Global Communications Newsletter

February 2002

Information Technology and Telecommunications: An Indian Perspective

By R. G. Gupta and V. B. Taneja, India

Organizational Structure

The advancement in electronics, information, and communication technology has had a profound impact on the quality of life of the masses. Countries are aware of the opportunity it offers to improve the overall prosperity of the country. This revolution has opened up new possibilities of economic and social progress, especially for the developing countries.

Over the last decade, the IT industry in India has grown by more than tenfold. The world has recognized India's capability in software and is looking toward India for development of IT-based applications.

Over the last decade, the IT industry in India has grown by more than tenfold. The world has recognized India's capability in software and is looking toward India for development of IT-based applications.

In order to take a concerted and focused approach to developing this sector, the Government of India set up the Ministry of Information Technology in October 1999 as the nodal Ministry for all initiatives in this area. The Ministry has targeted to implement a comprehensive action plan to make India an IT power and achieve a target of US$50 billion in software exports by 2008. The Ministry will facilitate achievement of the objective of creating wealth, employment generation, and IT-led economic growth. The role of the Ministry will be to become a proactive facilitator, motivator, and promoter. The challenge will be in spreading the benefits of IT to the masses and to ensure speedy IT-led development.

Noteworthy Developments in Policies and Activities in the IT Field

Information Technology Act 2000

In order to facilitate growth of e-commerce and electronic communication through the Internet, and accelerate introduction of IT in critical sectors of the economy, the Information Technology (IT) Act 2000 was approved by the government. It provides a legal framework to facilitate e-commerce and electronic transactions, and aims to recognize electronic contracts, prevention of computer crimes, electronic filing/documentation, digital signatures, and so on. Rules for implementing the Act have been noted, and the Act was brought into force on 17 October, 2000. The Controller of Certifying Authority was appointed.

Telecommunication

Internet service providers (ISP) have been permitted to set up international gateways and submarine landing stations in the country. ISPs have also been allowed to hire bandwidth on foreign satellites. This will enable increased availability of Internet bandwidth and facilitate Internet expansion in the country. Other significant decisions in the area of telecommunication are:

- Opening of national long distance and ISD telecommunication service
- VSNL monopoly on international technology to end in March 2002; participation of private industry allowed
- As a result of the same, significant investments made by the private sector in laying fiber optic xable throughout the country.

Community Information Centres

The Ministry of Information Technology has taken up a project to set up community information centers (CICs) in 486 blocks in the Northeast and Sikkim as a part of the Prime Minister's agenda for the socio-economic development of the region at an estimated cost of Rs.20 crores to provide connectivity at the block level within two years. Very small aperture terminals (VSATs) are being used to provide Internet connectivity under the scheme. The centers will be managed with the assistance of the central government for five years, after which they will be handed over to the state government. A pilot project in 30 blocks has been completed.

Through this scheme, the government plans to reach out to 95 percent of the people who are outside the digital world. These CICs can help combat escalating crises in healthcare, education, e-governance, and disaster management, as well as poverty alleviation.

This scheme will be further enhanced to other areas of the country.

Media Lab Asia

Media Lab Asia is a joint effort by the Ministry of Information Technology and Massachusetts Institute of Technology

(Continued on next page)

Information Technology and Telecommunications: An Indian Perspective (cont'd)

(MIT) Media Lab to further research in state-of-the-art technologies in the area of information and communication technologies (ICT), and deploy them to the benefit of the common people. Areas that will be addressed include education, health, occupation, and entrepreneurship. Academic professors and students will be used extensively to do research, build prototype, and undertake extension programs at the field level to demonstrate working products, gadgets, solutions, and services, which in turn can be introduced in the marketplace through entrepreneurship and industry. The whole approach is to address the issue of the digital divide by addressing technology aspects, robust products, and usability issues.

E-Governance

Information technology (IT) is highly effective in catalyzing economic activity, efficient governance, and developing human resources. As part of the increased thrust on e-governance, MIT has set up a Centre E-Governance (CEG) to demonstrate emerging applications in this area and to facilitate implementing e-governance applications in all the state governments.

Technology Development for Indian Languages

The Ministry has taken a number of initiatives in technology development for Indian languages, processing tools, a human-machine interface system, a translation support system, corporate and lexical resources, and so on. To promote information processing in Indian languages, a project has been taken up at 13 educational and R&D institutions spread across the country. The objective is to increase IT penetration in society, improve the quality of life of people of India by enabling use of IT through Indian languages, development of new products and services in Indian languages, and promote content creation efforts (on Web sites) in Indian languages for better dissemination of information among the Indian masses, apart from facilitating research in the technology-intensive area of language engineering.

