

**Technological Progress, Industry Dynamics,
And Telecommunications Policy:
The Need for Further Reforms in India**

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**TECHNOLOGICAL PROGRESS, INDUSTRY DYNAMICS, AND
TELECOMMUNICATIONS POLICY:
The Need for Further Reforms in India**

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Abstract

In this paper, we argue that much of the policy of the Indian government directed at the telecommunications sector does not pay sufficient attention to technological progress in the sector, or to the global changes in industry structure. We examine the 1994 National Telecom Policy (NTP) and have pointed out a number of problems with it including the license fees, interconnect agreements, and the regulation of financing of the projects. The myopic policy of allowing DOT to be the dominant player in all of the circles will encourage the private sector telecom companies to “game” the system in a number of ways, and the government will also find itself unable to reach the objectives of having significant rural coverage, and the use of domestic technology. We have outlined policy reforms for changing these problems. We also examine the areas of enterprise networking (including the Internet) and satellite communications where one needs urgent reform to take advantage of inherent industry dynamics which would give a boost to the Indian economy. By trying to regulate a modern fast paced technology sector without being sensitive to the current state-of-art, the Indian government will always put itself in the role of an ineffectual policeman. The Telecom Regulatory Authority of India (TRAI) will be more effective if it plays the role of (1) encouraging competition and universal access including extensive rural penetration (as opposed to coverage), and (2) safeguarding consumer rights including prices, service quality, and privacy.

1. INTRODUCTION

More than 2.8 billion people in Asia's lower income countries (not including Japan and the four tigers, Hong Kong, Korea, Singapore and Taiwan) make do with little more than 25 million telephone lines, an average less than one line per hundred people. Although many countries had embarked on plans to expand their telecommunications infrastructure, during the 1980s, the average annual growth in the number of lines in Asia was only around 7%. Most of the new installed lines (85-90%) were in urban areas where 15-20% of the populations lived. Public telephones were a rarity; for example, there were fewer than 150,000 public call boxes for the 1 billion people in India and Indonesia¹.

From the early 1990s, a number of the lower income countries in Asia have tried to speed up the process of expanding their telephone system, both wireline and wireless (i.e. cellular) communication. For example, China has a planned outlay of \$120 billion for the period 1995-99 for telecommunications. Malaysia, with 1/20th of the population is going to spend roughly 1/7th (\$16.2 billion) the capital for its telephone system. All countries expect to expand both wireline and cellular services. Each country has tried to "reform" telecommunications by either privatizing or liberalizing the sector. Another common feature in all the Asian countries is that they have opened the sector to the participation of foreign multinational companies². It should be noted that "reform" has hit the telecommunications sector in almost all countries around the world including the U.S.A., U.K., and Latin America.

The Indian telephone system was one of the worst in Asia. The teledensity in India was 0.89 per 100 people in 1992. The official waiting list was 2.5 million, and the average waiting time was 2.5 years³. India had slowly improved the telecommunications technology in the 1980s by replacing electromechanical exchanges by electronic ones in the major cities. However, even as recently as 1993, the Indian telecom system had 208.8 faults per 100 lines, one of the largest in the world⁴. The Department of Telecommunications (DOT) had a monopoly over providing all services. Local service was provided by the Mahanagar Telephone Nigam Limited (MTNL) and international service was provided by Videsh Sanchar Nigam Limited (VSNL), both of which were components of DOT.

In order to improve the telecommunications situation, the government undertook a number of commissions to examine the options open to the country. The result of the deliberations was the National Telecom Policy (NTP) of 13 May 1994. The main feature

¹ These figures are taken from a 1994 World Bank Discussion Paper entitled *Telephone Sector Reform in Asia: Towards a New Paradigm*. The numbers are changing every month, and may require some updating.

² World Bank (1994), *op cit*.

³ The 1994 report by the William Davidson Institute, University of Michigan entitled *Unlocking Hidden Wealth* contains all of these statistics in one place. Although the teledensity in India at the end of 1995 is close to 1.0, because of the nation-wide publicity given to the telecommunications sector reform, the official waiting list has actually increased with the increased expectation of the people.

⁴ William Davidson Institute, *op cit*.

of the NTP was that it liberalized the telecommunications sector in India by allowing non-DOT operators to provide both wireline and wireless services in pre-specified area, called "circles". Foreign multinationals were also allowed to hold up to 49% equity in the private companies that would provide telecommunications services.

In this paper we argue that the implementation of NTP, and the current policies and procedures governing the telecom sector in India fall far short of achieving what is best for India. The main problem is two-fold: (1) The policy seems to ignore both the technological progress and the dynamic evolution of the telecom industry globally which will have far reaching repercussions in India, and (2) The policy is aimed at maintaining a state owned monopoly in the telecom sector which may be counter-productive in both the short and long run. Indeed, there are a number of ways in which Indian enterprises can play very important and innovative roles in the future of telecommunications. The current telecom sector "liberalization", if not reformed further, will only allow "deep pocketed" foreign and domestic players any stake.

2. TECHNOLOGICAL PROGRESS

The international telecommunications industry has gone through rapid technological changes. First of all, everything has "gone digital"⁵. So whether one is considering voice services (i.e. plain old telephone calls), or data, facsimile, graphics, and video services, everything is digitized before being transmitted. Indeed, in the United States, the word "telecommunications" means a multiple of services, not just telephone calls. Due to this digitization, it is now possible to store, retrieve, transport information in many forms and in many places. Given the fact that all services are digitized, *the distinction between voice and data services has become obsolete.*

Next, the speed of communication has increased by leaps and bounds, primarily because of the wide spread use of fiber optics in wireline systems. There have been significant innovations in a number of technologies including switching and multiplexing, routing and bridging, protocol stacking, frame relays, asynchronous transfer mode etc. that has helped to increase the speed of telecommunications systems, and also to enable many different services to be transmitted on the same "pipe".

The current trend in the advanced industrial countries, and even in places like Malaysia and Singapore, is to try and have broad-band ISDN (integrated services digital networks), and to "multiplex" all different digital services onto the same system. Customer services equipment capable of handling multiple services are already available in the market⁶. Transport networks capable of handling multiple services, with ability to connect to different local area and wide area networks, are already being developed, produced, and

⁵ See the book by Nicholas Negroponte entitled *Going Digital* (MIT Press, 1995) for a very extensive and lucid description of the current status of telecom technology and its future trends.

⁶ In Malaysia, private operators are rapidly expanding the telecom infrastructure, and are going to deploy switches in each residence that can accept both telephone calls, and entertainment.

deployed. There is also a flurry of activity among the global telecom companies to acquire, merge, or have strategic alliances with entertainment companies in order to provide both the telecom network, and “content” being serviced by the network. (More of this in the next section).

