Sustainable Development Policy Institute

Development of Information and Communication Technologies in Pakistan: Keeping Pace With the Evolution

SDPI's Study Group
Current Status of Policy Recommendations
(1993 - 2020)
SDPI’s Study Group on Information Technology and Telecommunications

Current status of Policy Recommendations

(1993-2020)

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About Sustainable Development Policy Institute

Charting the Course of Research Excellence

Founded on 4 August 1992 in a small office in the capital of Pakistan with a handful of dedicated employees, the Sustainable Development Policy Institute (SDPI) is now one of the South Asia's leading non-partisan policy research organizations. It provides the global development community representation from Pakistan and the region as a whole. Over the past 28 years, it remained staunchly committed to the mission it has set for itself upon inception:

*To catalyze the transition towards sustainable development, defined as the enhancement of peace, social justice and well-being, within and across generations.*

In Pakistan, SDPI is the only organization that has been consistently ranked internationally by the Global Go To Think Tank Index in different categories since 2016.

Where We Come From?

The Institute's genesis lies in the Pakistan National Conservation Strategy (also known as Pakistan's Agenda 21), which was approved by the Federal Cabinet in March 1992, outlined the need for an independent non-profit organization in the country to serve as a source of expertise for policy analysis, evidence-based research and training services.
What We Do?

SDPI functions in an advisory capacity by carrying robust research, policy advice and in an enabling capacity by strengthening other individuals and organizations with resource materials and training. Specifically, the Institute’s broad-based yet holistic mandate is to:

- Conduct evidence-based research, advocacy, and trainings from a broad multi-disciplinary perspective,
- Promote the implementation of policies, program based on sustainable development,
- Strengthen civil society and facilitate civil society-government interaction in collaboration with other organizations and activist networks,
- Disseminate research findings and public education through media, conferences, seminars lectures, publications, and curricula development, and
- Contribute to building national research capacity and infrastructure.

How We Do It?

The diverse array of projects and programmes from inclusive economic growth to institutional governance, from trade, regional connectivity, energy economics to climate change, from food, water and human security to education, from sustainable industrial growth to hazardous waste management, from countering violent extremism and religious tolerance to peace building and gender equality, that SDPI has been involved in over the past 28 years, outlines the following core activities:

- Providing policy advice to the government
- Facilitating and organizing forums for policy dialogue
• Supporting in-house, local, regional and international academics, students, and researchers
• Publishing critical research for public and private sector use
• Acting as a conduit for North-South and South-South dialogue
• Creating an environment for information dissemination and training
• Campaigning for regional advocacy and networking.

Why We Do It?

The Institute's efforts remain unwavering in its vision to become a Centre of Excellence in the country and South Asia by producing knowledge that not only enhances the capacity of the state to make informed policy decisions, but also engages civil society and academia on issues of public interest for the betterment of current and future generations.

How We Reach Out?

Since its inception, SDPI has been organizing seminars, and national and international conferences that are innumerable in number. The Sustainable Development Conference (SDC) series has become a flagship event of the Institute that not only provides a forum for highlighting SDPI's own research, but also offers space to other researchers and academics from South Asia in particular and across the globe in general to share their work and engage in constructive dialogue with fellow intellectuals, movers and shakers from the public and private sector, students and the general public.
Preface

Since 1993, the SDPI’s Study Group on Information Technology and Telecommunications has been meeting periodically to discuss the challenges that Pakistan is likely to face as a result of this rapidly evolving field. So far, the group has held 62 meetings and done some studies. The emphasis of such studies has been on the efficiency and efficacy of Information and Communication Technologies (ICTs) infrastructure and services, regulatory issues, taxation, connectivity, and support to institutions. The Study Group has been bringing to bear the experience, opinions and ideas of engineers, scientists, economists, academics, business people and other relevant experts’ knowledge in the field.

With hindsight it is now easy to recapitulate that without moving with the evolution of ICTs, what would have been our fate during the COVID-19. Although, Pakistan’s ICT infrastructure and Internet penetration is not at the stage where it should have been, but the current level has served us fairly well. This has been separately explained in this document.