Information Technology for the Masses

The Ministry of Information Technology has set an ambitious target of 100 million Internet connections by the year 2008 and one million Internet-enabled IT kiosks/cyber cafes to be established covering the entire country. These will facilitate implementation of citizen-based e-governance applications and will also provide easy access to information.

Research and Development in the Electronics and Telecommunications Sphere

India has established a strong R&D base in electronics through the various laboratories under Ministry of Information Technology, Department of Space, Department of Atomic Energy, Department of Defense R&D, Department of Scientific and Industrial Research (DSIR), Ministry of Communication and other user ministries,Indian Institutes of Technology (IITs), and academic institutions. Besides these, a number of production agencies have strong in-house R&D groups.

R&D activities are also carried out in major units in the public and private sectors as part of in-house development. The government has provided various incentives to the industry in this direction. Besides these, both public and private sectors also get financial support from various agencies for specific technology development projects. These have resulted in significant equipment/system development capabilities in these organizations. In recent years, private sector industries have taken an interest in carrying out in-house R&D. At present, in-house R&D activities of more than 200 units in electronics have been recognized by the Department of Scientific and Industrial Research (DSIR).

The Ministry of Information Technology has also taken initiatives to promote R&D.

Telecommunication

Organizational Structure in Telecommunication

Telecommunications is now accepted as a basic infrastructure along with power and transportation for growth of the national economy. Telecommunications is also recognized as the means of accelerating the distribution of the fruits of economic growth to all regions, including remote and inaccessible areas in the country. Telecom in the modern world is expected to usher in a concept of a global economy and a single world marketplace. The Indian Telecom network must therefore become part of the modern global network providing access to anyone in the country for transporting information in the form of voice, data, or video to anywhere in the world.

India's 28-million-line telephone network is among the top nine largest networks in the world and second largest among the emerging economies after China with a growth rate of an average 20 percent for the last four years. The total number of lines added to the network over the last five years is 1.5 times the total number of lines added over the preceding five decades.

The Department of Telecom (DoT) and Bharat Sanchar Nigam Limited (BSNL) are Government of India Departments under the aegis of the Ministry of Communications.

The Department of Telecom (DoT) has its role in policy making, licensing, and coordination matters relating to telegraphs, telephones, wireless, data, facsimile, telematic services, and other like forms of communications. In addition, DoT is responsible for frequency management in the field of radio communication in close coordination with international bodies. It also enforces wireless regulatory measures for wireless transmission by users in the country.

Bharat Sanchar Nigam Limited (BSNL) is the premier telecom service provider of India. BSNL has a presence throughout the length and breadth of India. The main functions of BSNL include planning, engineering, installation, maintenance, management, and operation of voice and non-voice telecommunications services all over the country.

Capacities, Capabilities and Trends in the Telecommunications Sector

Telecom Equipment Manufacturing Sector

The Indian telecom equipment manufacturing industry manufactures a complete range of telecom equipment using state-of-the-art technologies designed specially to match the diverse terrain and climatic conditions. The production of telecom equipment in the country increased from Rs. 58 billion in 1993–1994 to about Rs. 163 billion in 1998–1999. The requirement for telecom equipment of various users during the five-year period 1997–2002 is estimated to be on the order of Rs. 1103 billion.

Switching

Digital switching system technologies of foreign companies (Alcatel, Siemens, Fujitsu, AT&T, GPT, Ericsson, and NEC) have been validated and approved by DoT for introduction in the Indian network. Manufacturing facilities based on these technologies (except GPT) have been set up, and a capacity of about 10 million lines based on foreign and indigenous technologies now exists in the country.

Transmission

(Continued on next page)

Information Technology and Telecommunications: An Indian Perspective (cont'd)

With the introduction of value-added services, demand for a radio transmission system has undergone a major change. A large number of public and private sector manufacturers, in collaboration with telecom giants such as Lucent, Fujitsu, and Siemens, have set up manufacturing facilities in India for digital transmission equipment. Digital microwave radio equipment has the potential for large investments and high returns since most of the radio equipment frequency spectrum in microwave is still available for deployment.

Terminal Equipment

With rapid growth in basic and value-added services, the need for a wide variety of terminal equipment, including telephone instruments ranging from normal pushbutton to multiline feature phones, is bound to grow. Production of telephone answering machines, key telephone systems, cordless telephones, pagers, cellular phones, handsets for radio trunk services, pay phones, fax machines, ISDN terminals, line jack units, data terminals, and modem, and so on provides excellent opportunities to prospective investors.

