CHAPTER III
GROWTH OF MOBILE PHONE IN INDIA

3.0 Growth of Communication Channel

Communication makes the world habitable. It consciously involves sharing ideas, feelings, thoughts, and many other things that humans share. Ojomo (2004) defined communication as the process of sharing ideas, feelings, thoughts and messages with others. Rothwell (2004) sees communication as a transactional process of sharing meaning with others. Kemoni (2004) citing Ojiambo states that communication involves the giving and receiving of information, signals or messages by talk, gestures and writing. Odini (1999) identifies communication as one of the core competencies that all information professionals should possess. Interpersonal communication involves sending and receiving messages between two or more people. DeFleur and Dennis (2002) conceptualized interpersonal communication as a process of using language and non-verbal cues to send and receive messages between individuals that are intended to arouse particular kinds of meaning. Rothwell (2004) posits that interpersonal communication is dyadic communication; according to him, it is a transaction that takes place between two people. Tubbs and Moss (2003) see interpersonal communication as encompassing many kinds of relationships from the most casual to the most long-lasting.

3.1 The development of the telephone

The emergence of telephones can be observed under two categories as follows:

3.1.1 Single-port.

The single-port design required the user to alternately speak into and then listen through the same hole. This history of the telephone chronicles the development of the electrical telephone. A 19th century acoustic 'tin can', or 'lover's' telephone.

3.1.2 Electromagnetic Telephones.

Before the invention of electromagnetic telephones, mechanical acoustic devices existed for transmitting speech and music over a distance greater than that of normal direct speech. The earliest mechanical telephones were based on sound transmission through pipes or other physical media.
The highly similar acoustic tin can telephone, or lover's phone, has been known for centuries. It connects two diaphragms with a taut string or wire, which transmits sound by mechanical vibrations from one to the other along the wire (and not by a modulated electrical current). The classic example is the children's toy made by connecting the bottoms of two paper cups, metal cans, or plastic bottles with tautly held string Among the earliest known experiments were those conducted by the British physicist and polymath Robert Hooke from 1664 to 1685, (9,10) The development of telephone can be traced back to the seventeenth century. The journey of telephones has been earmarked with the following milestones:

- 1667: Robert Hooke invented a string telephone that conveyed sounds over an extended wire by mechanical vibrations. It was to be termed an 'acoustic' or 'mechanical' (non-electrical) telephone
- 1844: Innocenzo Manzetti first mooted the idea of a “speaking telegraph” (telephone).
- 1854: Charles Bourseul writes a memorandum on the principles of the telephone. (See the article: "Transmission électrique de la parole", L'Illustration, Paris, 26 August 1854.) Antonio Meucci demonstrated an electric voice-operated device in New York; it is not clear what kind of device he demonstrated.
- 1861: Philipp Reis constructs the first speech-transmitting telephone December 28, 1871: Antonio Meucci files a patent caveat at the U.S. Patent Office for a device he named "Sound Telegraph"
- 1872: Elisha Gray establishes Western Electric Manufacturing Company.
- July 1, 1875: Bell uses a bi-directional "gallows" telephone that was able to transmit "voicelike sounds", but not clear speech. Both the transmitter and the receiver were identical membrane electromagnet instruments.
- 1875: Thomas Edison experiments with acoustic telegraphy and in November builds an electro-dynamic receiver, but does not exploit it.
- 1875: Hungarian Tivadar Puskas (the inventor of telephone exchange) arrived in the USA.
April 6, 1875: Bell's U.S. Patent 161,739 "Transmitters and Receivers for Electric Telegraphs" is granted. This uses multiple vibrating steel reeds in make-break circuits, and the concept of multiplexed frequencies.

January 20, 1876: Bell signs and notarizes his patent application for the telephone. February 11, 1876: Elisha Gray designs a liquid transmitter for use with a telephone, but does not build one. March 7, 1876: Bell's U.S. patent No. 174,465 for the telephone is granted.

March 10, 1876: Bell transmits the sentence: "Mr. Watson, come here! I want to see you!" using a liquid transmitter and an electromagnetic receiver.

January 30, 1877: Bell's U.S. patent No. 186,787 is granted for an electromagnetic telephone using permanent magnets, iron diaphragms, and a call bell.

April 27, 1877: Edison files for a patent on a carbon (graphite) transmitter. Patent No. 474,230 was granted on May 3, 1892, after a 15-year delay because of litigation. Edison was granted patent No. 222,390 for a carbon granules transmitter in 1879.


### 3.2 First practical telephone.

The modern telephone is the result of work of many people, The Graham Bell has the first to patent of the telephone, as an "apparatus for transmitting vocal or other sounds telegraphically". Bell has most often been credited as the inventor of the first practical telephone.

A telephone exchange is a telephone system located at service centers (central offices) responsible for a small geographic area that provided the switching or interconnection of two or more individual subscriber lines for calls made between them, rather than requiring direct lines between subscriber stations. This made it possible for subscribers to call each other at homes, businesses, or public spaces. This made telephony an available and comfortable communication tool for everyday use, and it gave the impetus for the creation of a whole new industrial sector.
3.3 The First commercial telephone exchange

The telephone exchange was an idea of the Hungarian engineer in 1876, while he was working for Thomas Edison on a telegraph exchange. The first commercial telephone exchange in the world was opened at New Haven, Connecticut with 21 subscribers on January 28, 1878\(^{(23)}\) in a storefront of the Boardman Building in New Haven, Connecticut. George W. Coy designed and built the world's first switchboard for commercial use. Coy was inspired by Alexander Graham Bell's\(^{(12)}\). In Bell's lecture, during which a three-way telephone connection with Hartford and Middletown was demonstrated, he first discussed the idea of a telephone exchange for the conduct of business and trade. On November 3, 1877, Coy applied for and received a franchise from the Bell Telephone Company for New Haven and Middlesex Counties. Coy, along with Herrick P. Frost and Walter Lewis, who provided the capital, established the District Telephone Company of New Haven on January 15, 1878.

The switchboard built by Coy was, according to one source, constructed of "carriage bolts, handles from teapot lids and bustle wire.". While the switchboard could connect as many as sixty-four customers, only two conversations could be handled simultaneously and six connections had to be made for each call.

The District Telephone Company of New Haven went into operation with only twenty-one subscribers, who paid $1.50 per month. By February 21, 1878, however, when the first telephone directory was published by the company, fifty subscribers were listed. Most of these businesses and listings such as physicians, the police, and the post office; only eleven residences were listed, four of which were for persons associated with the company. The New Haven District Telephone Company grew quickly and was reorganized several times in its first years.

3.4 National Historic Landmark

The site of the first telephone exchange was granted a designation as a National Historic Landmark on April 23, 1965. However it was withdrawn in 1973 in order to demolish the building and construct a parking garage.\(^{(13)}\)
3.5 History of telecommunication in the world

3.5.1 Liquid Transmitters.
Early telephones were technically diverse. Some used liquid transmitters which soon went out of use. Some were dynamic: their diaphragms wriggled a coil of wire in the field of a permanent magnet or vice versa. This kind survived in small numbers through the 20th century in military and maritime applications where its ability to create its own electrical power was crucial. Most, however, used Edison/Berliner carbon transmitters, which were much louder than the other kinds, even though they required induction coils, actually acting as impedance matching transformers to make it compatible to the line impedance. The Edison patents kept the Bell monopoly viable into the 20th century, by which time telephone networks were more important than the instrument.

The earliest telephones had only one wire for both transmitting and receiving of audio, and used a ground return path, as was found in telegraph systems. The earliest dynamic telephones also had only one opening for sound, and the user alternately listened and spoke (rather, shouted) into the same hole. Sometimes the instruments were operated in pairs at each end, making conversation more convenient but also more expensive.

Rural and other telephones that were not on a common battery exchange had hand cranked magneto" generator to produce a high voltage alternating signal to ring the bells of other telephones on the line and to alert the exchange operator.

3.5.2 Carbon microphone.
In 1877 and 1878, Edison invented and developed the carbon microphone used in all telephones along with the Bell receiver until the 1980s.

3.5.3 Candlestick telephone.
In the 1890s a new smaller style of telephone was introduced, “the candlestick telephone,” packaged in three parts. The transmitter stood on a stand, known as a "candlestick" for its shape, hence the name. When not in use, the receiver hung on a hook with a switch in it, known as a "switchhook." Previous telephones required the user to operate a separate switch to connect either the voice or the bell. Cradle designs were also used at this time, having a handle with the receiver and transmitter attached, separate
from the cradle base that housed the magneto crank and other parts. They were larger than the "candlestick" and more popular.