One of the most significant developments in the telecommunications field over the past ten years has been the proliferation of wireless technology. India has had a long history of pursuing satellite communications, and is in a position to play a role in personal communications systems that may be the mainstay of telecommunications in the 21st century. (More of this in section 6). In addition, paging and cellular telephony which is growing at a rapid pace internationally has also penetrated the Indian market. Wireless communication is now also being used in local area networks, and has been proposed for the local loop (i.e. WLL - wireless in the local loop) of large scale telecommunications networks as well. In advanced industrial countries, wireless communications is frequently seen alongside traditional wireline communication systems. In many developing countries, it could *the* solution for places where the economics of wireline telecom systems may not be very favorable. It should be noted that wireless telecommunications can easily by-pass wireline systems, but in most cases these systems complement each other.

The main point is that telecommunications policy in India should keep up with the changes in the technology. *It does not make any sense to have rules and regulations that can easily be circumvented by the technological capabilities of the system.* We will present many cases where the telecom policy seems to ignore technological reality. To give one example, DOT disallows the mixing of voice and data in VSAT networks which does not make any sense, whether from an economic, technological, or even practical perspective.

3. INDUSTRY DYNAMICS

The structure of the global telecommunications industry is evolving quite rapidly. In the international arena, competition in the different telecommunications sector has a clear structural component. The system is usually organized around two entities:

(i) *The Network Operator* who runs the network, and provides bandwidth to whoever wants to use it at different costs depending on the specific contract.

(ii) *The Service Provider* who offers a wide range of services on the telecom network. Examples of such services would be tele- video-conferencing, on-line CAD-CAM capability, directories and dictionaries, internet services etc.

It is usual for the service provider to purchase bandwidth from the network operator, and some of the “programs” from independent entities, and then ensure that the consumer receives the services contracted for. Two examples would highlight operation in this market.

The first example involves an advanced product, as yet not fully available even in advanced industrial countries. A service provider can obtain a video (say on industrial

pollution) from the creators of the movie (say an environmental NGO, non-governmental organization) and send it to an industrial telecom customer (say SAIL, steel authority of India Limited). The bandwidth needed for this transaction would be obtained from the network provider either on a as-needed basis, or as a dedicated line. The customer only contracts with the service provider, not with the network operator.

The second example is a very simple one, and there are hundreds of cases of its implementation in the U.S. The network service provider buys telecom capacity (i.e. lines) from the network operator in bulk at a reduced rate. Then, different services are provided to different customers at different rates. The service provider can take care of all the telecom needs of big firms, including providing PBX services, billing, cost allocation, network management etc⁷.

Although we have described two different operations in global telecom, in many countries, including India, there has been vertical integration of these entities. Even in the United States where this structure has been developed the best in order to foster competition and allow easy entry into the telecom market, in recent years there has been a "convergence" of network operation and service provision⁸.

However, what is clear is that healthy competition among service providers leads to a multiplicity of services available to customers (whether it be industrial or residential) at competitive prices. Having a strong independent service provider market also leads to competition among network operators to provide efficiently provisioned telecom bandwidth at the lowest cost.

There are a number of examples which seem to suggest that the Indian government policy does not seem very cognizant of the developments in the global telecom industry. For example, the rate structure VSNL charges for Internet services (Rs. 50 Crore for a 2 Mbps line) does not make it conducive for many organizations, especially small ones, to enter this business segment. We will elaborate upon in a later section.

4. BASIC TELECOM SERVICES

4.1. The 1994 National Telecom Policy

In 1994, India embarked on an extensive program of liberalizing its telecom sector with the primary aim of expanding and improving basic telecom (i.e. telephone) services in the country. The work of a number of commissions culminated in the National Telecom Policy (NTP) of 13 May 1994. In this section, we will briefly summarize the NTP and its

⁷ For further discussion on this point, see M. W. Zacher and B. A. Sutton, *Governing Global Networks*, Cambridge University Press, 1996.

⁸ See the paper by G. Anandalingam and A. Mehta entitled "On the to convergence: Consolidation in the telecommunications and cable-TV industries", Working Paper 95-22, Dept of Systems Engineering, University of Pennsylvania, Philadelphia, PA, USA.

implementation. *We need to caution the reader that, because this exposition is brief, we will not be touching upon every aspect of the policy.*

The stated objectives of the NTP was to make telephones available to all domestic sectors of Indian society on demand, to have a quality of service that is of world standard, and to foster manufacturing and export of telecommunications equipment. Defense related telecommunications interests were to be safeguarded. The targets were to have 10 million additional lines by the end of the 8th Five-Year Plan, a teledensity of 2 per 100 people by the year 2000, 1 local PCO for every 500 people in urban areas, and to provide basic telephone services to all villages (a minimum of 1 public telephone per village) by 1997.

In order to achieve the targets of the NTP, it was clear that private and foreign players had to be allowed to provide basic telecom services in pre-specified areas called "circles". Long distance telecommunications services was kept within the purview of Department of Telecommunications (DOT), with VSNL being the monopoly carrier. Private companies had to send a proposal to bid for developing regional circles.

Guidelines for preparing the bid proposal were as follows: The bidder had to be a majority private *Indian* company, but a foreign multinational could hold up to 49% of equity in the enterprise; the telephone tariff could not be greater than that charged by DOT, and 10% of the lines should be earmarked for villages; use of indigenous equipment was encouraged; and the bidder had to provide earnest money in the order of Rs.500 million for an A type circle in order for its bid to be entertained; in order to provide telecom services in a circle, the bidder should pay a non-transferable license fee, and the choice of private company for each circle would depend on the magnitude of this fee. The fee structure was revised after the first round of bidding.

There were also a number of criteria for screening the potential applicants for licenses. For example, only those who had experience in laying lakhs of lines were to be considered, and the asset values of the companies had to be greater than a certain level.

Once the applicants passed the screening tests, the bids would be "scored" using a transparent system of weights: 72% for the license fee, 10% for number of lines, 15% for rural coverage, and 3% for domestic technology content.

4.2. NTP: A Critical Analysis

The NTP was mostly a well thought out plan. There were a few problems inherent in the implementation. It should be made clear that a number of national and international forces were responsible for the telecommunications sector in India being reformed in the first place⁹. The reforms also had to satisfy different segments of the society, and also try to

⁹ For a very good summary of the history of the process and the actual paradigm shift, see the paper by one of the architects of the NTP, M. B. Athreya: "India's telecommunications policy", *Telecommunications Policy*, Vol. 20, No. 1, pp 11-22, 1996.

achieve multiple goals¹⁰. One should be sensitive to the fact that telecom liberalization in India was one of the most *comprehensive* in the world. State owned companies dominate the telecom sector in most countries in the world, even in the west. It is the contention of the author that in order to obtain a compromise solution among the real and perceived objectives, the implementation of the NTP contained many contradictions which will make it counter productive from the point-of-view of the industry, customers, and the nation as a whole.