Telecom Network in India

Current Status

Direct exchange lines	367.12 lakh
No. of telephone exchanges	31952
Switching capacity	402.60 Lakhs
Village public telephones	409919
Optical fiber	228795 RKms
Microwave	190592 RKms
TAX capacity	24.72 lakhs

Basic Services:

- Private operators started in six circles
- LOIs issued for further licensees

Cellular Mobile:

- Services in 18 telecom circles and four metros
- Two operators in each circle/metro
- Third operator (MTNL/BSNL) starting to provide services
- Subscriber base of 3.45 million
- Fourth operator — bidding in progress

ISP:

- Over 460 licenses issued
- About 120 services started
- 3 million subscribers
- 240 clearances for international data gateways

National Long Distance:

At present , BSNL/MTNL is operating the service. Private operators are expected to start service.

Telecom Equipment

Production (in Rs. Crores)

Year	Amount
1996-97	8300
1997-98	9960
1998-99	10,000
1999-2000	10,800
2000-2001	11,000

Telecom Equipment Exports (in Rs. Crores)

Year	Amount
1996–1997	240
1997–1998	296
1998–1999	250
1999–2000	180
2000–2001	390

Teledensity Projection

Year	Teledensity
2002–2003	5.34
2003–2004	6.6
2004–2005	8.07
2005–2006	9.69
2006–2007	11.5

Physical Targets: 2002–2007

Category	Target
Fixed/mobile phones by BSNL/MTNL	434 lakh
Fixed/mobile phones by private operators	400 lakh
Optical fiber	302,000 Rkms
Microwave	17,000 Rkms
TAX lines	30.5 lakh
IN	104 lakh
ISDN	11.75 lakh
Satellite	Projection of transponder requirement for sustaining existing services and their further growth: Normal C-band-61 transponders; extended C-band-53 transponders; Ku-band-89 transponders, Ka-band-6 transponders, and MSS-(1+1) transponder

Fixed and Mobile Phones Projections

Year	Fixed phones (Lakh lines)	Mobile phones (Lakh lines)	Total (Lakh lines)
2002–2003	44.8	67.2	112
2003–2004	56.8	85.2	142
2004–2005	68	102	170
2005–2006	76	114	190
2006–2007	88	132	220

Research and Development

Research and development activities are being carried out at various manufacturing units of India-based MNCs, and notable R&D is also being carried out at C-DoT, whose rural exchanges are very successful in the world market, apart from IIT Chennai, who have developed COREDECT technology. Application-oriented R&D is also being carried out at ITI Bangalore, IIT Chennai, BEL, Bangalore, Shyam, and HFCL at New Delhi.

DoT currently has a number of training centers all over India apart from IITs and other technical institutes all over India. Apart from this, Indian companies engaged in the telecom sector are also venturing into telecommunication training to fulfill the ever growing need for expert professionals in this sector.

The Future Scenario: The Telecom Equipment Manufacturing Sector

The main objective of the 10th five-year plan is to make available reliable telecom services on demand even in rural areas at reasonable prices and to improve the teledensity in tune with NTP-99. NTP-99 emphasizes the importance of convergence and the desirability of encouraging all technologies to achieve these objectives. A substantial part of the telecom equipment deployed in the network is still imported. The post-liberalization scenario

(Continued on next page)

Information Technology and Telecommunications: An Indian Perspective (cont'd)

posed many challenges to the telecom R&D and manufacturing sectors.

Noteworthy Developments in Policies and Activities in the Electronics and Telecommunications Field

New Telecom Policy, 1999

The New Telecom Policy (NTP), 1999 was introduced to:

- Create a modern and efficient telecommunication infrastructure by bringing about a greater competitive environment
- Protect the defense and security interests of the country
- Strengthen R&D efforts in the telecom sector and enable Indian companies to become global players
- Achieve efficiency and transparency in spectrum management
- Convert PCOs into public teleinfo centers
- Encourage development of telecommunication in rural areas by making it more affordable

The new policy framework is meant to put a special emphasis on creating an environment that enables continued attraction of investment in the sector to create the required infrastructure by leveraging technological development. Specific physical targets have also been laid down in the policy to make the telephone available on demand by 2002; achieve a teledensity of 7 by the year 2005 and 15 by the year 2010; cover all villages in the country by 2002 and provide reliable media to all exchanges; provide Internet access to all district headquarters by 2000; and develop high-speed data multimedia capability in all towns with a population of more than 2 lakh by 2002.