Around 1893, the country leading the world in telephones per 100 persons (teledensity) was Sweden with 0.55 in the whole country but 4 in Stockholm 10,000 out of a total of 27,658 subscribers.\(^{14}\) This compares with 0.4 in USA for that year. In 1893, the U.S. was considerably behind Sweden, New Zealand, Switzerland, and Norway in teledensity. The U.S. rose to world leadership in teledensity with the rise of many independent telephone companies after the Bell patents expired in 1893 and 1894.

Around three million phones by 1904 were connected in the U.S. were connected by manual switchboard exchanges. By 1914, the U.S. was the world leader in telephone density and had more than twice the teledensity of Sweden, New Zealand, Switzerland, and Norway. The relative good performance of the U.S. occurred despite competing.\(^{15}\)

Starting in the 1930s, the base of the telephone also enclosed its bell and induction coil, obviating a separate ringer box. Power was supplied to each subscriber line by central office batteries instead of the user's local battery which required periodic service. For the next half century, the network behind the telephone grew progressively larger and much more efficient, and after the rotary dial was added the instrument itself changed little until Touch-Tone signaling started replacing the rotary dial in the 1960s.\(^{16}\)

### 3.5.4 Bag phones.

The history of mobile phones can be traced back to two-way radios permanently installed in vehicles such as taxicabs, police cruisers, railroad trains, and the like. Later versions such as the so-called transportables or "bag phones" were equipped with a cigarette lighter plug so that they could also be carried, and thus could be used as either mobile two-way radios or as portable phones by being patched into the telephone network.

In December 1947, The hexagonal cell transmissions for mobile phones\(^{17}\) of Bell Labs, proposed that the cell Towers be at the corneRs of the hexagons rather than the centers and have directional antennas that would transmit/receive in 3 directions into 3 adjacent hexagon cells\(^{18}\)

The technology did not exist then and the radio frequencies had not yet been allocated. Cellular technology was undeveloped until the 1960s, when Richard H. Frenkiel and Joel S. Engel of Bell Labs developed the electronics.\(^{19}\)
3.5.5 Cellular phone

On April 3, 1973 Motorola manager Martin Cooper placed a cellular phone call (in front of reporters) to Dr. Joel S. Engel, head of research at AT&T’s Bell Labs. This began the era of the handheld cellular mobile phone. Meanwhile the 1956 inauguration of the TAT-1 cable and later international direct dialing were important steps in knitting together the various continental telephone networks into a global network. Cable television companies began to use their fast-developing cable networks, with ducting under the streets of the United Kingdom, in the late 1980s, to provide telephony services in association with major telephone companies. One of the early cable operators in the UK, Cable London, connected its first cable telephone customer in about 1990.

3.5.6 Internet telephony.

Internet Protocol (IP) telephony, also known as Internet telephony or Voice over Internet Protocol (VoIP), is a disruptive technology that is rapidly gaining ground against traditional telephone network technologies. In Japan and South Korea up to 10% of subscribers switched to this type of telephone service as of January 2005.(20)

3.5.7 Broadband Internet service.

Internet Protocol (IP) telephony uses a broadband Internet service to transmit conversations as data packets. In addition to replacing the traditional plain old telephone service (POTS) systems, IP telephony also competes with mobile phone networks by offering free or lower cost service via WiFi hotspots. VoIP is also used on private wireless networks which may or may not have a connection to the outside telephone network.

3.6 History of Telecommunication in India

India is the world’s fastest growing industry in the world in terms of number of wireless connections after China, with 811.59 million mobile phone subscribers. According to the world telecommunications industry, India will have 1.200 billion mobile subscribers by 2013. Furthermore, projections by several leading global consultancies indicate that the total number of subscribers in India will exceed the total subscriber count in the China by 2013.
3.6.1 Entry of Telecommunication in India

Well Postal means of communication was the only mean communication until the year 1850. In 1850 experimental electric telegraph started for first time in India between Calcutta (Kolkata) and Diamond Harbor (southern suburbs of Kolkata, on the banks of the Hooghly River).

In 1851, it was opened for the use of the British East India Company. Subsequently construction of telegraph started through out India. A separate department was opened to the public in 1854. Dr. William O’Shaughnessy, who pioneered the telegraph and telephone in India, belonged to the Public Works Department, and worked towards the development of telecom. **Calcutta or the-then Kolkata was chosen as it was the capital of British India.**

In early 1881, Oriental Telephone Company Limited of England opened telephone exchanges at Calcutta (Kolkata), Bombay (Mumbai), Madras (Chennai) and Ahmedabad. On the 28th January 1882 the first formal telephone service was established with a total of 93 subscribers.

From the year 1902 India drastically changes from cable telegraph to wireless telegraph, radio telegraph, radio telephone, trunk dialing. Trunk dialing used in India for more than a decade, were system allowed subscribers to dial calls with operator assistance. Later moved to digital microwave, optical fiber, satellite earth station. During British period all major cities and towns in India were linked with telephones.

**DOT:** In the year 1975 Department of Telecom (DoT) was responsible for telecom services in entire country after separation from Indian Post & Telecommunication. Decade later Mahanagar. **MTNL:** Telephone Nigam Limited (MTNL) was chipped out of DoT to run the telecom services of Delhi and Mumbai. **TRAI:** In 1990s the telecom sector was opened up by the Government for private investment. In 1995 TRAI (Telecom Regulatory Authority of India) was setup. This reduced the interference of Government in deciding tariffs and policy making. **BSNL:** The Government of India corporatized the operations wing of DoT in 2000 and renamed Department of Telecom as Bharat Sanchar Nigam Limited (BSNL). In last 10 years many private operator’s especially foreign investors successfully entered the high potential Indian telecom market. Globally
acclaimed operators like Telenor, NTT Docomo, Vodafone, Sistema, SingTel, Maxis, Etisalat invested in India mobile operators.(21)

3.6.2 Wireless Communication.

Pager communication successful launched in India in the year 1995. Pagers were looked upon as devices that offered the much needed mobility in communication, especially for businesses. Motorola was a major player with nearly 80 per cent of the market share. The other companies included Mobilink, Pagelink, BPL, Usha Martin telecom and Easy call. Pagers were generally worn on the belt or carried in the pocket. The business peaked in 1998 with the subscriber base reaching nearly 2 million. However, the number dropped to less than 500,000 in 2002. The pager companies in India were soon struggling to maintain their business. While 2-way Pagers could have buffered the fall, the pager companies were not in a position to upgrade their infrastructure to improve the ailing market. The Indian Paging Services Association was unable to support the industry. Pager companies in India also offered their services in regional languages also. However, the end had begun already. By 2002, Motorola slopped making or servicing Pagers. When mobile phones were commercially launched in India, the pager had many advantages to boast. Pagers were smaller, had a longer battery life and were considerably cheaper. However, the mobile phones got better with time and continuously upgraded themselves.

3.6.3 Mobile Communication.

First mobile telephone service on non-commercial basis started in India on 48th Independence Day at country’s capital Delhi. The first cellular call was made in India on July 31st, 1995 over Modi Telstra’s MobileNet GSM network of Kolkata. Later mobile telephone services are divided into multiple zones known as circles. Competition has caused prices to drop and calls across India are one of the cheapest in the world. Most of operator follows GSM mobile system operated under 900MHz bandwidth few recent players started operating under 1800MHz bandwidth. CDMA operators operate under 800Mhz band, they are first to introduce EVDO based high speed wireless data services via USB dongle. In spite of this huge growth Indian telecom sector is hit by severe spectrum crunch, corruption by India Govt. officials and financial troubles.
In 2008, India entered the 3G arena with the launch of 3G enabled Mobile and Data services by Government owned MTNL and BSNL. Later from November 2010 private operator’s started to launch their services. After US, Japan, India stands in third largest Internet users of which 40% of Internet used via mobile phones. India ranks one of the lowest provider of broadband speed as compared countries such as Japan, India and Norway. Minimum broadband speed of 256kbit/s but speed above 2Mbits is still in a nascent stage.

Year 2007 had been declared as “Year of Broadband” in India. Telco based on ADSL/VDSL in India generally have speeds up to 24Mbit max while those based on newer Optical Fiber technology offer up to 100Mbits in some plans Fiber-optic communication (FTTx). Broadband growth has been plagued by many problems. Complicated tariff structure, metered billing, High charges for right of way, Lack of domestic content, non implementation of Local-loop unbundling have all resulted in hindrance to the growth of broadband.

Many experts think future of broadband is in the hands of wireless factor. BWA auction winneRs are expected to roll out LTE and WiMAX in India in 2012.

3.6.4 Next Generation Network (NGN)
Next Generation Networks, multiple access networks can connect customers to a core network based on IP technology. These access networks include fiber optics or coaxial cable networks connected to fixed locations or customers connected through Wi-Fi as well as to 3G networks connected to mobile users.

