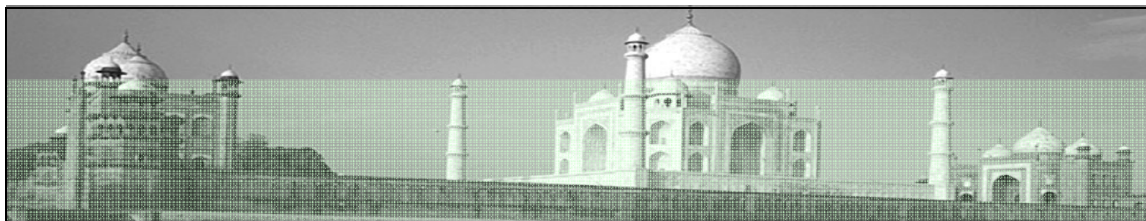


India Telecom Brief



By Ken Zita and Akash Kapur

India's telecom renaissance has been remarkable. After 44 years of government monopoly, market liberalization introduced in 1991 has led to a 7-fold increase in the number of phones in just 12 years. India's network is one of the largest in the world and, after China, second largest among emerging economies.

Given the persistent low telephone penetration rate of about 7 per hundred but high levels of overall economic growth, the telecom sector offers vast potential. The mobile market recently topped 31 million customers. It is therefore not surprising that India is one of the fastest growing telecom markets with an average annual growth of about 22% for basic telephony and over 100% for cellular and Internet services.

Recognizing that the telecom sector is one of the prime movers of economy, the Government's regulatory and policy initiatives have been directed toward establishing a world-class telecommunications infrastructure. Capital requirements are considerable. India requires investments of at least \$37 billion by 2005 and \$69 billion by 2010.

Until late 2003, continual litigation between GSM and CDMA operators 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 operators can now concentrate on rolling out networks, attracting subscribers and improving services instead of fighting battles in the press and in court.

India's telecommunications sector is now among the most deregulated in the world and presents potentially lucrative opportunities for service providers and equipment vendors alike. American companies that have successfully seized the opportunity are Agilent, AT&T Cisco, HP, Hughes Network Systems, Lucent Technologies, MCI Motorola, Qualcomm, Sprint and Tekelec.

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Key Indicators

Population	1.06 billion
GDP	\$573 billion
GDP real growth*	6.6%
GDP per capita	\$540
PPP	\$2,900 billion
Rs = \$USD	43.58
PPP per capita	\$2760
Pop.below poverty	25%
Literacy	59.5%
Phone lines*	71 million
Telephone density*	7 per 100
Mobile phones*	31 million
Mobile density*	3 per 100

Sources: U.S. Govt, EIU



Political and Economic Brief

India bills itself as the “world’s largest democracy” and its vibrant political life – marked by regional, national or village elections virtually throughout the year – represents a remarkable accomplishment for this nation of over a billion.

In 1947, at the time of independence from Great Britain, few could have foretold that Indian democracy would prove so enduring. Skeptics pointed to the nation’s many schisms – its divisions of language (over 100 are spoken), ethnicity, class, and, of course, religion. The country had just emerged from an orgy of religious violence, precipitated by the subcontinent’s partition into India and Pakistan, in which up to half a million people had died. Poverty – and the attendant ills of illiteracy, disease and malnutrition – were rampant. Regional tensions ran high, too. It took a great leap of the imagination for India’s founders to imagine out of this chaos a stable, secular democratic republic would emerge.

India’s ills have not exactly disappeared over time. Regional separatism has repeatedly raised its head, notably in the state of Punjab in the 1980s and in the ongoing conflict in Kashmir. Poverty remains endemic, and political and ethnic violence are still common in some parts of the country. Religious tensions have proven persistent, too, as evidenced by occasional violent encounters between Hindus and Muslims (12% of the population).

Yet despite all of this, India has somehow survived – and, lately, thrived. In 2003 the economy grew by over 8 percent, the second fastest in the world. The stock market has recently boomed and the nation’s remarkable technology industry shows no signs of slowing. Earlier in 2004, the government launched a national advertising campaign that promotes what it calls “India Shining.” Despite accusations that the ads are a thinly-disguised political campaign for April’s national elections, there is no doubt that a newly-confident India is basking in what local newspapers call a “feel-good factor.”

India’s democracy is one of the reasons it has survived so well, as it offers a safety valve of sorts for disaffected groups. It has also served to affirm the ability of the country to deal with its regional and ethnic problems, as it did in the northwestern province of Punjab, which returned to normalcy after a troubled period prior to state elections. A further reason was the existence, until the late 1980s, of a relatively stable polity. Barring a brief period from 1978-1980, India was ruled until 1989 only by a single political party: the Congress Party, led initially by Nehru, then by his daughter, Indira Gandhi, and then by her son, Rajiv Gandhi. By the late 1980s, after decades of virtually unchallenged authority, the Congress Party had begun to succumb to the corruptions of power. In 1989, amidst accusations of financial impropriety, Rajiv Gandhi, who had succeeded his mother with a landslide after she was assassinated in 1984, was voted out of power and replaced by a motley group of regional parties (Rajiv Gandhi was himself assassinated while campaigning in 1991). The era of coalition politics had arrived, and it may be some time before a single party government comes into power.

The price of this new dispensation is a certain degree of government instability, as evidenced in the pattern of shifting alliances and collapsing governments that has marked recent politics. The regional parties, with the power to make or break a coalition, now also wield greater weight than they did when the Congress dominated. The regionalization of Indian politics has also led to state-level innovation and greater competition between state governments to attract foreign

capital. While some regions have fallen behind, others (particularly the South and the West) have used their new clout to implement investor- and competition-friendly policies. Today, these regions, including states like Karnataka and Andhra Pradesh, are driving India's economic progress, particularly in high-growth sectors like technology, software and biotech.