First, given the screening criteria and the level of the earnest money deposit, no Indian company could bid for setting up telecom networks all by itself or even with another Indian partner. In fact, only the largest of the world's telecom MNCs could take part effectively. This was reflected in the type of partnerships that were formed: Reliance with NYNEX, Birla with AT&T, BPL with U.S. West etc. The only exception to the rule was HFCL with Bezeq, where the combined "experience" of both satisfied the criteria. It is a well known fact that most large scale companies, and the telecom MNCs in particular, increase their revenues by making sales in different parts of their organization. Thus, once the telecom MNCs had positioned themselves as important players in the telecom circles, they would have incentives for using their own equipment even in cases where Indian equipment was competitive.

Secondly, the weightage given for the different components of the bid meant that those who bid high on the license fee were in the best position to get the franchise to build and operate telecom networks in each circle. Thus, even if the bidders performance on rural coverage and domestic technology content was poor, they would win the privilege of setting up telecom networks provided the license fees bid were high enough.

In the first round, HFCL-Bezeq managed to win each of the 9 circles that it bid for purely on the extremely high license fee that they were willing to pay. Given the alarming financial exposure of HFCL-Bezeq if it were given all circles that it won on the first round, the entire rules of the game had to be changed. The number of circles given to any one company had to be capped to three, and the circles re-bid with the government insisting on minimum license fees. The second round seemed less transparent, and also led to delays. Many telecom companies were unhappy that HFCL had been allowed to choose its best circles, and to safeguard what seemed to be irrational bids.

In the second round, a number of well known international players like B.T., A.T.&T., U.S. West etc. did not even participate in bidding for the wireline networks. Many of these already had licenses for building cellular networks in some of the circles. Because of the poor response in the 2nd round, the bidding was continued into a 3rd round with the worst performance. In the 3rd round of bidding, Bharti Telecom was the sole participants, leaving Assam, Himachal Pradesh, Jammu & Kashmir, Kerala, U.P. East and West Bengal with no private sector participation.

¹⁰ N. Sinha, "The political economy of India's telecommunication reforms", in *Telecommunications Policy*, Vol. 20, No. 1, pp 23-38, 1996, and B. A. Petrazzini, "Telecommunications policy in India: the political underpinnings of reform", in *Telecommunications Policy*, Vol. 20, No. 1, pp 39-51, 1996.

One outcome of the bidding process is that in each wireline ("basic") circle, there would only be a maximum of two players: DOT as the dominant player, and one other private company. As outlined in the last paragraph, in a number of circles DOT may be the sole player. This lack of participation by private sector telecom companies will subvert the liberalization agenda in the sector. In each cellular circle, there will be a maximum of three players: two private companies, and DOT if it chooses to participate. Given the experience all over the world, this duopolistic set-up will probably not lead to better service and a lowering of prices¹¹.

We will now briefly discuss some specific areas of concern, and provide some prescriptions for dealing with the problems.

License Fees: The license fees that the network operators have bid in order to secure the right to set up telecom networks is going to be a substantial impediment to the development of the system. T. H. Chowdhary has pointed out¹² that the license fees will make the telecom systems costlier by 30-40%. Infrastructure projects in India are considered risky by the international financial community, and this inflation of costs will make it difficult for the private network operators to raise capital for these projects. A number of operators who won licenses might withdraw, and cause significant delays in the availability of telecom services in different parts of the country¹³.

There is also a strong case to suggest that the license fees are discriminatory because they increase the cost of only the networks implemented by private sector operators, giving a further undue price advantage to DOT. Even if consumers would prefer to switch to private operators because of reasons other than price, the private operators would not be able to recover the increased costs caused by the license fees by increasing prices. Prices to be charged to the consumer will be pegged to be no higher than those charged by DOT, and would certainly be regulated by the Telecom Regulatory Authority of India (TRAI). Thus, the license fees charged to only private operators will distort the very premise of competition.

Given the problems created by the substantial license fees, it is the expectation of this author that one or many of the following scenarios will play themselves out, undermining the objectives of telecom liberalization in India.

¹¹ G. Anandalingam, "Privatization and Liberalization of Telecommunications in Asia. Panacea or Problematique?", paper to be presented at the Telecommunications Policy Research Conference, Soloman Islands, Maryland (U.S.A.), October 1-3, 1996.

¹² T. H. Chowdhary, "Raising the issues on hold", *Economic Times*, 15 May 1996.

¹³ Current developments show that HFCL may indeed be "looking for a way out of basic telecom services" (*Economic Times*, 28 June 1996) in which case, Delhi, Haryana, Orissa and U.P. West will be left without an expansion in telecom services unless and until another player decides to take up these circles.

(1) It is quite likely that the private sector companies will go to court to argue against the discriminatory practices that they are facing vis-à-vis DOT: asymmetric license fees, differential tax codes, unfavorable interconnect agreements etc. Indeed, HFCL has already gone to court, with the tacit support of the other private companies, to argue against the procedures of DOT. Besides delaying the implementation of the telecom infrastructure in India, the outcome of these legal proceedings could range from, on the one hand, the entire liberalization program being subverted, to the private sector participants completely changing the rules of the game in their favor.

(2) DOT, flush with its competitive advantage viz prices will become a very dominant player that could undercut the private operators. The dominance of DOT will be intensified because VSNL continues to be the sole long distance carrier and thus, DOT can continue to subsidize local tariffs. Of course, if a substantial part of the revenues produced by the license fees go to DOT, it may become too strong a competitor for the private sector companies to deal with. The dominance of DOT would surely lead to complacency, with a resulting adverse effect on prices and quality of service to the consumer;

(3) In order to ensure profitability, the private operators will put great pressure on the government (or TRAI) to increase prices, and to change the agreements regarding interconnect charges. They will also try to enhance revenues by finding new "telecom" services for the consumer including entertainment, data services etc. Depending on whether industry prefers a private/foreign operator or not, they may be able to extract non-tariff premiums (such as charges for services etc.) from some customers. What is clear is that customers who do not maximize revenue will not be served; rural areas will probably be completely ignored.

(4) If the government is unwilling to bend on license fee relief, many private operators who have the rights to build telecom networks will withdraw, leaving a number of circles at the current status quo, i.e. only service by DOT. If the government decides to put up these circles for bid again, there may be single enterprises who will make very small bids that the government might have to accept if they want to expand the telecom infrastructure.

(5) Many of the joint venture companies created to develop the telecom circles would become bankrupt after starting work on the networks. This will leave the government in the difficult position of either setting up another transparent procedure for choosing new participants, thus delaying investment in the telecom infrastructure, or allowing entrepreneurs to purchase the assets and licenses of the failed companies for a song in order to rapidly complete the projects. In either case there would be outcries from the public, and a net welfare loss to the economy.