As a result, in the future, it would be impossible to identify whether the next generation network is a fixed or mobile network and the wireless access broadband would be used both for fixed and mobile services. It would then be futile to differentiate between fixed and mobile networks both fixed and mobile users will access services through a single core network. Cloud based data services are expected to come.

3.6.5 Indian Satellites.
India has launched more than 50 satellites of various types, since its first attempt in 1975. The organization responsible for Indian satellites is the Indian Space Research Organization (ISRO). Most Satellites have been launched from various Space stations, including American, Russian, European satellite-launch rockets, and the U.S. Space
Shuttle. First Indian satellite Aryabhata on 19th April 1975, later Bhaskara, Rohini, INSAT, Edusat, IRS, GSAT, Kalpana, Cartosat, IMS, Chandrayaan, ResourceSat, RiSat, AnuSat, etc. (22)

The growth of mobile phones in India and in particular their popularity and use by young people in India has been the object of international and national media attention in the past few years. In 2004, British Broadcasting Corporation (BBC) reported that youth drives India’s mobile phone revolution (23).

Cell phones have grown at an unprecedented rate in the Indian subcontinent in the past few years. The Telecom and Regulatory Authority of India (28 Trai 2008-09) (24). The Authority has tried to reported that over the last year, cell phone subscriptions have grown almost 50 percent— from 261 million to 506 million. Mobile phones came to India in the mind-1990s, when the Indian government liberalized the economy to let Western companies and products enter the Indian market (Fraunhals University, 2006) (25).

3.7 Evolution of Telecommunications and Mobile Communications in India:

A Synthesis in the Transition. Initially due to high costs, mobile subscriptions were very few and the service was mainly adopted by business executives and professionals. However, in January 2000, the government introduced a new policy called NTP99, which replaced the high-cost, fixed licensing regime with a lower cost licensing structure leading to a drop of over 90% in cellular tariff rates. The lowering of costs, which encouraged price wars among the cellular operators, and their promotion as fashionable technology has led to a massive boom in the mobile phone subscription levels, especially among the younger population. A couple of years ago, Motorola, a well-known cell phone company, launched its “MotoYuva” range of cell phones. The term “MotoYuva” stands for “Motorola for youth”. “Yuva” means youth in Hindi. (26)

3.7.1 Mobile Phones or Mobile Devices

As is evident from the above discussion, mobile phones in India not only provide wireless interpersonal communication, but they have now evolved into multi-media devices that allow for a host of different communication and multi-media functions. Mobile phones are seen as multi-media technology that can be used for communication and media-related activities. As a communication technology, mobile phones facilitate
various kinds of communication through voice calls, text messages, picture messages and video messages. As media devices, mobile phones can be used for various media-related activities such as accessing news alerts and video clips or listening to music and taking pictures. In this study, it is assumed that young people will use mobile phones for both of these activities. The next section describes the theoretical perspectives used in this dissertation to understand the significance and attitudes, feelings of mobile phones in the young students in Marathwada region.

3.7.2 Importance of Mobile Technology

Mobile technology is already playing an increasing role in addressing many development issues – such as providing access to banking, health information and agricultural services. The scale and ubiquity of mobile networks means they are often the only infrastructure in remote and rural areas. The mobile industry has shown innovative and sustainable approaches to using their networks to improve the lives of disadvantaged people.

Regarding various issues the GSMA and The MasterCard Foundation believe that a substantial, long-term development impact of mobile technology lies in education and learning for young people in developing countries and in connecting them to jobs. There is an increasing role for mobile technology in schools, but mobile Learning also has a unique role to play in reaching those who are outside the scope of traditional schooling, and who will benefit immensely from access to educational programmers. Likewise, mobile technology can also connect them to employers and help improve their job readiness skills. If mobile is to live up to this rich promise, it is crucial that it meets the real needs of young people. Organizations involved in developing and delivering mobile Learning services need to understand the day-to-day lives of young people if they are to create services that will improve education and employment prospects. Developing that understanding is the primary purpose.\(^{(27)}\)

3.7.3 Types of Mobile Phone

There are many types of mobile phone standards such as AMPS (Analog), TDMA, CDMA, DoCoMo and GSM. However, the standard of the mobile handsets are mostly categorised into two Types first one is Conventional cell phones and the second is Smart Phone.
3.7.4 Conventional Cell Phones:
Most of the models are compact and less priced from the keypad of the handsets and overall function is generally straightforward. Generally, it allows storing frequently used numbers and to send and receive text messages. Some of them have basic cameras, video, music and support for wireless Bluetooth headsets for hands-free communication. Other capabilities might include an HTML browser, a multi-mega pixel camera, memory-card storage for music and pictures, and more option for custom ring tones, games etc.\(^{(28)}\)

3.7.5 Smart Phones
Long used by corporate travellers to stay up with e-mail and appointments. It has a QWERTY-style keyboard instead of the small keypad of a conventional cell phone. A smart phone is able to typically handle multiple e-mail accounts including corporate types, has a sophisticated organizer, can handle Office documents, and has an open source operating system for developers.

The world of smart phones can be divided into two categories.

**A.** Some smart phones are made for personal use. They're good for playing music and multimedia services, reading and sending e-mail messages, well as opening Office-type attachments, but it does not allow consumer to make or edit documents and spreadsheets. On the other hand

**B.** The next type of smart phone offers business-purposeful capabilities in a palm-fitting package. It allow users to create and edit spreadsheets and documents, as well as it generally come with Microsoft Outlook, Palm Desktop, well as other personal information management software for PC. Several smart phones have touch screens that provide direct access to their features, controls, and applications.

The first smart phone was the Nokia 9000 Communicator in 1996 which incorporated PDA (Personal Digital Assistant) functionality to the basic mobile phone at the time. Smart shopping. Several phone series have been introduced or the various market segment, such as the RIM (Research In Motion), BlackBerry has focused on enterprise/corporate consumer email needs; the Sony Ericsson has got Walkman series for the music lover and Cyber shot series of camera phones
for taking picture; the Nokia N series as well as the Apple iPhone are good all
types of multimedia application. consumer-reports.\(^{(29)}\)

### 3.7.6 Usage of Mobile Phone

In 1990's it was the luxury item for the people because of high price but for the modern
technology the price of mobile phone become cheaper day by day. Mobile phone is the
most important item an individual can own now days. The main and major importance of
mobile phone is that talking in move. Mobile phone is not always about keeping in touch
with other, it also helpful in any emergency situation, it gives opportunity to store data, it
gives entertainment as well as its advance application provide users lots of modern and
necessary function\(^{\text{consumer-reports}}\).

According to Sidney Aronson, an American sociologist (1971), in an urban setting the
home phone functions psychologically to reduce loneliness and anxiety, to increase
feelings of security and to maintain consistency within family and friendship groups. The
telephone is used to compensate for (as well as facilitate) the geographical scattering of
family and friends. The author suggests that a key social function of the telephone is in
maintaining its users 'intimate social networks' or 'psychological neighbourhoods'.
Although both of above research was about telephone but it is believed that mobile phone
is more useful than telephone.\(^{(30)}\)

### 3.8 Mobile Manufacturing Companies

There are mainly Five mobile manufactures in India. These are –

1. Nokia
2. Samsung
3. LG
4. Sony Ericson
5. Motorola

Nokia has played a pioneering role in the growth of cellular technology in India, starting
with the first-ever cellular call a decade ago, made on a Nokia mobile phone a Nokia-
deployed network. Nokia started its India operations in 1995, and presently operates out
of offices in New Delhi, Mumbai, Kolkata, Jaipur, Lucknow, Chennai, Bangalore,
Hyderabad, Pune and Ahmedabad. The Indian operations comprise of the handsets
business; R&D facilities in Bangalore, Hyderabad and Mumbai; a manufacturing plant in
Chennai and a Design Studio in Bangalore. Over the years, the company has grown manifold with its manpower strength increasing from 450 people in the year 2004 to over 15000 employees in March 2008 (including Nokia Siemens Networks). Today, India holds the distinction of being the second largest market for the company globally.

**Samsung** Telecommunications is one of five business units within Samsung Electronics, belonging to the Samsung Group, and consists of the Mobile Communications Division, Telecommunication Systems Division, Computer Division, MP3 Business Team, Mobile Solution Centre and Telecommunication R&D Centre. Telecommunication Business produces a full spectrum of products from mobiles and other mobile devices such as MP3 players and laptop computers to telecommunication network infrastructure. Headquarters is located in Suwon, South Korea.