The growing role of religion in public life is another important trend. In 1996, the Hindu nationalist Bharatiya Janata Party (BJP), long a political pariah for its perceived rejection of India's cherished secularism, was voted to power as the head of an alliance. Its stock had risen significantly after the destruction in 1992 of a mosque by Hindu activists unleashed the worst religious violence since independence. The mosque, located in the city of Ayodhya, was on the site of what Hindus believe to be the birthplace of the god Rama. Many believe that the BJP, which headed the state government when the mosque was destroyed, played the crisis for political gain. Since that initial (short-lived) stint in power, the BJP has been voted back to power twice. ¹



Economy and Demography

India is the seventh largest country in the world, with a land area of over 1.2 million square miles (about a third the size of the USA), and the second most populous, with a population exceeding 1 billion. Between 1991-2001 the population grew by 180 million, more than the entire population of Brazil. The urbanization rate is approximately 28%. India has 35 cities with a population over 1 million each; total population of these 35 cities is 108 million. India consists of 30 states and half a dozen union territories, 593 districts, 5101 towns and 640,000 villages. Government statistics indicate that there are over 260 million people below the poverty line, estimated around a dollar per day (on a PPP basis), though some experts put the figure at 100 million.

There are considerable disparities between regions. The per capita income varies from a low of Rs 5,108 (\$113) in Bihar to a high of Rs 25,048 (\$553) in Punjab. India's much celebrated middle class – the consuming class -- consists of 182.8 million households, 132.6 million rural and 50.2 million urban households. At the top of the pyramid, an estimated 6 million households earn over \$4746 per year; another 55 million households earn between \$993 and \$4746. The size of an average Indian household is 5.5 persons.

¹ Note: the BJP lost in an upset election to the Congress Party coalition in the general election in May 2004.

For much of its post-independence history, India's economic performance lagged behind many of its neighbors. This was largely due to the socialist planned economy bequeathed to the nation by Jawaharlal Nehru, the country's first prime minister. By the 1980s, the web of controls and industrial licenses, combined with the political class's insistence on economic *swadeshi* (self-reliance), was effectively choking the country's economy. While China and the Southeast Asian tigers grew at double digits, India, the joke went, was capable only of chugging along at the "Hindu rate of growth," a measly 3.5%.

State	Rs	\$USD
Punjab	25,048	\$553
Haryana	23,742	524
Maharashtra	23,742	524
Tamilnadu	19,889	439
Kerala	19,463	430
Madhya Pradesh	10,803	238
Gujarat	19,228	424
Himachal Pradesh	18,920	418
Karnataka	18,041	398
Andhra Pradesh	16,373	361
West Bengal	16,072	355
Rajasthan	11,986	265
Uttar Pradesh	9,721	215
Orissa	8,547	189
Bihar	5,108	113

Source: Central Statistical Organization

But in 1991, the incoming Narasimha Rao Congress government found itself with a balance-of-payments crisis, in which the country was estimated to have foreign exchange reserves sufficient only for six weeks of imports. Under IMF pressure, the nation instituted a program of economic liberalization: import duties were cut, the rupee was devalued, and the all-pervasive "license raj" began to be dismantled. This program, sometimes referred to as the New Economic Policy (NEP), set the stage for the industrial and commercial revival that has—with a few interruptions—existed since.

Today, after more than a decade of relatively rapid growth and continued (if slow-paced) reforms, India has consolidated its position as the world's fourth largest economy in terms of purchasing power parity, behind the US, China and Japan. The economy has made a stunning rebound after the dismal performance of drought affected 2002-03, when GDP growth was just 4%. Real GDP growth in 2003-2004 is set to reach 8.13 per cent according to the National Council of Applied Economic Research (NCAER), based in part on a 10.7 per cent expansion of the agriculture sector. Merrill Lynch has raised its GDP growth forecast to 8 per cent from 7.3 per cent for the same period—and has raised its estimates for 2005 to 7.3 per cent. Inflation is expected to be 4.9% for the current fiscal year.

Agency	2003-04	2004-05
Ministry of Finance	7.0	
Reserve Bank of India	6.5-7.0	
ADB	6.7	6.3
IMF	5.6	5.9
NCAER	8.13	
EIU	6.0	6.6

India's foreign exchange reserves reached \$110.48 billion as of December 19, 2003 from an all time low of \$1.2 billion in July 1991. Since March 1991, India's external debt has gone up by only \$20 billion. The reduction in external vulnerability has prompted Moody's Investor Services to raise India's long-term currency rating to investment grade Baa3. However, Baa3 is just a notch above the psychological barrier of minimal investment grade. The rating was previously put at the speculative Ba1 grade. Fitch Ratings has also upgraded India's long-term currency to BB+ grade from BB.

Despite the generally positive economic news, a few concerns remain. The fiscal situation remains poor. Fiscal deficit and debt/GDP ratios are way above corresponding averages for emerging economies. The country's fiscal deficit (center and states combined) is 10.2 per cent of gross domestic product (GDP). Equally disturbing, by end 2002 India had accumulated a



sovereign debt/GDP ratio of 80.6 per cent, representing 441.2 per cent of annual revenues. Despite these poor ratios India does not manifest symptoms of a fiscal crisis. This is because capital inflows are buoyant and India has not borrowed excessively in foreign currency. India's external debt to sovereign debt is only 10.4%. The central fiscal deficit is projected to be 5.8% of GDP for the current financial year (ending March 2004), higher than the official estimate of 5.6%. The higher fiscal deficit is on account of higher government consumption expenditure and rising inflation. The tax GDP ratio also continues to be low.