Many of these scenarios may play themselves out simultaneously. If any of them were to take place, the telecom liberalization agenda of the Indian government will be thwarted. The license fee relief is the key. In section 4.3. we will present some ideas for using license fee relief to enhance competition, increase rural coverage, and provide a level playing field for domestic technology.

Interconnections and Technology Control: Many people have pointed out the major bottleneck in the telecom system is caused by the fact that DOT is the sole provider of interconnections between circles. Thus, DOT seemingly has an unfair control over the entire system. However, the technological developments in telecommunications will allow most private sector operators to by pass the interconnect switches provided by DOT by using any combination of radio-wave and satellite based technologies, if not even wireline systems. Thus, even though the government has prohibited anybody other than DOT from providing interconnections between circles, this monopoly is not sustainable. Indeed, Kishore Jethanandani's characterization of the interconnect agreement ("stupid") seems most to the point¹⁴.

The interconnect clauses also do not make sense in the context of telecom liberalization in India. DOT bars multi-media services on the telecom network, insists that the local loop should be wireless or fiber, and also expects the private telecom operators to share their plans with DOT 18 months in advance¹⁵. The last provision will again give undue strategic advantage to the already dominant telecom player in India. Directing the private operators on the type of technology smacks of planning at best, and will most likely lead to investment in out-of-date systems.

Most importantly, it does not make sense to restrict the type of services that can be carried on the telecom system. As we have pointed out, the entire global telecom industry is going digital and multi-media, and most customers in India will also demand substantially more services from their network than simply telephone connections. Thus, it is quite unimaginative for DOT to try to prevent the private network operators from using

4.3. Expanding Reforms in Basic Telecom Services

There is some scope for improving upon the liberalization process started in India for telephone services. As we have argued in the paper, despite a well thought out National Telecom Policy, the specific ways in which bids were solicited to expand the network should lead to distortions in price, quality of service, coverage and the enhancement of domestic technological capabilities. In this section, we will propose some ideas which should correct the "distortions". The main conceptual premise is that a combination of license fee relief and "managed" competition in the telecom sector would enhance overall national economic benefits.

Managed competition, or its counterpart "simulated" competition, is a situation where the government intervenes in a *dynamic* way to ensure that the suppliers of a good or service behaves competitively even when they are organized in a oligopolistic way. Competition is simulated by making the firms feel threatened by the entry of new firms, new and different goods/services, or both. This would make the firms compete in price, quality, new products, or a combination of all of the above. In the case of

¹⁴ K. Jethanandani, "An example of telecom competition", in *Economic Times*, 6 July 1996.

¹⁵ See "DOT's interconnect clauses betray telecom liberalisation" in *Economic Times*, 10 May 1996.

telecommunications in India, one may also want to use managed competition to induce the firms to significantly expand their network to the rural areas.

Price Competition: The government should set up a scheme to enable third party entrepreneurs to do bulk purchasing of telephone lines (i.e. capacity) at a reduced cost. These entrepreneurs should be allowed to resell services, both voice and data, on their leased lines to private customers.

From the experience in the U.S., it is clear that “resellers” of telecom services usually sell it at a lower price, otherwise the corporate entities that the resellers have targeted will most likely stay with the telephone company. In fact, some have argued that the economies-of-scale argument has become spurious in recent years because of technological changes, and it is natural to reduce the impact of monopolies by allowing multiple vendors of different services¹⁶. The difference in price between the resellers market and the telephone company’s market will reflect the possible downward movement in telecom prices. The telephone company will then have the pressure to reduce prices, rather than ask for tariff increases from TRAI. Indeed, in most situations where the threat of a small reseller company exists, the regulatory authority has to make sure that the large telephone company does not *reduce* the telecom price drastically, and set it below the marginal cost of production, in order to drive the small company out of the market. If managed simulated competition is encouraged by TRAI, the Indian consumer will see a lowering of prices. Also more Indians will be able to afford to own and use a telephone.

Clearly if there is price competition and quality standards, both DOT and the private network operator will try to increase their profits by investing in the most cost effective technology. Given the advances made by C-DOT in RAX (Rural Automated Exchanges) and MAX (Metropolitan Automated Exchanges), one might well see even the foreign telecom companies buying domestic Indian equipment.

One caveat is in order. For the *managed simulated competition* outlined above to work, the government will have to eventually allow competition in long distance services as well. In the voice networks in most countries, long distance telephone calls subsidize local telephone use. Thus, for instance, when AT&T was divested from its local service providers (the RBOCS - Regional Bell Operating Companies) almost all the consumers in the U.S. saw their local phone bills go up while their long distance bills went down. In India, only local areas have been opened up to new private entrants; long distance telephone use is going to be the preserve of VSNL. Thus, the rates currently charged by DOT for local calls is a subsidized price. TRAI cannot use these local prices to set the regulatory prices for long. Already the new operators in the circles have started lobbying for the local rates to go up, using the above reason.

Expansion of Rural Coverage: In spite of the NTP’s good intentions, the evidence seems to suggest that expansion of telecommunications to the rural areas will be slow at best. The private operators have been approved on the basis that 10% of their lines will be in rural

¹⁶ Zacher, *op cit*

areas. However, the Department of Telecommunications (DOT) does not have any legally binding targets, which seems too one-sided and unsatisfactory¹⁷. DOT has always had targets for providing rural coverage (i.e. at least one public call booth) in its master plans, but seem to have conceded that they may not be able to meet them¹⁸.

Rural coverage has always been a problem for private sector companies, whether one considers telecommunications, power, water, or a number of other sectors. The main problem is the concern of being able to extract payment for services provided. Clearly, the ability to pay for infrastructure services depends on income levels. Thus, many of the telecom network providers may well not try to provide services to those with lower income levels, especially in rural areas. Indeed, many private companies may question the validity of the asymmetric arrangement to provide rural telephony on the grounds that it provides DOT with an unfair advantage.

One can use the concept of managed simulated competition, with some modifications, to expand telecom into rural areas. As we have explained earlier, the largest component of cost for all private telecom providers will be the license fees that they will have to pay over a 15 year period to DOT for obtaining the franchise for the circles. If the payment of these licenses is postponed to later years, or a discount is given on the license fee itself, there will be a tremendous boost to the financial situation of all of these ventures. One could set up a competition for getting these "postponement/discount benefits" by pegging the license payment relief to the speed at which the private network providers expand services to the rural areas, as indicated in their proposals. DOT should be forced to compete to provide rural telephony by pegging government expenditure in DOT to its level of rural coverage. This type of mechanism will be effective for an organization like DOT only if it is eventually corporatized with some kind of profit motive.