**Motorola** India Private Ltd has Headquarters in Gurgaon, Haryana, with offices in Delhi, Mumbai, Bangalore and Hyderabad. Research and Development centers may also be found in Bangalore and Hyderabad. Mobile devices are increasingly the hub of people's lives, keeping them connected to the Internet, people, digital images, entertainment and a wealth of other types of content. The Mobile Devices business designs, manufactures, sells and services wireless handsets with integrated software and accessory products. It also licenses intellectual property.

**LG** Electronics India is an affiliate of the South Korean LG Group which produces electronic products. The previous company name was Lucky Goldstar. Before changing their name, many electronic products were sold under the brand name Goldstar, while some other household products (not available outside Korea) were sold under the brand name of Lucky. **LG** mobiles India entered the domestic market very recently. Its mobile phones, though are behind those of Nokia and Sony Ericsson, are becoming popular since they are cheap but offer great functions. LG has succeeded in CDMA phones that are available with Reliance but in GSM, success is not yet achieved by LG.

**Sony Ericsson** is a joint venture established on October 3, 2001 by the Japanese consumer electronics company Sony Corporation and the Swedish telecommunications company Ericsson to make mobile phones. The stated reason for this venture is to combine Sony's consumer electronics expertise with Ericsson's technological leadership
in the communications sector. Both companies have stopped making their own mobile phones.

### 3.9 Major Service Providers in India.

Two different technologies are deployed by the mobile operators in India namely GSM and CDMA. The GSM service providers are Bharti, BSNL, Hutch, IDEA, Aircel, Reliance, Spice, MTNL and BPL, whereas the CDMA service providers are TATA, HFCL, Shyam, and Reliance. The information shows the market share of each service provider in India.\(^{(31)}\)

India’s mobile market is dominated by foreign companies for high end telecom equipments, handsets, transmission equipments etc., \(^{(2)}\). Nokia, Samsung, and Motorola are the three important vendors for handsets. Other vendors who have their share in this market are L.G, Alcatel, Sony Ericsson, Siemens, National Panasonic, Philips, Mitsubishi, and Sagem.

### 3.10 Telecom Sector in pre liberalization era: (1980 to 1990).

1. Before liberalization, the public sector held monopoly in provision of telecom services.
2. The entire telecom services operation in the country was carried out by the department of telecommunication (DoT), a public sector entity established in 1985.
3. It manage the planning, engineering, installation, maintenance, management, and operation of telecom services for the whole India.

### 3.11 Telecom sector in post Liberalization era:

1. The government initially permitted players from the private sector to provide value Added services (VAS) such as paging services (CMTS), followed by the fixed telephony services (FTS) or basic services.
2. Eventually the private sector has been allowed to provide almost all telecom services.
3. During 1994, through a competitive bidding process, licenses were granted to 8 CMTS operator in 18 state circles, paging operators in 27 cities and 18 state circles.
4. The need for independent has risen with the entry of private players.
5. The telecom Regulatory Authority of India (TRAI) was established in 1997 to regulate telecom services including fixation/revision of tariffs.
6. Further, in 1998, the government also declared the policy for Internet Service provisions (ISP) by private operators and had even begun licensing of the same around that time.

7. In 2000, DTS was corporatized and renamed as Bharat Sanchar Nigam Ltd (BSNL), and thus the functions of the incumbent services provider were separated from that of the policy maker.

8. DOT is now responsible for policy-making, licensing and promoting private investment in both telecom equipment manufacturing and in telecom services.

9. Subsequently in 2002, even VSNL was privatized and its monopoly in ILD services was terminated (from March 31, 2002.)

3.12 Structure of Indian Telecom Industries:

There are two types of Indian telecom industries:

- Public telecom industry.
- Private telecom industry.

3.12.1 Under public telecom industries are:

- (BSNL) Bharat Sanchar Nigam Limited.

3.12.2 Private telecom industry:-

- Indian companies
- Foreign invested companies.

The private companies further classified into two types based on wire line based companies and second one is wireless companies

- **Wireline Companies** are
  - BSNL.
  - MTNL.
  - TATA DOCOMO.
  - RELIANCE INFOCOMM.
  - AIRTEL.

The total number of **telephones** in the country stands at 904.56 million, while the overall **teledensity** has increased to 73.32% as of 31 October 2013. and the total numbers of
mobile phone subscribers have reached 875.48 million as of October 2013. The mobile tele-density had increased to 70.96% in October 2013.

In the wireless segment, 4.90 million subscribers were added in October 2013. Telephony was introduced in India in 1882.

The wire line segment subscriber base stood at 29.08 million.\(^{(33)}\)

- **Wireless companies are further divided into two types.**
  - GSM.
  - CDMA.

(i) **GSM:** Global system for mobile communication. In 1995, August the GSM entered in India. The historic first phone call was made by mobile net joint venture between Telstra (Australia) company and B.M. Modi group. Mobile revolution began in culcutta. Handset cost was Rs. 40000 and call tariff rate 17 per minute.

The companies coming under GSM: \(^{(34)}\)

<table>
<thead>
<tr>
<th>Airtel</th>
<th>Reliance Gsm.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vodafone.</td>
<td>Tata docomo.</td>
</tr>
<tr>
<td>Aircel.</td>
<td>Uninor.</td>
</tr>
<tr>
<td>Bsnl.</td>
<td>Loop mobile.</td>
</tr>
<tr>
<td>Mtnl.</td>
<td>Videocon</td>
</tr>
</tbody>
</table>

(ii) **CDMA Companies are.**

- **Reliance Infocomm.**
- **Tata docomo.**
- **MTS**

Indian telecom operators added a staggering 227.27 million wireless subscribers in the 12 months between March 2010 and March 2011 averaging at 18.94 million subscribers every month. To put this into perspective, China which currently possesses the world's largest telecommunications network added 119.2 million wireless subscribers during the same period- averaging 9.93 million subscribers every month (a little over half the
number India was adding every month). So, while India might currently be second to China in the total number of mobile subscribers, India has been adding nearly twice as many subscribersevery month until March 2011. Mobile teledensity increased by almost 18.4 percent from March 2010 and March 2011 (49.60% to 67.98%) while wireline subscriber numbers fell by a modest 2.2 million. This frenetic pace of monthly subscriber additions means that the Indian mobile subscriber base has shown a year on year growth of 43.23%. Subscriber number hit a peak in June 2012 but has declined. The decline in telecom user base after June 2012 has been primarily due to the removal of inactive mobile telephone connections by the service providers.\(^{(35)}\)

### 3.13 Profit from telecom industry to India:

- According to TRAI there is an increase of telecom subscriber of 3.5% i.e. from 543.20 million in Nov 2009 to 562.21 million in December 2009.
- Indian Telecom industry notched up $8.56 billion in revenue during the quarter ended December 31\(^{st}\) 2009 earned by both landline and mobile services.
- The Airtel and Bsnl are considered as the major companies in the industry due to their large subscriber and revenue.
- In 2004-2005 the growth rate of Airtel was a very high rate (12866.1%). So 2004-2005 was considered as a turning point in the growth of the Airtel company in telecom industry.
- According to economic survey telecom sector profit may fall 84.7% in 2011-2012 due to the pressure of borrowing of 3G services.
- Indias Telecom equipment manufacturing sector is set to become one of the largest globally. Revenue are estimated to grow at a CAGR (compound Annual Growth rate) of 26.6% from 2006-2011 touching us$ 13.6 billion.\(^{(36)}\)

### 3.14 Growth of telecommunication sector in India:-

The telecommunication sector in India based on two technologies

- **Wire line Technology.**
- **Wireless Technology.**
- **Comparison.**

Further telecommunication based on subscriber base
Wire line subscriber.
Wireless subscriber.
Caparison.

A. Mobile Number Portability (MNP):

MNP was launched by the Prime Minister on January 20, 2011. The MNP service allows subscribers to retain their existing mobile telephone number even when they switch from one access service provider to another irrespective of mobile technology or from one technology to another technology of the same or any other access service provider within the same service area.

Implementation of MNP has not only given wider choices to the Indian subscribers but has also induced service providers to offer innovative, affordable and competitive traffic plans for the benefit of the masses. As on November 30, 2011, 19 million mobile customers have successfully ported their mobile numbers to the service providers of their choice.

B. Telecom Commercial Communications Customer Preference Regulations 2010:

Telecom Commercial Communications Customer Preference Regulations (TCCCPR) 2010 came into force on September 27, 2011. TCCCPR 2010 gives options to customers to exercise their preference, separate number for telemarketers starting with 140, easy registration of the telemarketers, sharing of database, blacklisting provisions, filtering of calls and SMS by service providers, effective complaint redressed system and financial disincentive on access providers.