Other significant developments in the area of telecom are under:

- The Telecom Regulatory Authority of India (TRAI) was set up as per the TRAI Act 1997 as an independent and autonomous regulator of telecom services in the country and matters connected thereto.
- There has been rapid progress in telecom services, particularly in the area of value-added services through private participation.
- In addition to promoting the penetration of Internet services in the country, a dual role for DTS has been planned, as a national Internet backbone (NIB) provider and an ISP. The NIB will provide easy Internet access to private ISPs besides enabling DTS to open points of presence (PoPs) all over the country. The DTS, MTNL, and VSNL taken together operate about 75 Internet nodes all over the country with about 4 lakh subscribers. The customer base of the private ISPs is about 2.7 lakh. The smaller ISPs would make available the desired connectivity to the Internet at remote locations without seeking leased lines once the NIB is put into position. As per NTP-1999, national long distance service is also being opened up, which will provide various options to subscribers to make long distance calls through any operator.

Furthermore, the entry of private operators in the VSAT arena in 1994 has encouraged corporate users to start relying on this technology. This has emerged as a potent weapon for diverse applications such as data access, voice, and multimedia connectivity even in remote locations. There are about 10,000 VSATs in the country. The Ku-band has been opened up for the existing VSAT licensees. In this area, higher bandwidth support will be a crucial development.

During the period August 1991–October 1999, 1106 proposals of domestic private investment of Rs. 27,339 crores were approved for the telecom sector. During the same period, 561 proposals of foreign direct investments (FDI) of Rs. 36,108 crores were also approved. In terms of approval of FDI, the telecom sector is the second largest after the energy sector. A package for migration from a fixed licence fee to revenue sharing under the new Telecom Policy was offered to the existing cellular and basic service providers and has been accepted by most of them.

The telecom network of the DTS and MTNL continued to grow during the current year. Equipped capacity was increased to 29.4 million; DELs touched a level of 24.3 million as of January 31, 2000. There has been rapid growth of the transmission network, especially optical fiber systems, used to connect telephone exchanges all over the country by reliable media. As of January 31, 2000, 3.53 lakh village public telephones (VPTs) were provided covering 58 percent of the total 6.07 lakh villages . The total number of DELs in rural areas, 3.6 million at the end of March 1999, are expected to touch a level of 4.5 million by the end of the current year.

There has been a sharp expansion of the telecom network in the country in terms of volume contributed by newer technologies during the last decade. In spite of the rapid growth and increase of teledensity from 1 percent to 2.5 percent during the last five years, it is still low compared to the world average of about 14.3 percent. Therefore, it is a serious challenge for the country to achieve the required pace of telecom development to be at par with rest of the world. This needs increased investments and upgrading of technology on a continual basis to keep up with the worldwide trend . The policies and strategies adopted are expected to help the sector overcome these challenges.

Global Communications Newsletter

www.comsoc.org/pubs/gcn

NELSON L. S. DA FONSECA
Editor

Institute of Computing
State University of Campinas
P.O. Box 6176
13083-970 Campinas SP, Brazil
Tel: +55-19-7885878
Fax: +55-19-7885847
E-mail: nfonseca@dcc.unicamp.br
gcn@comsoc.org

ALGIRDAS PAKSTAS, Associate Editor
KENZO TAKAHASHI, Chapters Corner Editor

Regional Correspondents
HOSSAN AFIFI, France • ABRAHAM ALCAIM, Brazil
BORHANUDIN MOHD ALI, MALAYSIA • PHAN ANH, Vietnam
JACOB BAAL-SCHEM, Israel • DINKO BEGUSIC, Croatia
PAULO DE SOUSA, Belgium • KHALED FUAD ELSAYED, Egypt
JOAN GARCIA-HARO, Spain • VOULA GEORGOPOULOS, Greece
SILVIA GIORDANO, Switzerland• RAM G. GUPTA, India
, RussiaCARLOS HIRSCH, Mexico • Liang Xiong Jian, China
HENRICH S. LANTSBERG, RUSSIA • Marie-Jose Montpetit, United States
NICOLAE OACA, ROMANIA • PAWEL OLESZAK, Poland
IRADJ OUVEYSI, AUSTRAILIA • GIANCARLO PIRANI, Italy
K. R. SUBRAMANIAN, Singapore • TOMOHIKO TANIGUCHI, Japan

A publication of the
IEEE Communications Society