Global investors ranked India 5th or 6th most attractive FDI destination worldwide. More than a fifth of all global executives said that their outlook on India had improved over the previous year. American, Canadian and British investors value the India's English speaking population. India's low cost, IT-savvy work force and its large market are its major attractions. As a leading offshore location, Indian has received investments from GE Capital, American Express, Citibank, Consec, Dell Computers, Convergys, World Bank and Accenture resulting in the development of call centers, back office support, transaction processing centers. All these in turn have driven demand for telecommunication facilities.

Telecom Policy Environment

Indian telecommunications today benefits from among the most enlightened regulation in the region, and arguably in the world. The sector, sometimes considered the "poster-boy for economic reforms," has been among the chief beneficiaries of the post-1991 liberalization. Unlike electricity, for example, where reforms have been stalled, telecommunications has generally been seen as removed from "mass concerns," and thus less subject to electoral calculations. Market-oriented reforms have also been facilitated by lobbying from India's booming technology sector, whose continued success of course depends on the quality of communications infrastructure.

Despite several hiccups along the way, the Telecom Regulatory Authority of India (TRAI), the independent regulator, has earned a reputation for transparency and competence. With the recent resolution of a major dispute between cellular and fixed operators (see below), Indian telecommunications, already among the most competitive markets in the world, appears set to continue growing rapidly.

While telecom liberalization is usually associated with the post-1991 era, the seeds of reform were actually planted in the 1980s. At that time, Rajiv Gandhi proclaimed his intention of "leading India into the 21st century," and carved the Department of Telecommunications (DOT) out of the Department of Posts and Telegraph. For a time he also even considered corporatizing the DOT, before succumbing to union pressure. In a compromise, Gandhi created two DOT-owned corporations: Mahanagar Telephone Nigam Limited (MTNL), to serve Delhi and Bombay, and Videsh Sanchar Nigam Limited (VSNL), to operate international telecom services. He also introduced private capital into the manufacturing of telecommunications equipment, which had previously been a DOT monopoly.

These and other reforms were limited by the unstable coalition politics of the late 1980s. It was not until the early 1990s, when the political situation stabilized, and with the general momentum for economic reforms, that telecommunications liberalization really took off. In 1994, the government released its National Telecommunications Policy (NTP-94), which allowed private



fixed operators to take part in the Indian market for the first time (cellular operators had been allowed into the four largest metropolitan centers in 1992). Under the government's new policy, India was divided into 20 circles roughly corresponding to state boundaries, each of which would contain two fixed operators (including the incumbent), and two mobile operators.

As ground-breaking as NTP-94 was, its implementation was unfortunately marred by regulatory uncertainty and over-bidding. A number of operators were unable to live up to their profligate bids and, confronted with far less lucrative networks than they had supposed, pulled out of the country. As a result, competition in India's telecom sector did not really become a reality until 1999. At that time the government's New Telecommunications Policy (NTP-99) switched from a fixed fee license to a revenue-sharing regime of approximately 15%. This figure has subsequently been lowered (to 10%-12%), and is expected to be reduced even further over the coming years. Still, India continues to derive substantial revenue from license fees (\$800 million in 2001-2002), leading some critics to suggest that the government has abrogated its responsibilities as a regulator to those as a seller.

Another, perhaps even more significant, problem with India's initial attempts to introduce competition was the lack of regulatory clarity. Private operators complained that the licensor – the DOT – was also the incumbent operator. The many stringent conditions attached to licenses were thus seen by many as the DOT's attempt to limit competition. It was in response to such concerns that the government in 1997 set up the Telecom Regulatory Authority of India (TRAI), the nation's first independent telecom regulator.

Over the years, TRAI has earned a growing reputation for independence, transparency and an increasing level of competence. Early on, however, the regulator was beleaguered on all fronts. It had to contend with political interference, the incumbent's many challenges to its authority, and accusations of ineptitude by private players. Throughout the late 1990s, TRAI's authority was steadily whittled away in a number of cases, when the courts repeatedly held that regulatory power lay with the central government. It was not until 2000, with the passing of the TRAI Amendment Act, that the regulatory body really came into its own. Coming just a year after NTP-99, the act marks something of a watershed moment in the history of India telecom liberalization. It set the stage for several key events that have enabled the vigorous competition witnessed today. Some of these events include:

- The corporatization of the DOT and the creation of a new state-owned telecom company, Bharat Sanchar Nigam Ltd (BSNL), in 2000;
- The opening up of India's internal long-distance market in 2000, and the subsequent drop in long-distance rates as part of TRAI's tariff rebalancing exercise;
- The termination of VSNL's monopoly over international traffic in 2002, and the partial privatization of the company that same year, with the Tata group assuming a 25% stake and management control;
- The gradual easing of the original duopoly licensing policy, allowing a greater number of operators in each circle;
- The legalization, in 2002, of IP telephony (a move that many believe was held up due to lobbying by VSNL, which feared the consequences on its international monopoly);



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- The introduction in 2003 of a Calling Party Pays (CPP) system for cell phones, despite considerable opposition (including litigation) by fixed operators;
 - And, more generally, the commencement of more stringent interconnection regulation by TRAI, which has moved from an inter-operator “negotiations-based” approach (often used by the stronger operator to negotiate ad infinitum) to a more rules-based approach.