In order to curb unsolicited commercial communication, which were a major cause of disturbance and inconvenience for telecom users, TRAI notified “Telecom Unsolicited Commercial Communication Regulations” in 2007, putting in place a framework for controlling unsolicited commercial communications. This regulation was further improved through two amendments in 2008. As a result of this regulation, the number of unsolicited calls decreased but the number of unsolicited SMS increased. The Indian telecom customer demanded more from TRAI, which led to enforcement of TCCCPR 2010.
3.14.1 Wireless vs. Wire line:

The preference for use of wireless phones has also been predominant in the sector. This is confirmed from the rising share of wireless phones, which increased from 80.19% (165.09 million) at the end of March, 2007 to 96.37% (881.41 million) at the end of October, 2011.

3.14.2 Trend in Teledensity:

Teledensity in the country is steadily increasing from 18.22% as on 31.3.07 to 70.89% as on 31.03.11 and currently stands at 76.03% as on 31.10.11. However, there is a wide gap between urban Teledensity (166.54%) and rural Teledensity (36.81%).

3.14.3 Rural Telephony:

97.09% of the villages in India have been covered by the Village Public Telephones (VPTs). Apart from the 308.87 million connections provided in the rural areas, 576350 VPTs have been provided till 31.10.2011.

3.14.4 Fixed Telephony

Market share of major operators in India as on 29 February 2012

The Indian Telecom sector has proved to be an international success story. The sector has witnessed a commendable growth over the past two years. With an overall subscriber base of 914.60 million and a Teledensity of 76.03%, the sector continues to grow from strength to strength. With the urban Teledensity reaching 166.54%, the market has been showing signs of maturity. Rural India is the key target market likely to drive the next round of growth, particularly for voice based services. It is envisaged that rural Teledensity of 40% would be reached by end of 2014. 3G and BWA are expected to reinvigorate the maturing urban markets and help in bringing balanced growth of economy. The aggressive growth observed by mobile services is yet to be replicated in case of broadband service, where the subscriber base currently stands at more than 12 million. The Government has a vision to provide telephone connection and broadband facilities on demand across the country at an affordable price and it strives to achieve the same.
3.15 The growth of telecom sector since 2007:

The 11th plan (2007-2012) had envisaged provision of 600 million connections. The number of telephone connections both wire line and wireless put together stands at 914.60 million on 31.10.2011. This registers an addition of 869.83 million connections by October 2011 against a target of 600 million connections by end of the 12th Plan i.e. March 2012. Wireless subscribers increased to 881.41 million by October 2011, exhibiting a Compound Annual Growth Rate (CAGR) of 43.93%. During the first seven months of the current year 2011-12, the wireless connections grew by 8.60%. The number of Internet subscribers grew by 22.30%, while the broadband subscribers grew at 34.43% during the year 2010-11. (38)

Wireless market share – Rural&Urban

<table>
<thead>
<tr>
<th>Area</th>
<th>Mar-12</th>
<th>Jun-12</th>
<th>Sep-12</th>
<th>Dec-12</th>
<th>Mar-13</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural</td>
<td>323.27</td>
<td>336.51</td>
<td>334.92</td>
<td>331.6</td>
<td>342.5</td>
</tr>
<tr>
<td>Urban</td>
<td>595.9</td>
<td>597.59</td>
<td>571.7</td>
<td>533.12</td>
<td>525.3</td>
</tr>
</tbody>
</table>

Sources: The Indian Telecom Services Performance Indicators
January – March, 2013


Sources: The Indian Telecom Services Performance Indicators
January – March, 2013
The following table shows the total market share of service providers in the year December 2012 to March 2013. Where as it shows no of subscribers in a million and the growth in it. Bharti leading at no one place with 21.04 million net subscribers addition while from MTNL and rest goes below zero.

**Share of service providers in the Market from Dec-12 to March 13 in millions.**

<table>
<thead>
<tr>
<th>Service Provider</th>
<th>No of Subscribers (in millions)</th>
<th>Market Share (%)</th>
<th>No of Subscribers (in millions)</th>
<th>Market Share (%)</th>
<th>Net Additions (in millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bharti</td>
<td>181.91</td>
<td>188.20</td>
<td>6.29</td>
<td>3.46</td>
<td>21.04</td>
</tr>
<tr>
<td>Vodafone</td>
<td>147.48</td>
<td>152.35</td>
<td>4.88</td>
<td>3.31</td>
<td>17.05</td>
</tr>
<tr>
<td>Reliance</td>
<td>118.53</td>
<td>122.97</td>
<td>4.44</td>
<td>3.75</td>
<td>13.71</td>
</tr>
<tr>
<td>IDEA</td>
<td>113.95</td>
<td>121.61</td>
<td>7.66</td>
<td>6.72</td>
<td>13.18</td>
</tr>
<tr>
<td>BSNL</td>
<td>99.92</td>
<td>101.21</td>
<td>1.28</td>
<td>1.29</td>
<td>11.56</td>
</tr>
<tr>
<td>Tata</td>
<td>69.56</td>
<td>66.42</td>
<td>-3.14</td>
<td>-4.52</td>
<td>8.04</td>
</tr>
<tr>
<td>Aircel</td>
<td>63.35</td>
<td>60.07</td>
<td>-3.28</td>
<td>-5.17</td>
<td>7.33</td>
</tr>
<tr>
<td>Unitech</td>
<td>41.52</td>
<td>31.68</td>
<td>-9.84</td>
<td>-23.69</td>
<td>4.80</td>
</tr>
<tr>
<td>Sistema</td>
<td>14.88</td>
<td>11.91</td>
<td>-2.97</td>
<td>-19.95</td>
<td>1.72</td>
</tr>
<tr>
<td>MTNL</td>
<td>5.30</td>
<td>5.00</td>
<td>-0.30</td>
<td>-5.71</td>
<td>0.61</td>
</tr>
<tr>
<td>Loop</td>
<td>3.00</td>
<td>3.01</td>
<td>0.01</td>
<td>0.43</td>
<td>0.35</td>
</tr>
<tr>
<td>Videocon</td>
<td>3.64</td>
<td>2.01</td>
<td>-1.63</td>
<td>-44.80</td>
<td>0.42</td>
</tr>
<tr>
<td>Quadrant (HFCL)</td>
<td>1.70</td>
<td>1.37</td>
<td>-0.33</td>
<td>-19.44</td>
<td>0.20</td>
</tr>
</tbody>
</table>

Sources: The Indian Telecom Services Performance Indicators (39)
January – March, 2013
3.16 Slowing Capital Expenditures and Foreign Direct Investments in the Telecom Sector

The operational and financial faced by operators. The sector is now characterized by an overcrowded market, fragmented industry structure, steep decline in tariffs, falling Minutes of Use, falling ARPU as well as declining revenue growth, and high network operating expenses as well as regulatory costs. Intense competition with 10 to 12 operators in a service area has led to a free-fall in tariffs. However, this has not been matched by an increase in Minutes of Use per connection per month (MoU or data usage), which on the contrary, have witnessed a drastic fall from a peak of 465 minutes in 2007 to 369 minutes at the end of 2010, a decline of more than 20%. The decline in the MoUs even with falling tariffs point to the limitation of the price elasticity of MoUs. Thus negative influence on revenues due to falling tariffs is not being compensated by increase in the MoUs.\(^{(48)}\)

FDI upto 49% is allowed subject to licensing and security requirement and adherence by the companies to the license conditions for foreign equity cap and lock-in period for transfer and addition of equity and other license provisions in basic, cellular, value added services and global mobile personal communications by satellite.

FDI upto 74%, with FDI beyond 49% requiring Government approval, is permitted in ISPs with gateways, radio-paging and end-to-end bandwidth, subject to licensing and security requirement. FDI upto 100% is allowed in ISPs not providing gateways (both for satellite and submarine cables), Infrastructure Providers providing dark fibre (IP category), Electronic Mail and Voice Mail, subject to prevalent conditions. No equity cap is applicable to manufacturing activities. Full repatriability of dividend income and capital invested in the telecom sector. Competition introduced in all service segments. International long distance services opened on 01.04.2002. National long distance services opened for free competition.

Revenue sharing regime in place of existing fixed license fee was introduced for both basic and cellular service operators. Fourth cellular operator, one each in four metros and thirteen circles were permitted with seventeen fresh licenses issued to private companies in September/October 2001. National and International automatic roaming facility was permitted for cellular subscribers. 25 new Basic Service License
Agreements were signed by private operators. Wireless in Local Loop Internet Services were opened for free competition and they were permitted to establish own international gateways (satellite or submarine cable) for carrying Internet traffic. National Internet Backbone (NIB) was commissioned and Global Mobile Personal Communication by Satellite (GMPCS) was opened for free competition. As a result of positive response to the investment policy being pursued for the sector, about 45% of the total inflow of FDI so far has come during the current year itself. During the period August, 1991-November, 2001, the actual flow of FDI was Rs.81224 million. In terms of approval of FDI, telecom sector is the second largest after energy sector. More than 32% of the total inflow of FDI in the telecom sector has come for cellular and basic services and about 54% for the holding companies.