Contained in this publication are the recommendations of the group submitted to the policy makers and other stakeholders from time to time. It also indicates the status of various recommendations. Also included in this document are the recommendations through other studies/policy briefs prepared by SDPI to draw the government’s attention towards the importance of the ICT sector and its needs. Two policy letters/papers written to the Prime Minister in 1993 (when the group used to function from
the platform of Prime Minister’s Committee for Research and Analysis) and the other to the Government of Pakistan in 1995, are also annexed. The main purpose of these papers was to recommend the way forward to successfully enter the twenty first century by enhancing the pace of development in the emerging field of ICTs.

SDPI expresses with satisfaction that a number of Study Group’s recommendations have either been implemented, or are in the process of implementation as shown against these. Policy making institutions, regulatory set-up and parliamentary committees are now fully cognizant of keeping pace with the evolution of ICTs and meeting the challenges that present themselves. Input/feedback from the readers would be welcome.

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Coordinator SDPI’s Study Group on Information Technology and Telecom  
December 2020
COVID-19: What if ICTs Hadn’t Evolved to the Current Level?

During the prevailing deadly COVID-19, the governments had to enforce lockdowns, and social distancing measures. According to a brief of the United Nations, by April 8, 2020, around 86 per cent (167 countries) of the member states had included information and guidance in their portals. Many countries have designed new apps and services to help fight the pandemic and engaging the people in following the standing operating procedures.

In these difficult times, ICTs have played a key role in keeping the people informed about the dangers and to adopt measures to fight the virus. ICTs have proved their importance to face the current and future challenges and enhancing resiliency against future pandemics.

In facilitating the essential services, learning and development and healthcare, ICTs have been of utmost importance. The evolving technologies have provided accurate and up-dated information to the people. National portals and mobile apps have played a crucial part in keeping the wheels of economy, education, health and food deliveries moving. Artificial intelligence has been an important resource in making healthcare services available through virtual doctors.

If ever there were any doubts about the criticality of ICTs for the nation, the horrific pandemic has laid such doubts to rest. One
shudders to think, if Pakistan had been at the same level of teledensity (3 per cent) as it was in the nineties, what would have been our fate during the present catastrophe. **It is in this context that the policy recommendations of the SDPI’s Study Group over the last 27 years acquire important relevance.** Over the decades, Pakistan has made significant progress in keeping pace with the emerging technologies because it has been focusing on building its ICT infrastructure and updating its services. However, alarm bells are still ringing because we continue to rank below all our neighbors except Afghanistan in almost every International ICT Index. Our Internet penetration is below 40 per cent and even that is not of the best quality. For Internet penetration, underserved and un-served areas of the country must receive urgent attention of the government. The focus must be on building optic fiber infrastructure for high speed and broadband Internet to effectively face the future challenges. This is, what we are lacking.

SDPI’s Study Group on ICTs will continue to engage the policy makers, legislators and regulators in the imperatives of keeping pace with the evolution to face future pandemics. ICTs must be a top priority of the government to ensure equal benefits to the people who are living in remote areas.
Study Group on Information Technology and Telecommunications\textsuperscript{1}

Important Recommendations Submitted to Policy Makers

1. During the last 27 years (August 1993 – to-date) the Study Group held 62 meetings. The emphasis in the deliberations has been on the efficiency and efficacy of the information and communication services, and infrastructure in Pakistan, higher tariffs and duty structure, regulatory issues, software industry, inadequate Internet connectivity, support to academics and researchers, and institutional development. The Study Group has brought to bear the experience, opinions, and ideas of important scientists, businessmen, academics, and technical experts knowledgeable in computers, telecommunications, data networks, and satellites.