All of these events have created an impressive forward-momentum in Indian telecommunications, resulting in a vigorously competitive and fast-growing sector. India has also suffered from its fair share of regulatory hiccups. Many operators (mobile players in particular) still complain about the difficulties of gaining access to the incumbent’s (BSNL) network, and the government’s insistence on capping FDI in the telecom sector to 49% (a move made in the name of national security) limits capital availability and thus network rollout. In addition, ISPs, who were allowed into the market under a liberal licensing regime in 1998, continue to hemorrhage money, and have been pleading with the government for various forms of relief, including the provision of unmetered phone numbers for Internet access. Despite initially impressive results, the growth of Internet in the country has recently stalled, with only 8 million users. Broadband penetration, too, remains tiny.

Unified Licensing

But perhaps the biggest – and, until recently, most intractable – regulatory problem has been the drawn-out battle over “limited mobility” telephony. This imbroglio began in 1999, when MTNL sought permission from TRAI to provide CDMA-based WLL services with “limited mobility.” GSM cellular operators were soon up in arms, arguing that “limited mobility” was simply a backdoor entry into their business. Moreover, fixed operators had paid lower license and spectrum fees than cellular ones; were not required to pay access charges for cell-to-fixed calls (unlike their cellular counterparts); and, amidst accusations of cross-subsidization, were charging considerably lower rates than the cellular operators.

The resulting conflict dragged on in the courts and in the political arena for years. Fixed operators including new entrants Reliance and Tata Teleservices claimed that they were being prevented from providing a cheap service that would drive penetration and be of benefit to the “common man”; cellular players bitterly opposed what they perceived as unequal regulatory treatment for two kinds of operators who were in fact offering the same service. The real victim, of course, was the Indian telecommunications market, which suffered from investor perceptions of regulatory confusion and operator in-fighting. In late 2002, for example, thousands of mobile users in New Delhi were for a time cut off from the fixed-line network when MTNL shut down interconnection for cellular companies. (MTNL later attributed the incident to a “technical snag.”)

It was not until late 2003 that the issue was finally resolved, under considerable government pressure, when cellular operators agreed to withdraw their many cases against the fixed-line operators. Fixed operators would in effect be allowed to enter the mobile business; in return, the government granted cellular players several concessions, including lower revenue-share arrangements estimated to total over \$210 million. Perhaps most notably, the government announced its intention to adopt a “unified access licensing” regime, which would in the future provide a single, technology-neutral license for fixed and cellular operators. The hope is that this

new license category will prevent a repeat of the recent controversy, and allow new technologies to enter the Indian market without requiring a wholesale rewrite of licensing laws.

Policy Horizon

With the apparent resolution of the “limited mobility” controversy, one of the darkest clouds over India’s telecom market has apparently lifted. Although some questions remain regarding the details of the new “unified licenses,” the hard-won peace between cellular and fixed players is a considerable achievement, and should set the stage for rapid growth in the industry.

Several other impending developments also justify a measure of optimism. Although in early 2004 the government failed at the last minute (against expectations) to hike FDI limits in telecom, indications are that the ceiling on foreign investment could be lifted to 74% sometime after the elections, due in April/May. A divestment of MTNL is also possible. There is also the likelihood of continued tariff rebalancing, with international and long-distance rates expected to fall further; local rates are unlikely to be increased by much, given the political sensitivities of doing so. Finally, TRAI continues to work on a new universal service policy -- a development that many feel is urgently needed given low rural penetration rates (approximately 1.41 per hundred), and the failure of private operators to fulfill the rural telephony requirements included in their original licenses.

Probably the single most important development on the horizon is a move towards converged regulation. In 2001, the government announced its intention to pass a Communications Convergence Bill, which would bring telecommunications, broadcasting, cable and Internet under a single regulator, the Communications Commission of India (CCI). Inspired by the emergence of “super-regulators” in several countries (e.g., UK and Malaysia), the bill has undergone several drafts, but at this point appears stalled in the legislative process. While its passage still seems possible, it is also possible that the government will take a more incremental approach towards converged regulation. In early 2004, for example, the government granted TRAI (whose purview was hitherto restricted to telecommunications) limited authority in the cable TV industry, asking it to resolve the confusion over a new payment system. Likewise, the decision to implement “unified” licensing can also be seen as a gradual step in the direction of converged licensing.

Spectrum Policy

In 2003, responding in large part to the pleas of cellular operators, TRAI announced a comprehensive spectrum policy review, which is expected to be finalized sometime in mid 2004. As part of this review, ministries, government departments/agencies, including Defense and police authorities, will have to pay for radio frequency allotted for their wireless needs from April 1, 2004. Currently, no royalty or license fees are charged from central government ministries and organizations, while state police are exempted from payment of royalties, but are charged a license fee.

Non-government users are currently charged two components: a license fee and a royalty charge. Cellular operators, at present, pay spectrum charges as a percentage of their adjusted gross revenue (AGR). While two percent of AGR is collected from operators using 4.4 MHz, for higher spectrum allocations of 6.2 MHz, the operators have to pay an additional one per cent of AGR. Royalty is calculated based on the number of frequencies utilized, bandwidth occupied and number of stations.



The Wireless Planning and Coordination wing of the Department of Telecommunications allocates spectrum in accordance with the National Frequency Allocation Plan. The NFAP is revised every two years in line with the radio regulations of the ITU. According to the frequency plan, the frequency band 824-844 MHz paired with 869-889 MHz has been earmarked for CDMA operations. The frequency band 890-915 paired with 935-960 MHz has been earmarked for GSM mobile operators. The frequency band 1710 to 1785 MHz paired with 1805-1880 MHz is also reserved for cellular mobile and WLL operators.

