mobile phone consumers and 21.69 million CDMA mobile phone users in India.

Table 3.18

Number of Mobile Phone Consumers in Million (March 2006)

Year	GSM	CDMA	Total Number of Consumers
1999	1.20	-	1.20
2000	1.90	-	1.90
2001	3.60	-	3.60
2002	5.64	0.76	6.40
2003	13.1	1.60	14.67
2004	26.21	8.21	34.42
2005	41.04	11.31	52.35
2006	69.19	21.69	90.88

Source: Voice & Data, July 2006

Mobile phone usage is being watched minutely as it has been proven that mobile phone penetration has direct correlation with economic growth and the standard of living.[32] Mobile phone services can further be considered on the basis of services i.e. pre-paid and post-paid. During the year 2001, growth rate of post-paid connection was 40 percent, which has increased to 124 percent in the year 2004. Similar growth trend can be seen for pre-paid service connections also. During the year 2001, 96 percent of growth was measured whereas in 2004, 168 percent of growth can be observed for the same.

[32] www.expresscomputer.com, 2006

Table 3.19

Rate of Growth in pre-paid and Post-paid Mobile Phone Consumers in India (2000-2004)

Year	Growth Rate of Post-paid Consumers	Growth Rate of Pre-paid Consumers
2000	NA	NA
2001	40	96
2002	57	157
2003	14	98
2004	124	168

Source: www.indiastat.com, 2007

State-wise target for mobile phone services in India for the year 2005-2006 is shown in Table 3.20. The all India target is to have 69,00,000 mobile phone consumers during the year 2005-2006 and to achieve the same figure 4,00,000 mobile phone consumers from Gujarat state is being targeted by the government. Thus Gujarat state has to contribute 17.25 percent of mobile phone consumers to contribute for the predetermined target. Contribution of Andhra Pradesh, Karnataka, Kerala, Maharashtra, Rajasthan, and Uttar Pradesh states is higher than the Gujarat state. While Tamilnadu (excluding Chennai) and Chennai city has also to contribute 4,00,000 mobile phone consumers during 2005-2006. Andaman and Nicobar Island has to contribute only 6,000 consumers in order to achieve the all India target of 69,00,000 mobile phone consumers.

Table 3.20

State wise target for mobile phone services in India (2005-2006)

Telecom Circle	Target
Andaman and Nicobar	6,000
Andhra Pradesh	4,50,000
Assam	1,30,000
Bihar	3,80,000

Chattisgarh	1,00,000
Gujarat	4,00,000
Haryana	1,70,000
Himachal Pradesh	80,000
Jammu and Kashmir	1,20,000
Jharkhand	1,50,000
Karnataka	5,00,000
Kerala	4,50,000
Madhya Pradesh	2,00,000
Maharashtra (-) Mumbai	5,00,000
North East – I	45,000
North East – II	45,000
Orissa	2,24,000
Punjab	2,20,000
Rajasthan	4,10,000
Tamil Nadu (-) Chennai	4,00,000
Uttar Pradesh	8,20,000
Uttaranchal	80,000
West Bengal (-) Kolkata	2,20,000
Chennai	2,00,000
MTNL (Delhi and Mumbai)	4,00,000
Kolkata	2,00,000
India	**69,00,000**

Source: www.indiastat.com, 2007

TRAI carried out a comparative study in 2006 on the status of telecommunication sector of two fastest growing telecommunication markets in the world - China and India. Some of the comparative figures in relation to mobile phone usage pattern follow.

Table 3.21

Comparative Picture of India and China Mobile Phone Market

Particulars	China	India
Consumer Base (in million)		
2004	335	33.6
2005	390	52.21
ARPU – CDMA		
2004-05	10.31	5.74
2005-06	9.31	5.56
ARPU – GSM		
2004-05	9.62	8.89
2005-06	9.43	8
MOU – CDMA		
2004	292	NA
2005	277	470
MOU – GSM		
2004	297	330
2005	300	393
Average SMS per consumer per month		
December 2005	37	40

Source: Telecom Regulatory Authority of India, 2006

Table 3.21 shows that as compared to China MOU (for both GSM and CDMA) and average number of SMS per consumer per month in India these figures are high whereas ARPU and the number of consumer base is more in China. CDMA technology is been accepted at a faster rate in India as compared to China. Indian mobile phone consumers are more attractive towards non-voice calls i.e. SMS. Its usage pattern as per December 2005 is 40 per month as compared to only 37 SMS per month in China during the same period.