Improvement in Information and Communications Sector

2. In early 1993, the Study Group formulated some important recommendations for the Federal Government for an overall improvement in the Information and Communications Sectors (Annexure A). Realizing the urgent need for enhancement and improvement in data networks to enable Pakistan to reap the fruits of information revolution, particularly the Internet the Group sent the following recommendation to the then government: -

2.1. The country is in dire need of establishing “ELECTRONIC HIGHWAYS” with zeal comparable to the interest in

\textsuperscript{1} This group comprises consultants, scientists, educationists and economists, who meet periodically to discuss and evaluate current developments in the rapidly evolving fields of telecommunications, computers, data processing, networking, mass media and other issues related to the generation, processing, management as well as the use of information. The purpose of these meetings is to create awareness amongst both public and private sectors of the importance of exploiting useful information resources, address existing difficulties in this respect, foresee future developments which might have an impact on the national economy and society at large. The group also undertakes the preparation of policy and planning recommendations that could subsequently be pursued by the agencies concerned.
building modern motorways and road networks. *(Implemented. Ongoing)*

2.2. The private sector should be allowed free participation in the establishment and operation of private and public data networks to cater to a potentially very large demand for such services which is presently suppressed due to the poor service in this area. *(Implemented. Ongoing)*

2.3. Rationalization of the existing data tariffs of Pakistan Telecom Corporation (then PTC) for data transfer, which is extremely exorbitant by international standards and improve its services, which is unreliable at best. *(Implemented. Data rates are on the decline)*

2.4. Encourage the use of electronic information interchange by government agencies and make sure the use of these services by the private sector, banks, travel and hotel businesses, and traders. Establishing network links between universities, research establishments, and libraries would be an important step in strengthening our abysmal educational facilities and is a prerequisite for supporting first-rate academic and scientific research. *(Implemented. Infrastructure has improved considerably linking educational institutions throughout the country.)*

2.5. The government policies on computer and communication equipment must be further rationalized. The present surcharges on equipment and duties on spares should be removed in order for the country to truly benefit from the electronic revolution, which can immediately open up enormous economic and employment opportunities. *(Under Implementation. The taxes and duties on computers are minimal, however, there are no incentives for communication equipment.)*

3. The government’s response was positive which is discernable from the various steps it has taken in the direction of privatization and
liberalization of this sector. *(Implemented. The sector has been deregulated.)*

4. The Study Group agitated for the establishment of a regulatory body to respond to the changing needs of the society. *(Implemented. The government established the Pakistan Telecommunications Authority.)*

5. We have been endeavouring to meet the Parliamentary Committees for Information and Communications to explain to them the requirements of the changing times in the context of information and communications and suggest various policy actions to catch up with the time. *(Not much of success)*

**Letter to the Government of Pakistan**

6. In 1995, the Study Group sent a memorandum to the Government of Pakistan (Annexure B) depicting the prevalent scenario and making important recommendations.

7. It explained that the Study Group had provided a platform for face-to-face meetings between the data network operators, service providers and officials of the Pakistan Telecommunications Corporation and Pakistan Telecommunications Authority. These meetings had helped understand each other’s problems, criteria for government policies and future planning, etc. These meetings had also helped in the solution of some problems. *(Implemented. Regular interactions between the stake holders are ongoing.)*

8. The Study Group proposed that access to international networks of information and knowledge must become one of the top priorities of the nation. It was an essential prerequisite for moving into the 21st century with dignity. This goal needed urgent attention from the highest levels in the country.

9. In view of this, the following actions were recommended:

9.1. **President’s Task Force on Electronic Communications:** A task force should be constituted to frame policy on electronic communications, with the following mandate:
9.1.1. To take stock of the current status of telecommunications infrastructure in Pakistan and other related issues, including the relevant policies and plans. *(Telecom infrastructure over the years has improved considerably in the urban and rural areas. The Universal Service Fund has played a key role in the development in unserved areas).*

9.1.2. To formulate a course of action, taking into account the market forces and with a view to making rapid acquisition of new technologies in the field of telecommunications. *(Pakistan is not far behind in adopting new technologies. 3G & 4G has improved the data rates, Fiber to the Home (FTTH) has linked the businesses and homes for unlimited bandwidth capacity).*