Spectrum is generally not auctioned but allotted to all licensed operators. The present allocation of spectrum is on a case-by-case basis. In the 900 MHz band, the cellular operators are allotted a total of 4.4 MHz, followed by an additional 4.4 MHz (depending on the subscriber base) for state circles. For metros, the cellular operators are assigned 6.2 MHz followed by another 3.8 MHz in the 1800 MHz band.

For the CDMA operators, the allocation is 5 MHz, allocated in a phased manner: 2.5, MHz initially followed by 1.25 and 1.25 MHz after roll out obligations.

At present, the existing three GSM cellular operators (including MTNL & BSNL) have been allocated spectrum in the 890-915 MHz p/w 935- 960 MHz band. The fourth cellular operators have been allotted spectrum in 1710-1785 paired with the 1805-1880 MHz band.

Existing unified license operators who utilize the CDMA technology (such as Reliance Infocomm and Tata) have been allocated 5+5 MHz in 824-844 paired with 869-889 MHz bands on a first come first serve basis. The frequency band 1880-1900 MHz is earmarked for Cor-DECT operations.

The Group of Ministers on Telecommunication has agreed to free 25 MHz of additional spectrum from Defense to mobile telecom service providers over the next three years. The ministry of finance is expected to spend nearly Rs 9 billion (\$206 million) to upgrade the communication systems in the armed forces to enable them to use radio frequency more efficiently. .

Despite considerable excitement over the potential of Wi-Fi to provide broadband access in remote areas, the government has shown no signs of delicensing the 2.4GHz and 5GHz bands. Citing security considerations (a major issue in virtually all spectrum-related decisions in India), the government has instead gone for a limited delicensing policy, in which the 2.4GHz band has been made available for indoor or “campus” use (up to 100mw of power). There are also indications that a similar policy might be adopted for the 5GHz band, although no date has yet been set.

Telecom Market Summary

At the end of 2003, India had a total of 70.5 million phones of which 42 million were landline and 28.2 million were mobiles. During 2003, 17.5 million mobile subscribers were added. While GSM operators added 11 million subscribers, the two main CDMA operators added 6.2 million subscribers. With the recent expansion, India has reached the tele-density target of 7 per hundred in 2003, 15 months ahead of the March 2005 target set by the New Telecom Policy 1999.

As of March 2004 the total mobile market has reached 31.4 million, of which 24.65 million subscribers are GSM and 6.75 million are CDMA (excluding BSNL and MTNL). Of these totals, Reliance Infocomm has 6.822 million (6.065 CDMA and 0.757 GSM), Bharti is 6.199 million (GSM), BSNL is 4.954 million, (GSM) Hutch is 4.826 million (GSM), and Idea Cellular is 2.584 million (GSM).

Mobile connections are expected to reach 56 million by the end of 2004, representing a 96 per cent increase over 2003, according to Gartner. The pace of growth will accelerate with the introduction of “full mobility” CDMA loop services and the adoption of unified licenses.

The market for telecom services in 2002-03 has been estimated to be Rs 503.58 billion (\$11.5 billion), as compared to Rs 479.08 billion (\$10.9 billion) in 2001-02. The equipment market is estimated to have reached a turnover of Rs 282.37 billion (\$6.47 billion) in 2002-03, up from Rs 257.06 billion (\$5.89 billion) in 2001-02. The telecom industry comprising services and equipment is expected to increase to \$24.29 billion by 2006.

Private players are steadily acquiring an increasing share of the telecom services market. Ten years after the sector was opened to private participation, they account for more than a third of the total subscriber base in India. Private players play the largest role in cellular mobile services, where the 6-7 companies that own 75 licenses operate in 23 service areas (there are six operators of mobile services in each circle). BSNL's existing market position -- particularly its dominance in remote and rural areas -- has made it harder for private players to operate. BSNL's nationwide presence is also allowing it to catch up with private players in the mobile market, where the state operator provides the most comprehensive coverage.

Initially, as noted earlier, the government permitted only two operators in each circle. But the government has now moved to unrestricted entry and unlimited completion in all types of services. As a result, there are now multiple operators in each service and in each license area. The entry of additional operators (typically BSNL or MTNL) had led to drastic tariff reductions.

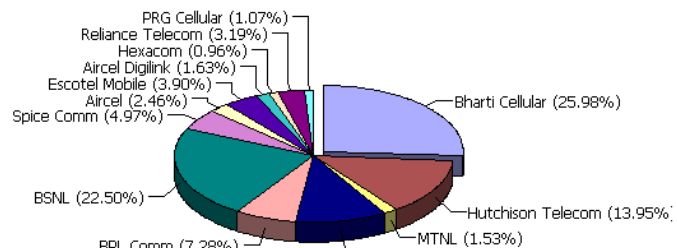
India Telecom Services Market

Revenues in Dollars for US companies

Category	2002-03	2001-02
Basic services	289.08	265.10
Cellular services	83.03	55.16
NLD services	59.70	75.32
ILD services	54.45	68.54
Internet services	12.85	11.24
VSAT services	2.25	2.05
Radio trunking services	1.75	1.41

India's wireless market share

December 2003



Source: PriMetrica's GlobalComms Database

Indeed, the competition was so intense that TRAI stopped setting the price for mobile services and allowed the market to set prices.

As the battle between the GSM and CDMA operators shifted from the courtroom to the marketplace, consumers reaped the benefit of lower prices. Reliance has already signaled its aggressive intentions by announcing nationwide roaming at no extra cost. This has prompted Hutch and Bharti to reduce their high roaming rates. The recent lowering of license fees should also result in lower tariffs for the consumer. International and domestic long distance services are still not competitive despite all the reforms in the Indian telecom sector. Gartner has rated voice in the NLD and ILD category as having limited competition, since the competition is limited to access carriers and not to end-users. There is also limited competition in leased line services, but no competition in frame relay, ATM, and IP-VPN. New operators are still rolling out their networks and infrastructure.