3.16.1 Foreign Direct Investment (FDI) in the Indian Telecom Sector

The slow pace of investments by operators is also reflected in low tenancy ratios, slowdown in growth of telecom tower companies and the decreasing size of the Indian telecom infrastructure market. Tenancy ratios of Towers companies are low relative to the potential given the number of players. Among large players in the telecom tower space, only Viom Networks (a joint venture between Tata Teleservices Ltd. and Quippo) currently has a tenancy ratio of more than two. Indus Towers (a 3-way joint venture between Bharti Airtel, Vodafone, and Idea Cellular), American Towers, Bharti Infratel, Reliance Infratel, and GTL have tenancy ratios of less than two at 1.83, 1.8, 1.73, 1.6, and 1.4 respectively. The pace of rollout of Towers has also declined significantly. In 2008, the year-on-year growth rate was over 60% (albeit from a low base). In contrast, the year-on-year growth rate was only 5% in 2010. Considering the massive need for Towers for rural and 3G / BWA expansion, this represents an almost halting of the network rollout machinery. Even industry leader Indus Towers, which currently has ~100,000 Towers, has indicated an addition of only ~5,000 Towers on an annual basis, representing a growth rate of ~5%.
3.17 Growing Rural-Urban Divide and Slow-down in Growth in Rural Mobile Connections

It is evident that the urban markets are almost saturated whereas there is a lot of untapped demand in rural markets. Therefore, additional investments are required for rolling out services to the unconnected population, primarily in rural areas. Moreover, with India's broadband penetration being abysmally low at ~1%, investments are needed to deploy 3G/BWA services and meet the latent demand for broadband across urban and rural India. (40)

3.18 Policy Reforms and New Initiatives

For a dynamic sector, reforms are necessitated by dynamics of changes including technological innovations. The telecom sector in India has been witnessing a continuous process of reforms since 1991. During the recent years, various policy initiatives have been carried out to give boost to the sector. Major policy initiatives and milestones achieved in Telecom Sector include

3.18.1 Foreign Direct Investment (FDI):

Govt. Policies Towards FDI:

The total revenue in the telecom service sector was ₹86720 crore (US$15.9 billion) in 2005–06 as against ₹71674 crore (US$13.1 billion) in 2004–2005, registering a growth of 21% with estimated revenue of FY'2011 of Rs.835 crore (US$ 19 Bn Approx). The total investment in the telecom services sector reached ₹200660 crore (US$36.7 billion) in 2005–06, up from ₹178831 crore (US$32.7 billion) in the previous fiscal. Telecommunication is the lifeline of the rapidly growing Information Technology industry. Internet subscriber base has risen to more than a 121 million in 2011.

Out of this 11.47 million were broadband connections. More than a billion people use the Internet globally. Under the Bharat Nirman Programme, the Government of India will ensure that 66,822 revenue villages in the country, which have not yet been provided with a Village Public Telephone (VPT), will be connected. However doubts have been raised about what it would mean for the poor in the country.
It is difficult to ascertain fully the employment potential of the telecom sector but the enormity of the opportunities can be gauged from the fact that there were 3.7 million Public Call Offices in December 2005 up from 2.3 million in December 2004.

The Total Revenue of Indian Telecom Services company is likely to exceed Rs 200000 Cr (US$ 44 Bn approx) for FY 11–12 based on FY 10–11 nos and latest quarterly results. These are consolidated nos including foreign operation of Bharti Airtel.

The government has relaxed significantly the foreign investment norms in the sector. Presently 49 per cent equity participation is permitted in telecom services and 74 per cent in Internet services under the automatic route. Maximum foreign equity participation for Internet Service Providers (ISPs) is 100 per cent. Private investors, both domestic and foreign, have already invested over US$ 2,449 million in different segments of the industry. 100 per cent FDI is allowed for manufacturing telecom equipment(41)

3.18.2 National frequency Allocation Plan:

The National Frequency Allocation Plan-2011 (NAFP) came into effect from October 1, 2011 to ensure its efficient and effective management. Radio spectrum is becoming increasingly important for all walks of life and needs to be managed rationally.

NAFP-2011 is a policy document which contains spectrum allocation for various radio communication services/applications in different frequency bands. This document provides the basis for development, manufacturing and spectrum utilization activities in the country, both for Government and private sectors.

3.18.3 Initiatives undertaken by USOF:

The strategy for network expansion in rural areas mainly involves provision of phones in the viable areas through market mechanism and through Universal Service Obligation Fund (USOF) in the non-viable areas. While Village Public Telephones (VPTs) will enable public access, a scheme of Infrastructure sharing by Infrastructure Providers and Universal Service Providers has been launched under USOF to create infrastructure in rural and remote areas. The achievements of the schemes under USOF are as under:

- Apart from the 308.87 million connections provided in the rural areas, 576350 VPTs have been provided till 31.10.11. 97.09% of the villages in India have now been covered by the VPTs.
· As on 30.10.2011, 7289 Towers i.e. about 99% have been set up under shared mobile infrastructure scheme. The infrastructure so created is being shared by three service providers for provision of mobile services.
· As on 30.09.2011, a total of 2,24,631 broadband connections have been provided and 5674 kiosks have been set up in rural and remote areas under Rural Broadband Scheme for expanding provision of Wire line Broadband Connectivity up to village level.
· Another Scheme has been launched to provide sufficient back-haul capacity to integrate the voice and data traffic from the access network in the rural areas to their core network by strengthening the OFC network. This scheme considers Optical Fiber Cable (OFC) Network augmentation between the blocks' HQ and Districts' HQ to begin with. USOF, through this Scheme, shall provide subsidy support for augmentation, creation and management of intra-district SDHQ-DHQ OFC Network on the condition that it will be shared with other Telecom Operators at the rates prescribed in the Agreement. Assam has been taken up first for implementation. (42)

3.18.4 Some of the pilot projects undertaken by USOF are as under:-

(i) Support is being provided for mobile charging stations in 5000 villages through Tata Energy Research Institute (TERI) project of Lighting a Billion Lives (LaBL). The solar mobile charging stations in these 5000 villages are to be provided in a phased manner over a period of two years from the date of signing of the Agreement. Till 30.04.2011, mobile charging stations have been established in 322 villages.

(ii) A Memorandum of Understanding (MoU) has been signed with BSNL for financial support from USOF for provision of Broadband enabled Rural Public Service Terminals (RPSTs) to eligible Woman SHGs (Self Help Groups) on pilot basis in the states of HP and Rajasthan. BSNL shall provide an RPST to one eligible SHG from each of its eligible rural wire-line exchanges under the MoU as per agreed terms & conditions with subsidy support from USO Fund. At present, 150 RPSTs (100 in Rajasthan and 50 in HP) have been provided under this scheme.

(iii) Recognizing the vital role that Information Communication Technology (ICT) can play in the empowerment of rural women, a scheme has been launched for pilot projects aimed at facilitating Self Help Groups (SHGs) access to ICT enabled services. Financial
support from USO Fund is to be provided towards Value Added Service (VAS) subscriptions for SHGs in accordance with the provisions of underlying subsidy Agreements. At present Mouse have been signed for Proof of Concept (PoC) for 8 mobile VAS projects in the state of Tamilnadu, Kerala, Maharashtra, Uttar Pradesh, Uttarakhand, Andhra Pradesh, Rajasthan and the Union Territory of Pondicherry.

3.18.5 Implementation of National Optical Fiber Network (NOFN): All village Panchayats are to be connected through NOFN to enable delivery of public and private electronic services to citizens in urban and rural areas.

- Broadband is a tool for improving the life of people by providing affordable and equitable access to information and knowledge. For individual, broadband has direct impact on their day to day life style and behavior. For State, it enormously contributes towards trade and generation of employment.

  Many Information and Communication Technologies (ICT) applications such as e-commerce, e-banking, e-governance, e-education and tale-medicine require high speed Internet connectivity.

- Government has approved National Optical Fiber Network in October 2011 for providing Broadband connectivity to all Panchayats at a cost of approx 20,000 Corer.

  The plan is to extend the existing optical fiber network up to Panchayats. The Network will be available to telecom service providers for providing various services to the citizens in non-discriminatory manner. As per the approval of the Cabinet, the action for establishing and operational sing Special Purpose Vehicle (SPV) has been initiated for management and operation of the NOFN and ensuring non-discriminatory access to all service providers.