Domestic Technology: It is important to have a level playing field for domestic technology to compete at par with the technology that the non-Indian telecom companies have developed. Most telecom companies generate revenue for themselves in a number of ways: designing and constructing networks, providing telecom equipment, managing the network and adding new services etc. In almost every case, the telecom majors are inclined to "purchase" equipment that they have produced even though this may be a more costly option¹⁹. The reasons are simple: the companies want to recover many years of research and development (R&D) expenditure that went into developing technology, and also want to increase revenue for all parts of the company to show success to their shareholders. Thus, there will be little incentive for foreign companies to buy Indian technology for Indian telecom networks.

¹⁷ K. Jethanandani, "Natural monopoly and universal service", *Economic Times*, 26 April 1996.

¹⁸ See a number of articles in *Economic Times*, March 4 and 7, 1996.

¹⁹ It is clear that one of the main reason for the 1995 break-up of AT&T into three parts was because it was not possible to sustain a situation whereby the network services part of the organization was always pressured into buying AT&T equipment when much better and cheaper alternatives existed in the marketplace. By breaking up, AT&T was able to compete better globally in network services, while the equipment side (now called Lucent Technologies) had to improve to compete.

One of the success stories in Indian telecommunications was the creation of C-DOT (Centre for the Development of Telematics), and the rural exchange (RAX) that it developed. RAX was the *first exchange in the world* to perform well under rural conditions where more than 70% of the world population still lives: extremes of heat, dust, and on occasion, humidity, and the prevalence of vermin, snakes etc. Given the fact that the Indian government invested in the R&D efforts at C-DOT and this investment needs to be recovered, for the effort and past success of C-DOT to be sustained, and to encourage future Indian entrepreneurs who are inclined to invest in telecom technology, there needs to be incentives for the network operators to purchase domestic technology.

There are three ways one can think of providing incentives for the use of domestic technology. First, if, as discussed in the previous section, price competition is significant and rural telephony is given its due importance, most private telecom operators will have to consider RAX (and even MAX) developed by C-DOT as a very competitive alternative. In fact, given the state-of-art of telecom equipment, one cannot see how RAXs would not be used in the rural areas in India. A second mechanism would be to use *license relief* as a vehicle for directly influencing the purchasing of domestic technology. One could create a performance measure based on the percentage of equipment that is domestic, and provide license relief (postponement of payment, discounting of license etc.) based on the performance measure. It should be emphasized that this measure should be *simple*, and should not entail many months of committee meetings²⁰. A third mechanism would be to provide direct subsidies in the form of discounts for using the equipment (exchanges in particular) developed by C-DOT. The discounting of C-DOT equipment would make sound financial sense: the government cannot recover R&D investment unless C-DOT sells equipment, even at a discount. Also, the license fees collected by the government is sufficient to provide this subsidy, and also be left with a significant net income.

It may be argued that the main danger of actively encouraging the private telecom operators to purchase C-DOT equipment is the complacency that might be created in the organization. If one knows that one will be able to sell equipment reasonably easily, then the incentive to innovate and improve may be lost. There are a number of ways of dealing with this problem. One should have a limited timespan for the providing the incentives for investment in domestic technology outlined in the previous paragraph. Leadership is an all important ingredient in the Indian industrial arena, and one of the main reasons C-DOT was able to produce RAX (and MAX) even in a public sector setting was the leadership of Sam Pitroda. Thus, even in a situation where it is made easier to sell equipment it produces, with proper leadership, C-DOT could continue to be on the frontier of technological innovation. Of course, one of the best ways to ensure competitiveness of C-DOT is to eventually "corporatize" it, and thus force it to act like a profit center.

It is important that the government is active in playing a role to enable domestic technology to be used in the basic telecom circles. The government should act in a manner

²⁰ See the last section (A Final Word) for further elaboration on a primary concern of this author on work ethics and archaic procedures in India.

to enhance market decisions, rather than in the old planning mold. Besides the short term recovery of R&D dollars spent by the government, this would also provide the right signals to future domestic entrepreneurs in the telecom sector.

4.4. Financing of Telecom Projects

Another area in the implementation of NTP that needs urgent reform is the set of guidelines for financing the projects. They say that “one cannot teach old dogs new tricks”. The financing of basic and cellular telecommunications projects is a good example of this saying. The Government of India has been quite involved with setting norms for financing telecom projects. These norms includes maximum debt-equity ratios, minimum maturity time of loans etc. Many of the private operators find the norms to be too restrictive, and have asked the government for changes. Of course, in the time honored fashion, a committee has been set up to “work on norms for financing telecom projects”²¹. This is simply make-work for so called “experts”, many of whom are retired civil servants, and is very unproductive from the point-of-view of rapidly extending telecom services to the country, not to mention the welfare losses for the economy as a whole.

The issue is why should the Government of India have any guidelines at all for financing telecom projects by the private sector. The principle is simple: The market knows better than GOI what financial arrangements make sense. The private sector telecom operators are in the best position to know what financing mechanism is best for their particular venture. The international finance community is in the best position to know what conditions to set in order to respond to the financial needs of the telecom operators in India. For example, when an international bank looks at a loan application, it will ensure that the debt being carried by the company can be serviced by it, the cost of capital reflects the level of estimated risk, the debt-equity ratio is at the level which reflects commitment by the company, etc. The company itself will have to “optimize” the correct combination of long-term versus short-term debt so that both investment and working capital needs are met, and that the debt can be serviced effectively.

The government should have an open policy when it comes to the financing of telecommunications projects in India.

The issue as to what the tax implications are for the different financial arrangements are a little more complex. For instance, is the license fees an expense, in which case it is not taxable, or is should it be on the capital account, in which case there is no tax relief. The government has made the latter ruling, i.e. the license fee is a capital expense, and that should be left to stand. However, rather than change the tax code for every new infrastructure venture, the current tax code for companies should be allowed to also govern telecom projects. For example, interest payments whether on short-term or long-term debt should not be subject to tax. Other such tax mechanisms should also be in effect in the telecom sector.

²¹ See *Economic Times*, 25 March 1996; also *Times of India*, 30 March 1996.

5. ENTERPRISE NETWORKING AND THE INTERNET

During the past decade, it has become essential for a modern economy to have excellent data networking capabilities. "Enterprise networking" has become the concept that is used to identify corporate use of networks in most countries. The enterprise networking industry in India is embarking on a period of rapid growth. The current growth rate of this segment of the telecommunications industry is supposed to be as high as 60 per cent per annum, and by the end of the century, the market size is expected to be Rs. 6000 crore²². A number of entrepreneurial companies like Microland have thrived on the thirst of Indian companies for rationalizing their data communication needs.

In parallel to the growth of enterprise networking worldwide, the "Internet" has become an important "medium" for business and pleasure in many countries. During 1995, there were more articles written internationally about the Internet than any other topic²³. The Internet is a global network consisting of the interconnection of numerous data networks owned and operated by different entities. In many of the advanced industrial countries, data networks, including the Internet, have been used to transmit voice, graphics, and video, blurring the distinction between data networking and general telecommunications networking.