With the acceptance of core vision of NTP 99 of affordable and effective communication, the telecommunication sector has achieved a lot in recent years. Number of mobile phone consumers is increasing day by day at a high rate. Number of mobile phone service providers and their consumer base with special emphasis in relation to the present study area i.e. consumer base in Gujarat circle is shown in Table 3.22. Due to non-availability of district-wise number of consumers, Gujarat circle is taken here as collectively.

Table 3.22

Mobile Phone Service Providers and Consumer Base in Gujarat (2005)

Service Provider	Number of Consumers
Bharti Airtel	5,00,792
BSNL (GSM)	5,21,505
BSNL (CDMA)	17,716
Hutch	12,30,039
Idea Cellular	6,58,723
Reliance Infocom	7,01,769
Tata Indicom	93,106
Total	**37,23,650**

Source: www.indiastat.com, 2007

Target and achievement of telecommunication sector in Gujarat from the year 2001-2002 to 2004-2005 are shown in Table 3.23. Gross telecom connection (fixed, mobile, WLL) for the year 2001-2002 was targeted at 6,50,000 whereas the actual connections distributed was 5,87,866. For the same period, achieved optical fiber cable (route Kilometers) was ahead of the target i.e. 9,215 achieved and 9,050 targeted. Trunk automatic exchanges (Kilo circuits) achieved was 61 while the target goal was of 59. In the year 2002-2003 all the three gross telecom connection (fixed, mobile, WLL), optical fiber cable (route Kilometers), and trunk automatic exchanges (Kilo circuits) were ahead of the target goals. But in the year 2003-2004, gross telecom connection (fixed, mobile, WLL) lagged behind the targeted goal. In 2004-2005 (January 31, 2005) targeted gross telecom connection (fixed, mobile, WLL) was 6,63,000 while the achieved connections

were 2,70,111 only. 3,92,889 gross telecom connection (fixed, mobile, WLL) were short of the target. Same trend of less achievement can be seen for optical fiber cable (route Kilometers), and trunk automatic exchanges (Kilo circuits) also.

Table 3.23

Target and Achievement of Telecommunications Services in Gujarat (2001-2002 to 2004-2005)

Year	Parameters					
	Gross Telecom Connection (Fixed, Mobile, WLL)		Optical Fiber Cable (Route Kilometers)		Trunk Automatic Exchanges (Kilo Circuits)	
	Target	Achievement	Target	Achievement	Target	Achievement
2001 - 2002	6,50,000	5,87,866	9,050	9,215	59	61
2002 - 2003	5,02,700	5,84,669	2,000	2,633	86.5	90.5
2003 - 2004	4,24,000	3,98,840	1,200	2,008	51	29
2004 - 2005 (31.01.05)	6,63,000	2,70,111	1,000	383	26	16

Source: www.indiastat.com, 2007

Target of various telecommunications services for Gujarat state for the year 2005-2006 is shown in Table 3.24. Maximum numbers of connection targeted are for mobile phone services i.e. 11,00,000, followed by broadband connection with 83,750. Only 1,305 Village Public Telephone (VPT) connections are targeted for the year 2005-2006 in Gujarat state.

Table 3.24

Target of Various Telecommunications Services in Gujarat (2005-2006)

Service	Target
Cellular Mobile Connection	11,00,000
Wireless Connections	49,000

WLL Connections	65,000
Broadband	83,750
Village Public Telephone connections	1,305

Source: www.indiastat.com, 2007

Factors' contributing to high growth rate of mobile phone market in India includes;

- Minimum rental and easy availability.
- Alternatives available for selection of service providers and services.
- Great reduction in prices of handsets.
- Increasing coverage area.
- Status symbol and necessity.
- Acceptance of new technology.