- In economic terms, the benefits from the scheme are expected through additional employment, e-education, e-health, e-agriculture etc. and reduction in migration of rural population to urban areas. As per a study conducted by the World Bank, with every 10% increase in broadband penetration, there is an increase in GDP growth by 1.4%.

  NOFN will also facilitate implementation of various e-governance initiatives such as e-health, e-banking, e-education etc. thereby facilitating inclusive growth.
The Network will provide a highway for transmission of voice, data and video in rural areas. It will enable the broadband connectivity up to 2 Mbps, capable of providing various electronic services like education, health, entertainment, commerce etc; to people and businesses.

The people in rural areas, student, entrepreneurRs, various Government Departments providing services under e-govt projects will be benefitted. It will also provide connectivity to various public institutions like Gram Panchayats, Primary Health Centers (PHCs), schools etc. in rural areas. It will also result in investment from the private sector both for providing different services and manufacturing of broadband related telecom equipment. The NOFN project would be implemented in 2 years. (43)

3.19 Low Rural Mobile Penetration

Boosting rural mobile connections and bridging the rural-urban gap is extremely important to ensure that the people in rural and remote areas of the country, whose per capita income levels and access to other infrastructure/services are relatively lower, do not miss out on the tremendous opportunity provided by mobile services to fulfil their communication and information needs. Moreover, rise in mobile penetration can also stimulate the rural economy significantly, as discussed earlier, and boost ruralGDPper capita levels. To bridge the gap, operators need to make significant investments over the next few years to expand their network as well as distribution coverage and bear the higher operating expenses (in the form of tower rentals, diesel consumption, backbone expenses, etc.) of serving rural areas. After a phase of robust growth over the recent past, the Indian telecom juggernaut appears to be slowing down.

The number of net mobile connection additions in May 2011 was around 35% less as compared with March 2011.

The slowdown in sector growth should be an area of great concern as the growth journey of the sector is only partially complete especially on the broadband side. Although connections are higher, according to TRAI estimates actual penetration in India remains below 50%. Using only the number of connections overestimates the number of unsubscribeRs due to two key aspects – inactive connections and usage of multiple SIM cards by subscribers. As per TRAI, as at the end of May 2011, only ~70% of India’s ~840 million connections (~590 million connections) were active connections (refer chart 1
Moreover, it is estimated that at least 15% of Indian mobile users have multiple SIMs either in the same phone or in different phones. Applying both filters - active users and multiple SIM holders translates to approximately 500 million unique subscribers in India. Therefore, looking at only the reported connection numbers alone does not convey accurate information about the extent of actual number of people benefiting from mobile connections. Considering that India's current population is ~1.2 billion, more than half of the population has not yet benefited by subscribing to mobile services.

While large scale additional investments are the need of the hour, the sector is witnessing a reverse trend. There has been a significant slowdown in FDI as well as capital expenditures in the telecom sector.\(^{(44)}\)

FY12 saw the continuance of growth for the Indian telecom market, in rural area the above graph shows from 1999 to 2000 the no of subscriber was 28.53 million, whereas from the year 2001 to 2011 it trend was gradually increasing but from 2006 then onwards it rising more and in 2010 it was high that is 621.25 millions. which witnessed a 12% YoY increase in its subscriber base during the 12-month period. At the end of March 2012, the country's total telecom subscriber base (fixed plus mobile) stood at about 951 m. The tele-density level stood at about 76% by the end of the fiscal.\(^{(45)}\)

Foreign Direct Investment (FDI) is one of the important sources to meet the requirement of huge funds for rapid network expansion. The FDI policy provides an investor-friendly environment for the growth of the telecom sector. Telecom has emerged as the third major sector attracting FDI inflows after services and computer software sector. At present, 74% to 100% FDI is permitted for various telecom services. This investment has helped telecom sector to grow. The growth of FDI in Telecom Sector since 2007 is as under:

### 3.20 Foreign Direct Investment (in million US$)

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>FDI</td>
<td>478</td>
<td>1261</td>
<td>2558</td>
<td>2554</td>
<td>1665</td>
<td>1901</td>
</tr>
</tbody>
</table>

Sources:-23-December ,2011 16:20 Ministry of Communication &Information Technology.)
3.20.1 Declining Tariff:

The telephone tariffs have declined dramatically over the last two years making the mobile telephone affordable to the common man. There are a large number of options available for the subscribers to choose from the market depending upon their usage profile. The prepaid tariffs have gone as low as ½ paise per second.

3.21 Manufacturing of Telecom Equipment:

The exponential growth witnessed by the telecom sector in the past decade has led to the development of the telecom equipment manufacturing and other supporting industries. With the advent of next-generation technologies and operators looking to roll out 3G and broadband wireless access services, the demand for telecom equipment has increased rapidly. In an attempt to capitalize on this opportunity, the Government is focusing on developing the domestic manufacturing industry. The Indian equipment manufacturing sector has come a long way in the past few years. From being an import-centric industry, it is slowly but steadily moving towards becoming a global telecom equipment manufacturing hub. In 2002-03, India produced telecom equipment worth Rs 144 billion, which increased to Rs 520 billion in 2010-11, making a growth of 265 per cent.

One of the key reasons for this trend is the setting up of domestic manufacturing facilities by Indian companies along with multinational companies. The market is currently dominated by multinational companies like Nokia, Nokia Siemens Networks, Ericsson, Alcatel-Lucent, Motorola, LG Electronics, Samsung etc. which have set up their production facilities in the country over the past decade and many more are planning to set up. Also, with Indian as well as multinational companies setting up base in India, the country is not only emerging as a manufacturing hub but is also planning to increase its telecom exports. In the year 2006-07, India exported equipment worth Rs 18.98 billion, which increased by over 730 per cent to Rs 158 billion in 2010-11. Indian mobile handset companies increased their share in the domestic market to 14 per cent in 2009-10 from 3-4 per cent in 2008-09. Domestic brands have established themselves in the market and are competing with international handset vendors.

The Government is supporting the domestic equipment manufacturing industry and the growth of indigenous technology. With efforts from both the Government and the
industry, India can build a conducive ecosystem to boost the equipment manufacturing sector, which can lead to the creation of an industry that will compete with the best in the world. With above initiatives India is expected to be a manufacturing hub for telecom equipment.

3.22 Draft National Telecom Policy (NTP– 2011): Draft NTP 2011 was announced on October 10, 2011. NTP–2011 proposes to provide stable, rationale and objective policy regime over next decade or so:

- To make available secure, reliable and affordable voice telephony and high speed broadband services to every citizen in India with special focus on rural and remote areas.
- To improve the broadband experience by enhancing the speed of delivery
- To make India a global hub of manufacturing for all electronic products including telecom equipment with substantial value addition within the country and safeguard security concerns of the nation
- For simplification and rationalization of licensing regime, transparent system for allocation of spectrum and enable efficient usage of spectrum.
- For discovery of price of spectrum through market related processes.
- To achieve One Nation- Full Mobile Number Portability
- To enable free roaming throughout the country.
- To harness full potential of mobile phones for enabling provision of citizen centric services related to education, health, employment, agriculture, entertainment, banking & insurance services, skill up gradation, vocational training etc.
- To encourage indigenous manufacture of cost effective mobile devices.

The faster roll out of high speed and reliable broadband in rural and urban areas will enable decentralized governance, participative democracy and delivery of basic services such as health and education to every citizen of the country. The thrust on manufacturing will promote entreprenuerShip, create more job opportunities, reduce imports and improve security. Efficient usage of scarce resources like spectrum will result in better quality of service to the customers at affordable cost. The new policy regime will be
beneficial to end consumers/citizens, Telecom Service Providers, Value Added Service Providers, Government and Manufacturers. Policy is likely to be approved by the June 2012.

3.23 Services Obligation Fund (USOF)

The setting of the Universal Services Obligation Fund (USOF) to grant subsidy to telecom operators is a huge step, which will increase the teledensity in the rural areas. This step will be responsible for reaching the magic teledensity 25% by 2010. Government has set aside nearly Rs. 12 billion to grant subsidies to the telecom operators and infrastructure providers who are willing to set up the telecom industry.