The Internet is one of the fastest growing segments of the global telecom market²⁴. There are more than 40 million people world-wide who use the internet for a variety of services including electronic mail (e-mail), economic and business information, entertainment, on-line shopping, discussion groups on a wide ranging topics from movies to cooking etc. In the United States, the current situation regarding the Internet is considered by many to be a "Gold Rush", and many enterprises are becoming very rich by providing many innovative uses for the Internet.

Even in India, the Internet is beginning to capture the imagination of a number of people ranging from academics to business people. As of March 1996, there were 13 e-mail providers in India, and while there is no proper estimate of the number of e-mail users, it is clear that it is becoming quite significant. A number of organizations, primarily educational and in the IT industry are also frequent users of the informational and entertainment uses available in the Internet. VSNL controls the main backbone of the Internet in India, and provides 3 kinds of services: dial-up ("shell") accounts, a TCP-IP packet switched network, and a dedicated line account.

²² For a good description of the enterprise networking industry in India, see the article "Spreading its net rapidly" in the *Economic Times*, May 16, 1996.

²³ Talk by Pradeep Kar (Microland) at the Karnataka Chamber of Commerce meeting on Telecommunications, Ashoka Hotel, April 1996.

²⁴ For a good description of the current situation viz the Internet read "Wired up or beamed in, the Net is coming, faster and cheaper", *Times of India*, 6 July 1996.

The problem is that VSNL's cost structure only allows the biggest players to become Internet service providers.

While a number of private and public institutions in India have started using networking as a vehicle to improve productivity, there is a long way to go. The Government of India has already played a major role in funding ERNET (Education and Research NETWORK), and NICNET (National Informatics Center NETWORK). In addition, the government has allowed a number of private sector operators (like DART, RPG etc.) to provide data networking services like e-mail.

A number of companies are now involved with designing and implementing enterprise networks for companies for all their data needs from e-mail to data processing, warehousing, and mining. While the local area networks (LANs) are usually provided at the customer premises by different technologies including twisted pairs, co-axial cables etc., wide area networks (WANs) are provided by leasing the infrastructure owned by VSNL, and usually using VSAT (very small aperture technology). The government in turn imposes a number of conditions for the use of the VSNL network.

While, networking in India has grown tremendously over the past five years, and the government of India has been a catalyst for this phenomenon, going forward to the 21st century requires further policy/regulation reforms. In the area of networking, the policy reform has to follow five important principles: autonomy for network operators, freedom for service providers to access networks, universal access, security, and privacy.

Autonomy: Given industry dynamics in the global telecom sector, and the intense competition among many service providers, the government should give complete autonomy to both public and private providers of enterprise networking solutions. The government should also allow new network operators to enter the business. In the case where the network is being operated by an educational or research organization, there should be an autonomous body selected by the institution that will be in charge of operating the network. Clearly, research and educational institutions do not generally have the finances to maintain and upgrade data networks, and should be supported by the government in order to provide a necessary public good for the country. In such a case, the autonomous body running the network should send a proposal to the government every 2-3 years for additional funding. The proposal should examine how the network was used to enhance research and teaching, and also justify the use of funds for the next 2-3 years. Private for-profit organizations should be allowed to make their own decisions regarding the telecommunications technology they plan to use in their networks, and to whom they will provide capacity, and at what price.

Freedom of Entry: Those who plan to provide telecommunications services on the network should be given the freedom to choose any network provider, and provide any digitized service, at a negotiated network use price. The network operator should not be allowed to refuse capacity to service providers, unless the reasons can be defended in a law court. Also the government should not be in the business in setting prices, or in making decisions about what services are allowed on the network. *In fact, the government should*

speedily drop its objection to putting voice over data on its own VSAT network. This practice does not make any sense given the technological progress in telecommunications. The ease with which voice (i.e. telephone calls) can be digitized and multiplexed onto data networks will make it extremely difficult to police voice-over-data applications in enterprise networks. However, the government should, through TRAI perhaps, ensure that price discrimination practiced by the network operator should only be based on justifiable economics, rather than on either a need to retain monopoly rights to provide services, or some other reason. The government should, through a strong consumer protection organization, ensure that the customers of the service provider are given satisfactory service at prices that are not discriminatory.

Universal Access: The government should also uphold the principle that there is universal and equitable access to ensure that every person has the right to utilize data networks, and also the Internet. This principle has two parts: (1) All those with the technological capability should have access to networking, and (2) Everyone should have the right to have the technological capability. The first consideration above is easily resolved by ensuring that there is independent regulation and arbitration to ensure that the right to communicate is not throttled by any form of monopoly pricing, and social barrier²⁵. The second consideration, is an extremely difficult proposition which requires enormous financial resources. This issue of information rich versus information poor has not been resolved in most advanced countries either, and there are no easy solutions²⁶. We shall not attempt to address this problem here. However, suffice it to state the obvious: The government of India has to really have an intensive study on how the benefits of the information revolution, other than cable television, can be made universally accessible to all segments of the society, and not be confined to a small urban elite. Following the study, the government has to make a political and financial commitment to ensure that universal access to telecommunications services is possible.

Security: In this world of interconnected networks, there is a possibility for much "leakage" of data, leading to a loss of sensitive corporate data. The level of security of the enterprise network should be a matter to be resolved between the network service provider, network operator, and the consumer, whether it is a private citizen or a corporate organization. The government should not be mandating security levels for the network. The role of the government is to be a referee whenever there are disputes as to whether the level of security agreed to was the level of security provided. In fact, if security levels are specified in legally binding contracts, it is really up to the judicial system to arbitrate disputes rather than any other government body. The only active role for the government in this case is, perhaps, to provide consumers with the latest information about levels of security that are possible with current technology available in India. Again, for this, one needs a strong consumer protection organization.

²⁵ See also the article by S. Chandrashekar in *Economic Times* entitled "Right of way on the I-way", March 1996.

²⁶ See for instance "Universal Service: Prosaic Motives and Great Ideals" by H. Sawhney in *Journal of Broadcasting and Electronic Media*, Fall 1994, and "The Socio-Economic Benefits of a Universal Telephone Network" by S. Graham et al. in *Telecommunications Policy*, Vol 20, No. 1, 1996.

Privacy: The final issue of privacy is under the joint purview of the government and the industry providing enterprise networking services. The government should set very clear guidelines as to what outcomes are considered violations of privacy. The companies providing network services should not be allowed to keep information on what the consumers are using their networks for. In many cases, it is possible for governments to also use information networks to spy on their own citizens, especially in terms of their electronic consumption behavior, and their electronic mail correspondence. These temptations must be resisted, and the consumer protection organization should also be a watchdog over government behavior.