9.1.3. To recommend an appropriate legislative framework to regulate future telecommunications services. *(Under implementation. Most of the directives as envisaged in Telecom Policy 2015 especially Over the Top (OTT) services have not been implemented).*

9.2. **Creation of a Regulatory Body:** A regulatory body, i.e. the Pakistan Telecommunications Authority (PTA) was created. However, its mandate was not very strong. It should have been a fully independent body, consisting of eminent professionals in telecommunications, engineering, law, finance, economics, and other related disciplines, which could respond to the changing needs and requirements of the society. PTA remains a toothless body under the authority of the Cabinet Division. *(Under implementation)*

9.3. **Full Internet Connectivity:** Full internet connectivity should be provided immediately. *(Implemented)*

9.4. **Establishment of a High-Speed International Link:** The planned link between Karachi and the submarine cable at
Fujairah should be installed at the earliest possible opportunity. This should be followed up by establishing the link to the Trans Asia Europe terrestrial cable. (Pakistan is now connected with five undersea cables, including the one at Fujairah. However, all these cables have their landing stations at Karachi. To give diversity, a landing station at Gwadar is of utmost importance.)

9.5. **Lowering of Data Transmission Tariffs:** The entire PTC tariff structure, and in particular the tariffs on international data transmission and cost of leased lines, should be lowered and brought in line with other countries. Access to the international networks by academics should be free. The cost for this should be met by the universities that should be given liberal grants for this purpose. (Ongoing with Transworld Associates (TWA) as the submarine cable operator the data rates are coming down in line with other countries. Government has given some incentives to academia, however, further relaxation is required.)

9.6. Free or subsidized access for universities, research organizations, libraries and public institutions to international databases and online information services should be provided. (Not implemented)

9.7. **Elimination of Import Tariffs on Computers and Communications Equipment.** Although computers are subject to lower tariffs, they are still liable to various surcharges amounting to 30 per cent of the value. Besides, computer software, computer peripherals (such devices as printers, data storage units and modems), and up-gradation accessories are subject to higher tariff duties. These duties and surcharges should be eliminated to encourage the information industry. (Under implementation. Tariffs on the import of computers have seen a downward trend, however, there is no relaxation on the import of communication equipment.)
9.8. **Rationalization of Licensing Agreements for Private Data Networks**: Present licensing agreements have too many flaws and impose harsh conditions which would hinder rather than facilitating the progress towards the establishment of information and communications infrastructure in the country. The standard agreements should be reviewed to produce more balanced arrangements. *(Under implementation. The licenses still contain very tough rollout obligations.)*

9.9. **Support for the Software Development Industry**: Support can take the following forms:

9.9.1. Declaring software development to be an industry, in order to enable it to access financial support from the financial sector. *(Implemented)*

9.9.2. Providing software industry with fiscal incentives. *(Implemented)*

9.9.3. Establishment of technology parks, with high quality services at low cost. *(Under implementation. Technology parks have been established in some major cities, but are also needed in other cities)*

9.9.4. Support for training of professionals in this area. *(Under implementation)*

9.10. **Removal of Restrictions on Use of Data Communication Equipment**: Unless directed otherwise, all equipment approved by the United States Federal Communication Commission (FCC) should automatically be considered approved for use on PTC lines. *(Not implemented. NOC is required from PTA on imports of communication equipment)*

9.11. **Removal of Restrictions on Public Information Sources**: Many public information sources are subject to restrictions, mainly obsolete, on grounds of security. These sources
include satellite and aerial photographs, detailed maps, and even statistical information on electronic format (e.g., government statistical, meteorological, and financial data). Since these data are available from many sources, they do not prevent any large organization from accessing or converting them for its own use. They only obstruct research scholars, analysts, and others, who may be interested in these sources. *(Under implementation)*

**More Recommendations Made by the Study Group Over the Years**

10. **Facilitating Broadband:** In order to maximize the benefits of fast data rates available with 3G/4G technology across the socio-economic divide, the Ministry of IT should take lead in coordinating the national broadband plan. The plan should cater for the needs of all stakeholders, including the provincial governments. Universal Service Fund and ICT Research and Development Fund (R&D Fund) can play a major role in the execution of the national broadband plan.