For India’s rapidly growing telecom sector, 2005 was a year of high tempo. Mobile connections grew faster than ever before and value added services made their presence felt and accounted for a notable share of revenues. On the regulatory front, FDI limit was hiked from 49% to 74%, long distance entry barriers were lowered, new uniform tariff structure for the entire country called ‘IndiaOne’ was announced and subsidies were announced by the government for operators to promote rural telephony.(46)

3.24 ICT (Information and Communication technology)

Rural India possesses enormous potential in terms of economy and human resources. Recent experiments have confirmed that ICT (information and communication technology) helps improve the timeliness and efficiency of rural farm operations and enhance income through producer-oriented markets. Hence the communication ministry has requested the finance ministry for higher allocations from the USO Fund for executing rural telephony network. The finance ministry has made a budgetary allocation of 15 billion from the USO Fund. The rural telephony targets include, providing 50 million telephones by 2007 (i.e. one phone per three rural households) and 80 million by 2010 (i.e. one phone per two rural households) and provisioning mobile access to all villages with population more that 5,000 by 2006 and more than 1,000 by 2007. The Government is confident that the Bharat Nirman Programme target of providing coverage to remaining 41,000 villages would be met by March 2007 which will be much earlier than a schedule of November 2007.
India plans to establish 0.25 million, village knowledge centres. The ICT industry can establish rural call centres modelled on the Kisan Call Centre established by the Ministry of Agriculture to provide domain knowledge in the services, agriculture and manufacturing sectors. This spread will increase the volume of users and automatically bring down bandwidth cost, with a spiralling effect on efficiency and economy. Advanced telecom services are no longer considered a luxury but a necessity for all. Thus, providing telecom services to every individual in a country like India is a huge challenge, and at the same time holds immense opportunities for those in the telecom industry.\(^{(47)}\)

3.25 Economic Benefits Of Mobile Services In India

According to a study conducted by the reputed international agency, Ovum on “The economic benefits of mobile services in India” the Indian mobile industry is a major contributor to the social and economic growth of the country, in terms of employment generation, revenues to the Government, GDP growth and rural development.

a. 8.1 Employment

Because of the mobile industry about 3.6 million jobs could be generated directly or indirectly. Ovum has also estimated that employment dependent on the industry is expected to rise by at least 30% over the next 12 months.

b. 8.2 Government Revenues

The Government can generate Rs. 145 billion per annum through License Fees, Spectrum Fees, Import Duties, Taxes, etc. from Mobile industry in the year 2010.

c. 8.3 GDP

The mobile services industry can generate an annual GDP contribution of Rs. 313 billion.in the 2010.\(^{(48)}\)

3.25.1 Telecom Infrastructure:-

Company Revenues Have Declined significantly in the past year, indicating dampening of demand for network rollouts from operators. The revenues of players in the wireless infrastructure segment declined by ~24% from Rs. ~24,000 crores in FY2010 to Rs. ~18,600 crores in Fy2011. The market size of the broadband infrastructure segment also more than halved from Rs. ~2,200 crores in FY2010 to Rs. ~940 crores in Fy2011. The
slowdown in demand was exacerbated by the strict security policy of the government. This paradox - slowdown in investments when the industry needs to make massive rollouts - can be attributed to a great extent to the poor and deteriorating financial performance of companies in the Indian cellular mobile services sector. (49)

3.25.2 Government regulation.

To effectively regulate the sector, facilitate growth and development, promote transparency and ensure fair competition, the government has set up the Telecom Regulatory Authority of India (TRAI) as an independent regulatory body and the Telecom Dispute Settlement Appellate Tribunal (TDSAT) as a dispute settlement body. Both have been set up for price regulation, ensuring technical compatibility, recommending terms and conditions of license, facilitate competition, protecting consumer interest, resolution of disputes, etc.,

India is one of the most deregulated telecom markets in the world. Private participation is permitted in all segments of the services such as international long distance, domestic long distance, basic, cellular, internet, radio-paging, and a number of value-added services. Private participation in international voice services has been a significant step undertaken by the government. Private players have been allowed to provide international long distance services since April 2002; two years ahead of schedule.

The governments New Telecom Policy (NTP) 1999, further de-regulated the sector with respect to services like basic, international long distance (ILD), national long distance (NLD) and Wireless in Local Loop (WLL) among others.

The government has liberalized the sector with the following objectives

- Ensure availability of telephones on demand
- Provide Universal access to basic telecom services at affordable prices
- Benchmark telecom services with global standards
- Position India as a major manufacturing base and exporter of telecom equipment
- Introduce all value added services available internationally
- Achieve higher telecom penetration

(50)
3.26 MOBILE COMMUNICATION IN INDIA

India initially started with GSM technology for mobile communication. Being a technology neutral country, India later allowed for CDMA technology also. Now 2.75G EDGE technologies has been implemented and used. BSNL has got license for bringing 3G into operation. Trials are being conducted for 3G implementation in the four metropolitan cities of India. Commercial 3G will be started by March 2007. With the dwindling revenues of the operators from the data and voice there is a need to look at newer applications to fuel growth of the telcos. TV on Mobile has emerged as a solid and potent answer to this consumer yearning. South Korea, China, South Africa, Australia and Europe have seen this need and have acted upon the same by implementing TV on Mobile. India is around the corner for implementation of similar technology for the benefit of consumers, operators, content providers and Government. It promises to be a USD 1 billion industry by 2010, if roadmaps are created and implemented properly

3.26.1 Increasing Mobile penetration & decreasing Landline Popularity

The decline in the fixed telephony market is reflected in Figure 2.1, which shows that the total number of fixed lines fell by 0.6% (0.2m) to 33.2m in 2008, a faster rate than in 2007. At the same time the numbers of mobile subscriptions has increased by 4.1%. (Ofcom, 2009)

Mobile-originated voice call volumes likely to overtake fixed in 2010

The increasing importance of mobile telephony to the overall telecoms market. which shows the market share of total voice telephony call volumes. In 2008 the proportion of voice calls originating on mobile networks increased by 3.9 percentage points to 44.5%, mainly at the expense of BT (whose share declined by 3.7 percentage points to 25.7%), although other providers also saw a decline. The same pattern was evident in the five-year period to December 2008, with mobile gaining market share at the expense of fixed operators. If current trends continue, mobile-originated voice call volumes should overtake those from fixed lines in 2010. (Ofcom, 2009)
3.26.2 Rise in 3G Connections

Ofcom data suggest that by the end of 2008 the total number of UK 3G mobile connections had risen to 17.9 million, an increase of 5.4 million (42.9%) on a year previously. This represented almost a quarter of all UK mobile subscriptions (23.3%), a 6.3 percentage point increase on the figure at the end of 2007. During 2008 Vodafone overtook 3UK to become the UK's largest network in terms of 3G subscriptions, while O2, the largest network in terms of total subscriptions, ranked only third. (Ofcom, 2009)

3.26.3 Simultaneous Use of Fixed & Mobile Connections

According to Ofcom (2009) 38% of adults stated their mobile is their main method of telephony (both inside and outside the home), a rise from 33% in Q1 2008 and 30% in Q2 2006. Despite the increasing take-up of mobile telephony among adults, the proportion of households which rely exclusively on a mobile connection for all their communications needs has remained stable since 2006. Four in five households continue to have both a fixed and mobile connection (unchanged since 2003), indicating that while consumers are increasingly substituting mobile for fixed calls, the large majority of households continue to have a fixed line. The need for a fixed line in order to connect to the internet using DSL broadband may have constrained further growth in mobile-only households (a fixed voice line connection is required for all DSL broadband in the UK), and voice services are included within most cable broadband tariffs. However, this may change as consumers increasingly use mobile broadband to connect to the internet. (Ofcom, 2009)\(^{(52)}\)

3.26.4 Preferences of Younger people

More than one in four 15-24 year-olds live in mobile-only households, compared to just 3% of over 65s. This is indicative of the continued importance of a fixed-line connection for older age groups, while younger people are more likely to rely solely on a mobile connection partly because they have grown up in a world where mobile communication is a way of life, and partly because they are more likely to live in shared or temporary accommodation and are therefore less likely to make a household investment in a fixed-line connection.\(^{(53)}\)
3.27 Market Segmentation

For most of the past century, major consumer products companies held fast to mass marketing, mass-producing, mass-distributing and mass-promoting. However, companies today recognize that it is not possible to create apple to all Buyers in the market place with the same product or service or same marketing mix because of Buyers are too numerous, too widely scattered as well as too varied in their needs and buying behaviour. So it is better to compete in a segment or target market rather than compete in entire market especially when competition with superior competitors. (Armstrong and Kotler, 2004)

According to Armstrong and Kotler, (2004) Market segmentation is the process of dividing a products market into distinct groups with distinct needs, characteristics of the prospective Buyers, or behaviour who might require separate products or services or marketing mix. Which shows the major three steps in target marketing.

Steps of Market Targeting

Market Segmentation
Market Targeting
Market positioning

The first stage of the target market is Market segmentation (Dividing the market in small groups with distinct needs and character), second stage is Market targeting (Evaluate the attractiveness of market segment and select one or more segment to enter). The final steps of target marketing are Market positioning (Develop competitive positioning for the product in target segment and develop a marketing mix). (Armstrong and Kotler, 2004)  

(54)
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