6. SATELLITE COMMUNICATIONS

Satellite communications will continue to be important in the future. While both are “wireless”, satellite communications is different from cellular communications in that the latter does not require satellites. The National Telecom Policy encourages the implementation of cellular telephony in India. We have already dealt with concerns regarding the NTP. In this section, we will focus on satellite communications which is extremely important in the short run in India for enterprise networking through the VSAT technology, and for television entertainment. In addition, one of the main future thrusts in telecommunications would be PCS (personal communication systems) with LEOS (low earth orbital satellites) as the backbone. A personal communication system is one in which each person has a telephone, and one telephone number, which would be operable in any part of the world, and which can communicate with another telephone which is located in any other part of the world. The Indian market would have a significant impact on the future of satellite communications because of both its size, and the current situation technological situation²⁷.

Government policy in India should encourage the active participation of Indian companies in the future of satellite communications. In a previous section, we described the role played by C-DOT in the telecom sector in India. Another significant public sector Indian enterprise in telecommunications is ISRO (Indian Space Research Organization) which has given a fillip to domestic technology by designing, building, and launching satellites in India. One of the most absurd situations regarding satellite communications was witnessed during the World Cup cricket tournament that was held in March-April 1996 when the matches that were beamed to all parts of the world did *not* use the INSAT satellites belonging to ISRO. The Department of Telecommunications controls the uplinking facilities of the ISRO satellites, and is reluctant to allow these to be used for television broadcasting. Further, there is a concern that allowing private sector enterprises to use uplinking facilities may lead to the violation of national security; terrorist organizations could apparently use these as well²⁸. Based on convoluted reasoning, the

²⁷ In the 1 May 1996 issue of *Times of India*, U. R. Rao is quoted as saying that at least 15 global satellite operators are waiting to exploit the Indian market.

²⁸ Personal communication from anonymous ISRO source. In this author's opinion, India frequently overstates the concern over national security, very similar to the U.S.

Indian government having spent enormous amount of money on ISRO to develop indigenous satellites did not make good commercial use of it.

The government should take a fresh look at all of its concerns and policies regarding satellite communications. In particular, it is imperative that ISRO become part of a thriving commercial international satellite market. Given the rapid progress in telecommunications technology, and the likely development of PCS in the early 21st century, it is important that ISRO is helped to position itself to become a major player globally. The only way this will happen is if the government of India takes off its blinders regarding national security, and clearly understands the need to enhance competitiveness.

7. PRIVATIZATION OF DOT, MTNL, AND VSNL

These days, most people talk about liberalization and privatization as though go together²⁹. Liberalization involves opening up a sector and providing vehicles through which new entrants can enter the business. India has embarked on a fairly extensive liberalization program in the telecommunications sector, and if all goes well, and some of the problems with the National Telecom Policy are sorted out, there will be a number of domestic and foreign companies operating networks and providing network services by the end of this century.

Privatization involves turning over company assets wholly owned by the state to private sector shareholders. Although a number of private sector companies have entered the telecom sector, the largest players will continue to be the government enterprises, DOT that has monopoly to provide long distance service, VSNL which monopolizes international telephony and the Internet backbone in India, and MTNL that has the virtual monopoly to provide local services in Delhi and Bombay. The private operators who will provide basic and cellular services in the different State circles have to depend on the government enterprises for interconnectivity among themselves. Thus, the state telecom enterprises will continue to play a dominant role in the telecom sector.

There are a number of problems that may result if DOT, MTNL and VSNL playing a dominant role in the telecom sector in India, individually or collectively. (For the remainder of this section, we will use "DOT" to represent the collective state enterprises in the telecom sector). Based on the experience in other countries, and the economic theory of oligopolies³⁰, it is clear that DOT will be the leader, and the private operators will be followers in a number of decisions pertaining to the sector. One of the main impacts of this Stackelberg behavior will be that prices for telecom services, whether it be regulated by

²⁹ For a discussion of the privatization versus liberalization issue, see the paper by G. Anandalingam entitled "Telecommunications Sector Reform: India in a Global Perspective" in *Telecommunications: Technology Alternatives and Policy*, Indian National Academy of Engineering, Allied Publishers, 1996.

³⁰ See Anandalingam, 1996, *op cit.*, and H. S. Gopalan, S. K. Goel, and M. Singh, *Telecommunications Privatisation: A Cross Country Comparison*, Contemporary Concerns Study, Indian Institute of Management, Bangalore, December 1995.

TRAI or not, will reflect the operational efficiencies of DOT. There is no one who doubts that the telecom system operated by the government is extremely inefficient and ineffective. This inefficiency coupled with a dominant position will result in much higher prices for consumers than a true liberalization of the telecom sector would reflect. There are many other areas in which DOT decisions would dominate including the size of the interconnect switches, the number and capacity of international gateways etc.

Many have argued that there is a great need to privatize government telecommunications companies³¹. A privatized company would have a very different culture than a government company, especially if it thrown into a competitive situation. The personnel would be transformed from an employee, salaried more-or-less for life, to one whose remuneration depends on performance. In all likelihood, in India, the quality of service from a privatized telecom company will be far superior to its former state counterpart. In addition, a privatized telecom company will be more nimble in its pursuit of a whole gamut of new opportunities broadly defined as telecommunications, its core competency: wireless, entertainment, and many different types of data services.

One has to be aware of the dangers of turning a state monopoly into a private monopoly³². What could well happen is that the newly privatized company, if very dominant, would simply become a low cost producer by reducing employment; but its pricing and entry barrier strategies will remain unchanged allowing it to make enormous financial gains at the expense of competition and the consumer. Thus, in addition to privatizing the state telecom companies, the government has to also remove restrictions on the other private sector companies to compete on long distance, and international telephone services, and also allow them to provide nation-wide interconnectivity. If the entire telecom market is open to competition, the privatized state telecom companies will have to be more efficient to maintain or even keep significant market shares. The net result will be better prices and services to consumers.

Another problem with specifically privatizing the telecom companies in India is that these are among the more profitable public sector companies. Thus, the government will lose revenue, unless the valuation of these companies are done correctly. Thus, it is imperative that before a program of privatization is carried out for VSNL, MTNL etc., a very thorough analysis should be done of its financial value.

Many of the problems of privatizing a dominant public sector can be dealt with setting up a regulatory mechanism. However, the regulatory structure has to be clear about

³¹ There are many articles on privatizing telecom in India where the theme is simply an ideological one: private sector is always better than public sector, and it is always better to privatize. See for instance S. P. Kothari's piece in *Economic Times*, 19 March 1996. One should be acutely aware of the dangers of privatizing state monopolies, as well as the advantages.

³² See the discussion in Anandalingam, 1996, *op cit*.

its mandate, and the limits of its influence vis-à-vis changes in technology and industry structure³³.