Competition in telecom services

Service	License Area	Entry Policy	# Operators
Unified Access Licence line (Basic) services	21 Circles and 4 metros	Unrestricted entry*	BSNL/MTNL Reliance Infocomm Tata Teleservices Bharti Telenet HFCL Infotel Shyam Telelink and ¼ GSM operators
Domestic long Distance	4 regions or all India	Unrestricted entry*	BSNL Reliance Infocomm Bharti Telesonic Tata
International long distance		Unrestricted entry*	VSNL Data Access Reliance Infocomm Bharti
Internet	City, State All India	Unrestricted Entry	Over 100 companies BSNL, Reliance MTNL Satyam VSNL
VSAT		Unrestricted*	Hughes Escorts Max Comsat, HCL Comnet Bharti Broadband

*Subject to fulfillment of eligibility conditions and obtaining a license

The unified access license and the liberal takeover and foreign direct investment norms are expected to catalyze consolidation. In addition, in early 2004, TRAI published norms that would, under certain conditions, allow intra-circle mergers (i.e., at the regional level) between operators. Mergers will be allowed, for example, if the new entity does not have a market share of above 50%, or if the top two firms in a given circle do not together account for 75% or above of the

market. If these conditions are not met, TRAI has asked the DOT to conduct a detailed impact study on the proposed merger before granting its approval.

The competitive nature of the Indian market leads analysts to predict that there will be a spate of takeovers at the national level in 2004 and 2005, and that only the large operators – BSNL/MTNL, Reliance Infocomm, Tata, Hutchison-Essar, Idea and Bharti -- will survive. The consolidation has already begun. Aircel, which operates GSM mobile services in the southern state of Tamil Nadu (except Chennai), has in 4Q03 taken 100% stake in RPG Cellular in the city of Chennai. Aircel will now be able to offer services in the capital city also. Aircel had 475,705 customers in Tamil Nadu while RPG Cellular has 212,823 customers in Chennai.

Idea Cellular, the three way joint venture of the Tata group, Aditya Birla group and AT&T has signed a purchase agreement to buy 100% stake in Escotel, which operates in the six states of Kerala, Haryana and UP (west), Uttar Pradesh (east), Rajasthan and Himachal Pradesh. The subscriber base in these states exceeds 800,000. The 100% buyout comprises the 51% stake held by Escotel and the 49% stake held by First Pacific. Hutchison is consolidating all its 11 operating circle licenses into a single holding company, Hutchison- Essar. Post consolidation, Essar is likely to have a 35% stake in the company. The Tata owned and recently privatized VSNL is planning to buy Dishnet Internet and DSL business for Rs 3090 million (\$65.7 million) while Tata Teleservices may buy HFCL Infotel's Punjab circle operations. Reliance Infocomm has acquired Flag Telecom for \$112 million. With this Reliance Infocomm will become a leading supplier of bandwidth to over 100 telecom players round the globe.

Despite the regular sops to the private operators and the scorching pace at which the mobile market is growing, foreign investors continue to exit telecom service joint ventures. Vodafone has sold its 20.76 per cent stake in RPG Cellular, one of the two original operators in Chennai, to the Sterling Infotech group, promoted by Chinnakannan Sivasankaran. Next, AT&T has decided to exit from its joint venture, BPL Mobile Cellular, by selling its 49% stake to its Indian partner BPL. The acquisition of AT&T's stake will give BPL flexibility in approaching other financially strong investors. Telesystem International Wireless of Canada has sold its 27.5% stake in Hexacom , operator of mobile services in Rajasthan, to Hexacom. First Pacific has sold its 49% stake in Escotel to Idea Cellular. Qualcomm has dropped plans to invest \$200 million for a 4 per cent equity stake in Reliance Infocomm. Note the table below:

Changing foreign equity stakes in telecom ventures

Foreign investor	Indian company	Equity stake	Comments
Hutchison Whampoa, Hong Kong	Hutchison Max	49%	
AT&T , USA	Idea Cellular	33%	
AT&T, USA	BPL Cellular	49%	Sold to BPL
Singapore Telecom	Bharti Tele-Ventures	20%	
Warburg Pincus, US	Bharti Tele-Ventures	19%	
France Telecom	BPL Mobile	26%	
Distacom, Hongkong	Spice Communications	42%	
First Pacific, Hongkong	Escotel	49%	Sold to Idea Cellular
TIW Canada	Hexacom	27.5%	Sold to Shyam Telecom
Vodafone	RPG cellular	20.76%	Sold to Sterling Infotech
Century Telephone	Aircell	10%	
Pacific Century	Data Access	24%	Reduced stake from



Cyberworks(PCCW)			49%to 24%
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Major Players

There are three types of players in telecom services:

- -State owned companies (BSNL and MTNL)
- -Private Indian owned companies (Reliance Infocomm, Tata Teleservices,)
- -Foreign invested companies (Hutchison-Essar, Bharti Tele-Ventures, Escotel, Idea Cellular, BPL Mobile, Spice Communications)

BSNL

On October 1, 2000 the Department of Telecom Operations, Government of India became a corporation and was renamed Bharat Sanchar Nigam Limited (BSNL). BSNL is now India's leading telecommunications company and the largest public sector undertaking. It has a network of over 45 million lines covering 5000 towns with over 35 million telephone connections.