Overall present scenario of telecommunication sector in India with special emphasis on mobile phone services shows a high rate of growth and the trend is suppose to follow with increasing rate in future.

3.5.2 Future Vision

Societies can develop and advance only as far and as fast as they can acquire, use and maintain system of communication-system of acquiring, recording, assimilating and dissimilating information.[33] In its wider sense, this observation of Prof. Colin Cherry, Imperial Collage, University of London, would apply to mass communication and also to personal and business communication.

India has attained a significant quality upgradation of its network in the 1990s .In the coming future, competition will be among big firms by offering innovative VAS to the consumers for having a big piece of cake collectively said as market. Priority will be of new digital technologies. The current low tele-density offers telecommunication companies substantial growth opportunities within the nation and gives an option of adopting new technologies. Regulatory authorities will have to work further to make the

[33] Swaminathan, C. S. (1983) "Role of Telecommunication in Rural Economy", Telecommunication for National Development, Indian Chamber of Commerce, Calcutta.

market more competitive with maximum flexibility and innovation process. Telecommunication sector is responding very positively to the reform measures introduced in early 1990s. Therefore the policy formation process should be an ongoing one. Market maturing will be a continuous process at some of the segments of telecommunication sector. Significant reforms in the most promising market should be factual.

Introduction of CPP regime in August 1999 made it possible for mobile phone revolution to cross the number of fixed landline phone connection on October 24, 2004, nine years after mobile phone services commenced in India. One of the important conclusive factors of high growth of the evolution is reduction in price of handsets. Future expectation is the increasing demand for mobile phone handsets along with the point of cross over between fixed landline phone, mobile phone, and Internet and also between voice and data.

Mobile phones have become ubiquitous, but India being the second most populated country in the world with over one billion people, has less than 10 percent hooked on mobile phones. What exists is a huge gap mainly driven by the affordability factor. Acceptance by the second phase of Global System of Mobile Association (GSMA) of ultra low cost cell phones called as Emerging Market Handset (EMH) initiative should be taken into policies, for making wireless more affordable. ABCD (Aaya – Bai – Carpenter - Driver) syndrome should be taken seriously to catch next one billion consumers. As ABCD factor is for real and not for illusion.

Growth of mobile phone market is likely to come from the rural sector, small towns, and cities. Both public and private major service providers need to focus more on rural areas in order to have an all India presence and increase their consumer base, leading to a growth in the top line. Further fall in ARPU is likely as the government initiates another round of cuts in access deficit charges and broadband, but an increasing consumer base would offset that.

As specified long back, in the India Infrastructure Report, improved communication is vital for productivity in all spheres of activity - agriculture, industry, trade, and

commerce. Easy communication is essential for a developing country like India, it is thus important that policies and programs be initiated and resources committed to bring about rapid growth in the sector.[34]

The most sophisticated telecommunication technology in the world need to look for new partners, entities, stakeholders with pot rating multimedia as important point in new business models, connecting world.

Equal and wealthier society i.e. Information society, where IT and telecommunication merge and soon overlap each other for the benefits of expansion and modernization of society.

3.6 Conclusion

Telecommunication services as said by layman is a communication over distance by cable, is no more bound by wires. In less than a decade, there are over half a dozen service providers available in the market. However, early imposition of monopoly structures on the telecommunication industry was not only due to governments strategic interest in it, but also to a certain view of public interest-a view whose relies continues to be found in the development process.

While most countries in 1980s adopted the cheaper wireless mobile technology and grew their tele-densities and economy. Deregulation of Indian telecommunication sector shows how infrastructure can be brought to global standards. Achievements of excellent telecommunication services as per the world standard are the result of NTP 94, NTP 99, CCB 2001 and TRAI.

In the post liberalization era, there has been a surge in telephone connections in India. Telecommunication sector has been struggle in the name of security. A basic reason for the improvement in telecommunication quality is the national government realized that a reliable telecommunication infrastructure is essential for socio-economic development.