8. THE TELECOMMUNICATIONS REGULATORY AUTHORITY OF INDIA

In the long run, the government of India will best serve the public by playing the role of regulatory authority, and consumer "watchdog" in the telecom sector. In the preceding sections of the paper, we have made references to TRAI (Telecommunications Regulatory Authority of India). This entity is being set up in order to have an organization which will oversee developments in the telecom sector in India, and will play the role of referee in cases of dispute between the private sector companies and the government of India, and also among the private sector entities. It is important that this body be truly independent of the government of India, have staff members who are well versed in the technological and economic aspects of global telecommunications and how it relates to the Indian case, and have sufficient authority to adjudicate on important issues.

However, as Chowdhury has pointed out, "the TRAI envisaged in the ordinance-born bill is worthless"³⁴. The reasons for this statement are clear: There is too much influence of DOT on TRAI whose membership is going to consist of retired judges and civil servants who have spent their lifetime in a command economy that is used to having a state monopoly in telecommunications. Further, it is easy for TRAI's decisions to be appealed at even the high court level. Thus, from the looks of it, the TRAI as currently constituted seems to lack the clout that is necessary to serve the public well.

If the government is serious about having an effective regulatory mechanism in the telecom sector, one of the first orders of business should be to ensure that, because of its dominant position, DOT does not use a pricing mechanism to either extract monopoly rents or to undercut the potential profitability of the private network operators. In order to effectively monitor this, it is important for TRAI to have well trained economists who will be able to assess the price structure effectively. Additionally, TRAI needs to have telecom engineers who are experts at technology assessment in order to ensure that regulation is consistent with technological progress in the sector.

Further, TRAI should play two critical roles: (1) Ensure that the private telecom companies expand rural coverage and the use of domestic technology. The mechanisms for this have been outlined in section 4 of this paper. (2) Protect telecom consumers by ensuring that quality of service provided is what has been contracted for, and there is no non-economic barriers for either universal service, or entry of new service providers. We have also detailed these issues in section 5.

³³ For a good exposition of this issue, see the article by Trebung, H. M. (1994), "Privatization and the Public Interest Is Reconciliation Through Regulation Possible?", in B. Mody, J. M. Bauer, and J. D. Straubhaar (eds.), *Telecommunications Politics*, (Mahwah, New Jersey: Lawrence Erlbaum Associates Publishers), 1995.

³⁴ T. H. Chowdhury, "Raising the issues on hold", *Economic Times*, 15 May 1996

Looking further into the future, the likely convergence of telecommunications, computing, entertainment, and publication (news, fiction, and non-fiction) in India will require a similar convergence in the approach to policy and regulation. In most countries, telecom is subject to price regulation, and entertainment and publication to content regulation. The computing industry has essentially evolved without too much regulation. As Blackman has pointed out, "the coming together of these [different activities] will lead to a collision of regulatory traditions and forces us to think carefully about how we should regulate multi-media"³⁵. The TRAI should be the primary body providing advice to the government of India on how to rationalize regulations in the different sectors, and make them consistent with each other. Indeed, one of the most important roles of TRAI would be to be forward looking.

9. CONCLUDING REMARKS

In this paper, we have argued that much of the policy of the Indian government directed at the telecommunications sector does not pay sufficient attention to technological progress in the sector, or to the global changes in industry structure. We have examined the areas of enterprise networking (including the Internet) and satellite communications where one needs urgent reform to take advantage of inherent industry dynamics which would give a boost to the Indian economy. By trying to regulate a modern fast paced technology sector with without being sensitive to the current state-of-art, the Indian government will always put itself in the role of an ineffectual policeman. The Telecom Regulatory Authority of India (TRAI) will be more effective if it plays the role of (1) encouraging competition and universal access including extensive rural penetration (as opposed to coverage), and (2) safeguarding consumer rights including prices, service quality, and privacy.

We also examined the 1994 National Telecom Policy (NTP) and have pointed out a number of problems with it including the license fees, interconnect agreements, and the regulation of financing of the projects. While trying to liberalize the telecom sector in India, the implementation of NTP also tries to safeguard the dominance of DOT (and its constituents MTNL and VSNL). This myopic policy of allowing DOT to be the dominant player in all of the circles will encourage the private sector telecom companies to "game" the system in a number of ways, and the government will also find itself unable to reach the objectives outlined in the 1994 National Telecom Policy: rural coverage, and the use of domestic technology. We have outlined policy reforms for providing incentives for the private sector companies to increase their rural coverage, use technology developed by domestic enterprises (eg. C-DOT), and not set "monopoly prices" for basic telephony.

I would like to end this paper by a personal observation which may be more vital than all of the policy prescriptions outlined above.

One of the first things one notices about the Indian information technology industry is the *speed* at which technological advancement is being pursued, and the *slowness* that remains due to peoples work ethics and archaic procedures. For example, almost every

C R Blackman, "Editorial", *Telecommunications Policy*, Vol 20 no 1 1996

faculty member at the Indian Institute of Management, Bangalore where I am a Visiting Professor has as good a desk-top computer as my colleagues at the University of Pennsylvania have, if not better. I can download software from a "server" using the local area network whenever I need it, and then return it after I have finished, thus saving the need to have a lot of memory in the desktop computer. The telecommunications technology in my workplace is near state-of-art in relation to universities in the U.S.

However, if there is even a minor problem in the computer center at IIMB that houses the server, it takes many hours to fix because of the amount of paperwork that needs to be attended to, the work ethics of the engineers, and sometimes, what I consider to be a agrarian attitude to an advanced industrial technology: approximate solutions to the problem which make a bad situation worse.

Work ethics and archaic procedures are currently making people question the efficacy of telecommunications liberalization in India³⁶. One of the most vital issues of providing interconnections to the private companies operating in state circles has taken so long to finalize that HFCL has used this as an excuse to refuse to pay the license fees³⁷. One also cannot understand, from an international perspective, why everything should be in limbo, just because there is an election. Why should all previous agreements be subjected to the scrutiny of a new government if one is in a modern economy? Why do all procedures have to go through many layers of analysis and examination in the government, especially in a situation where work is done at a pace quite at variance to the urgency for improving the infrastructure?

In the end, what will improve India's global competitiveness³⁸ is the ability of the system to increase productivity very quickly. In an arena like telecommunications which is vital both as infrastructure to improve the standard of living, and also as an essential ingredient to make India a truly global player in the information technology sector, it is necessary to speed up both government procedures and change the work ethics. Otherwise, India will continue to play catch-up, or languish near the bottom of any measure of global competitiveness.

³⁶ There are newspaper accounts of this frequently, see for instance "Telecom projects hit by unrealistic gestation" and "Cellular operators fear delay over frequency allocation" in *Times of India*, 11 April 1996

³⁷ See the Editorial in *Economic Times* of 28 June 1996 entitled "Exit HFCL" where the government is criticized harshly for all the unnecessary delays

³⁸ The Geneva based World Economic Forum has published a report entitled *The Global Competitiveness Report 1996* (extracted in *Business Today*, June 22-July 6, 1996) which ranks India 45 out of 49 countries