The state-controlled BSNL operates basic, cellular (GSM and CDMA) mobile, Internet and long distance services throughout India (except Delhi and Mumbai). BSNL will be expanding the network in line with the Tenth Five-Year Plan (1992-97). The aim is to provide a telephone density of 9.9 per hundred by March 2007. BSNL, which became the third operator of GSM mobile services in most circles, is now planning to overtake Bharti to become the largest GSM operator in the country. BSNL is also the largest operator in the Internet market, with a share of 21 per cent of the entire subscriber base.

BHARTI

Established in 1985, Bharti has been a pioneering force in the telecom sector with many firsts and innovations to its credit, ranging from being the first mobile service in Delhi, first private basic telephone service provider in the country, first Indian company to provide comprehensive telecom services outside India in Seychelles and first private sector service provider to launch National Long Distance Services in India. Bharti Tele-Ventures Limited was incorporated on July 7, 1995 for promoting investments in telecommunications services. Its subsidiaries operate telecom services across India.

Bharti's operations are broadly handled by two companies: the Mobility group, which handles the mobile services in 16 circles out of a total 23 circles across the country; and the Infotel group, which handles the NLD, ILD, fixed line, broadband, data, and satellite-based services. Together they have so far deployed around 23,000 km of optical fiber cables across the country, coupled with approximately 1,500 nodes, and presence in around 200 locations. The group has a total customer base of 6.45 million, of which 5.86 million are mobile and 588,000 fixed line customers, as of January 31, 2004. In mobile, Bharti's footprint extends across 15 circles. Bharti Tele-Ventures' strategic objective is "to capitalize on the growth opportunities that the Company believes are available in the Indian telecommunications market and consolidate its position to be the leading integrated telecommunications services provider in key markets in India, with a focus on providing mobile services".

MTNL

MTNL was set up on 1st April 1986 by the Government of India to upgrade the quality of telecom services, expand the telecom network, introduce new services and to raise revenue for telecom development needs of India's key metros – Delhi, the political capital, and Mumbai, the business capital. In the past 17 years, the company has taken rapid strides to emerge as India's leading and one of Asia's largest telecom operating companies.

The company has also been in the forefront of technology induction by converting 100% of its telephone exchange network into the state-of-the-art digital mode. The Govt. of India currently holds 56.25% stake in the company. In the year 2003-04, the company's focus would be not only consolidating the gains but also to focus on new areas of enterprise such as joint ventures for projects outside India, entering into national long distance operation, widening the cellular and CDMA-based WLL customer base, setting up internet and allied services on an all India basis. MTNL has over 5 million subscribers and 329,374 mobile subscribers. While the market for fixed wireline phones is stagnating, MTNL faces intense competition from the private players—Bharti, Hutchison and Idea Cellular, Reliance Infocomm—in mobile services. MTNL recorded sales of Rs. 60.2 billion (\$1.38 billion) in the year 2002-03, a decline of 5.8 per cent over the previous year's annual turnover of Rs. 63.92 billion.

RELIANCE INFOCOMM

Reliance is a \$16 billion integrated oil exploration to refinery to power and textiles conglomerate (Source: <http://www.ril.com/newsitem2.html>). It is also an integrated telecom service provider with licenses for mobile, fixed, domestic long distance and international services. Reliance Infocomm offers a complete range of telecom services, covering mobile and fixed line telephony including broadband, national and international long distance services, data services and a wide range of value added services and applications. Reliance IndiaMobile, the first of Infocomm's initiatives was launched on December 28, 2002. This marked the beginning of Reliance's vision of ushering in a digital revolution in India by becoming a major catalyst in improving quality of life and changing the face of India. Reliance Infocomm plans to extend its efforts beyond the traditional value chain to develop and deploy telecom solutions for India's farmers, businesses, hospitals, government and public sector organizations.

Until recently, Reliance was permitted to provide only “limited mobility” services through its basic services license. However, it has now acquired a unified access license for 18 circles that permits it to provide the full range of mobile services. It has rolled out its CDMA mobile network and enrolled more than 6 million subscribers in one year to become the country's largest mobile operator. It now wants to increase its market share and has recently launched pre-paid services. Having captured the voice market, it intends to attack the broadband market.

TATA TELESERVICES

Tata Teleservices is a part of the \$12 billion Tata Group, which has 93 companies, over 200,000 employees and more than 2.3 million shareholders. Tata Teleservices provides basic (fixed line services), using CDMA technology in six circles: Maharashtra (including Mumbai), New Delhi, Andhra Pradesh, Tamil Nadu, Gujarat, and Karnataka. It has over 800,000 subscribers. It has now migrated to unified access licenses, by paying a Rs. 5.45 billion (\$120 million) fee, which enables it to provide fully mobile services as well.

The company is also expanding its footprint, and has paid Rs. 4.17 billion (\$90 million) to DoT for 11 new licenses under the IUC (interconnect usage charges) regime. The new licenses, coupled with the six circles in which it already operates, virtually gives the CDMA mobile operator a national footprint that is almost on par with BSNL and Reliance Infocomm. The company hopes to start off services in these 11 new circles by August 2004. These circles include Bihar, Haryana, Himachal Pradesh, Kerala, Kolkata, Orissa, Punjab, Rajasthan, Uttar Pradesh (East) & West and West Bengal.