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[34] Opcit (2000)

The economic reforms initiated in 1990's, through an invitation to the private service providers, resulted in the growth of the industry. Pitroda, S., father of the development of the Indian telecommunication sector started with many more like minded future seekers and as a result, today telecommunications is a do or die situation. DOT took the initiative to increase the growth of the sector by various telecommunications policy. Achievements of the excellent telecommunications services as per the world standard are the result of NTP 94, NTP 99, CCB 2001, and TRAI.

Increasing demand of telecommunication services, in the remote areas of the nation shows the continuous increase in the number of future consumers. Rate of acceptance of mobile phone services can not only be judged by the number of fixed landline phone consumers but also with the revenue generated by both the services.

Today telecommunication is a central part of people's lives. It is the fastest growing sector with the huge investment opportunities. Society is always in the process of change and the pace of change is becoming more rapid every day. Communication environment contributes to quality of life, to social, political, and security objectives with the ability to improve the scope and efficiency of business operations.

A more competitive market structure is possible, but it requires a very different approach to the present one where government licenses operators and the regulator fitfully interferes in the tariffs.

Appendix 3.1

15 Years of Telecommunication Reforms in India: From Bidding to Rollout to Consolidation

Years	Achievement
1992	VAS including mobile and paging services, privatized; Bharti, BPL, Essar, Hutchison Max, Modi Telstra, RPG, Skycell and Usha Martin win licenses for mobile phone services in metros.
1994	NTP 94 introduced. Emphasizing the phone on demand, world-class services at reasonable prices, and greater private sector role.
1995	34 licenses given to 14 companies for cellular services for 18 other circles, with HFCL bagging nine by bidding Rs. 85,000 crore; paging services debut; VSNL begins public internet access, Modi Telstra launches first cellular operation in kolkata.
1996	Poor response to basic services bidding after several rounds, only six licenses given.
1997	Government signs pact with World Trade Organization (WTO) allowing companies with up to 25 per cent foreign equity access to most parts of the Indian telecom market; TRAI set up with three members; mobile services commence in non-metro circles.
1998	DOT nod for national and international roaming; ISP policy announced (no limit on number of licenses, Rs. 1 fee); Airtel first private player to offer basic services, in Madhya Pradesh.
1999	TRAI increases the monthly mobile rental from Rs. 156 to Rs. 600, cuts peak ceiling rate from Rs. 16.80 to Rs. 6 per minute; NTP 99 formalizes migration from license fee to revenue sharing. Introduction of Government as third mobile phone service provider, and withdrawal of all cases against the government.
2000	TRAI given complete powers to fix tariffs and interconnectivity terms; ordinance bifurcates its role between regulator TRAI and adjudicator

	(TDSAT); cellular operators allowed to share infrastructure with other service providers: BSNL formed by corporatising DOT.
2001	Reliance Communications, Tata Teleservices, Shyam Telecom, and HFCL Infotel allowed offering fixed and limited mobile services; COAI contests limited mobility; fourth cellular licenses awarded in 21 circles; unrestricted competition in NLD leads to sharp price cuts.
2002	Tata's acquires VSNL; ILD thrown open to competition, ending VSNL's monopoly; universal service obligation fund created; BSNL launches countrywide cellular services; Reliance Communications launches WLL (M) services.
2003	After much litigation, TDSAT rules in favor of WLL (M), but operators were asked to pay additional fee; unified licenses issued to Reliance, Tata Tele, Shyam Telecom and HFCL.
2004	TRAI mandate expanded to include broadcasting and cable services; mobile subscribers exceed fixed line subscribers for the first time.
2005	Norms for NLD, ILD services license drastically liberalized; FDI limit in private telecom companies raised from 49 per cent to 74 per cent.
2006	BSNL's one India tariff package, offering flat long distance calling rate throughout India launched; mobile phone subscribers cross 100 million.

Source: Telecom Regulatory Authority of India, 2006 and Department of Telecommunication, 2006