VSNL

On April 1, 1986, the Videsh Sanchar Nigam Limited (VSNL) - a wholly Government owned corporation - was born as successor to OCS. The company operates a network of earth stations, switches, submarine cable systems, and value added service nodes to provide a range of basic and value added services and has a dedicated work force of about 2000 employees. VSNL's main gateway centers are located at Mumbai, New Delhi, Kolkata and Chennai. The international telecommunication circuits are derived via Intelsat and Inmarsat satellites and wide band submarine cable systems e.g. FLAG, SEA-ME-WE-2 and SEA-ME-WE-3.

The company's ADRs are listed on the New York Stock Exchange and its shares are listed on major Stock Exchanges in India. The Indian Government owns approximately 26 per cent equity, M/s Panatone Finvest Limited as investing vehicle of Tata Group owns 45 per cent equity and the overseas holding (inclusive of FIIs, ADRs, Foreign Banks) is approximately 13 per cent and the rest is owned by Indian institutions and the public. The company provides international and Internet services as well as a host of value-added services. Its revenues have declined from Rs. 70.89 billion (\$1.62 billion) in 2001-02 to Rs. 48.12 billion (\$1.1 billion) in 2002-03, with voice revenues being the mainstay. To reverse the falling revenue trend, VSNL has also started offering domestic long distance services and is launching broadband services. For this, the company is investing in Tata Telservices and is likely to acquire Tata Broadband.

Market Share of players in telecom services

Company	Million Subs (Nov 2003)	% share
BSNL	40.3	58.8
Reliance	6.1	8.9
Bharti	5.7	8.3
MTNL	4.9	7.2
Hutchison	2.9	4.2
Idea Cellular	2.1	3.0
BPL	1.4	2.1
Tata Teleservices	1.3	1.9
Spice	1.0	1.4
Escotel	0.8	1.1
Fascel	0.8	1.1
Aircel	0.9	1.4
Hexacom	0.2	0.3
Shyam Telelink	0.1	0.2

Source: COAI, ABTO



Equipment Market

The total network equipment market is estimated at approximately \$6.3 billion in 2003.

Revenues in Billions

Category	2002-03 Rupees	2002-03 Dollars	2001-02 Rupees	2001-02 Dollars
Carrier equipment	150.1	3.3	148.1	3.3
Enterprise equipment	47.3	1.0	43.0	1.0
Others	84.9	2.0	66.0	1.5
Total	282.3	6.3	257.1	5.8

Source: Voice and Data (using constant exchange rate of Rs. 45.3 per dollar)

India represents a huge opportunity for handset vendors. Conveniently for them, they need not manufacture locally. Despite the market for over 10 million handsets, all handsets are imported into India. Even Nokia, the undisputed market leader, has not ventured to manufacture locally and has instead recently got permission for wholesale trading of imported handsets.

Telecom Equipment Market

Equipment	Buyers	Market Size (2002-2003)	Established Suppliers
CDMA handsets	Reliance Tata MTNL BSNL	Rs.5.59 billion (\$128 million)	Samsung L G Nokia Kyocera
G SM handsets	BSNL /MTNL Hutchison – Essar Bharti TeleVentures Idea Cellular BPL Cellular Escotel Spice Aircel	Rs 17.950 billion (\$412 million)	Nokia, Motorola, Panasonic, Siemens, Alcatel LG Ben Q DB Tel
Switching equipment	BSNL MTNL Reliance Infocomm Tata Teleservices Bharti Tele- Ventures	Rs 40.37 billion (\$926 million)	Lucent Technologies Alcatel Ericsson Motorola ITI HFCL Siemens UT Starcom
Transmission Equipment	BSNL Reliance Infocomm VSNL Bharti GailTel Railtel, PowerGrid	Rs. 7.83 billion (\$179 million)	Nortel Fibcom Siemens Tellabs Marconi NEC Huawei ZTE ITI
Enterprise	Reliance	Rs. 40.37 billion	Cisco



Equipment	Infocomm Tata Indicom Call centers Banks State govts Insurance companies	(\$92.6 million)	Nortel Tata Avaya Tyco Electronics
Optical Cables	BSNL Railtel PowerGrid Reliance Infocomm GailTel	Rs. 13.97 billion (\$320 million)	Sterlite Optical Aksh Optical Birla Ericsson Finolex Cables Vindhya Telelinks
T&M Instruments	BSNL MTNL Reliance Infocomm Tata Bharti ITI HAL ISRO DRDO BEL	Rs. 2.950 billion (\$67 million)	Agilent Technology Acterna Tektronix Rohde & Schwarz Anritsu
VSAT	Hughes Escorts HCL Comnet Max Comsat Bharti Playwin	Rs.2.34 billion (\$54 million)	Gilat HNS Viasat NDSatcom
Telecom Software	BT Ericsson Nortel Siemens Telestra Alcatel Cisco	Rs. 55.70 billion (\$1.28 billion)	TCS Wipro Mahindra British Telecom Infosys Hughes Software Siemens Software

*Voice and Data estimates

Even as foreign telecom service providers are exiting the market, foreign equipment manufacturers are being lured by the growing GSM and CDMA mobile market. ZTE of China has concluded a technology transfer agreement with ITI to manufacture CDMA network equipment.

During 2002-03, Lucent was the top telecom equipment vendor thanks to the very large contract from Reliance Infocomm and a contract from BSNL for GSM. Cisco was the undisputed leader in the enterprise equipment segment while Agilent was the leader in test and measuring instruments.

Market segment	American Vendors
Carrier equipment	Lucent Motorola Nortel



	Vocaltec UT Starcom Cisco
Enterprise Equipment	Cisco Nortel D. Link Motorola Avaya
GSM Phones	Motorola
CDMA Phones	Motorola Qualcomm
Test & Measuring Instruments	Agilent Actruna Tektronix
Telecom Software	Hughes Software Motorola Cisco