10.1. An effective Information and Communications plan plays a major role in the development of a society. Therefore, a new and improved version of national IT and Telecom policy by the government, framing a clear, multidimensional, stakeholder-friendly to cater for short-term and long-term objectives must be made. *(Implemented. Telecom Policy 2015 is in place)*

10.2. Software industry shall play a major role in bringing new contents to match the increased data speed of 3G/4G. Therefore, the traditional Research and Development have to be modified to discover and create new content knowledge enabling development of valuable new products, processes, and services. *(Under implementation. A company R&D Fund has been established where the telecom operators remit a certain portion of their revenues)*
10.3. The real success of 3G/4G technologies shall depend on how the users respond. Therefore, following action shall benefit in absorbing the technology:

10.3.1. There should be reduction in the cost of 3G/4G supported handsets, as the same is out of reach of many Pakistani subscribers. (*Under implementation*)

10.3.2. Public awareness campaign must be launched to educate the public regarding benefits of 3G/4G services through workshops as well as electronic, print and social media. (*Implemented*)

10.4. There must be an inbuilt approach and obligation of telecom operators for capacity building and training of Pakistani telecom professionals, who currently are not competitive in international market due to lack of working experience on advanced technologies such as 3G/4G. (*Under implementation*)

10.5. The Next Generation Mobile Services (NGMS) provides a high-speed pathway to benefit from the e-services. The services like E-Education, E-Governance, E-Health and E-Agriculture require a broadband eco-system from the government, the regulator, and the telecom industry. (*Implemented*)

**Pakistan’s Highly Taxed Telecom Market**

11. **Fallout and Impact:**

11.1. The government is collecting Withholding Tax (WHT) from those who are not even liable to pay their Income Tax (as per law), which is illegal as per the government’s own tax laws. A mechanism should be formulated to charge withholding tax from only those subscribers, who are otherwise taxable and are liable to file their tax returns. Furthermore, rate of WHT should be reduced from 14% to 10% to treat the telecom
sector equitably among other sectors and peer economies. 
*(Not implemented)*

11.2. GST on telecom services (ranging from 18-19.5%) should be reduced to the average rates (i.e. 16%) as in other sectors. *(Under implementation because, only Federal Excise Duty (FED) has been reduced on telecom services from 18% to 17%. However, all Provinces are still collecting 19.5%)*

11.3. Telecom sector should be classified and given “Industrial Undertaking” under clause (b) of section 2(29C) of the Income Tax Ordinance 2001 as earlier promised by the government during NGMS auction in 2014. *(Not implemented)*

11.4. Federal Board of Revenue (FBR) should revert back the increase in customs duty from 2.15 per cent to 0.5 per cent for facilitating telecom operators to expedite infrastructure roll-out hence encouraging them to provide quality broadband services to consumers. *(Under implementation)*

11.5. SIM Activation Tax must be removed as this tax was levied in lieu of tax on import of handsets. Now, when another tax on import of mobile phone handsets (ranging from Rs300 to 1000) has been imposed, tax on SIM activation/supply is unjustified. *(Not implemented)*

11.6. Owing to fear of immediate loss, the government is not taking any bold step in rationalizing the tax rates. Use of ICT for easy collection of taxes can be one way of overcoming this fear. *(Not implemented)*

11.7. We are not addressing the right audience; we should also engage officials from the Ministry of Finance and FBR to have an impact in connection with the rationalization of taxes.

11.8. The government should collect taxes, but on lower rates. It will ensure higher collection. *(Not implemented)*
11.9. Liaison with media, judiciary, and consumer groups to highlight the issue should be undertaken. *(Under implementation)*

11.10. A focused effort should be made to convince provincial governments to withdraw sales tax on broadband services. *(Under implementation)*

11.11. The revenues collected from consumers by the government must be audited by some professional body. *(Not implemented)*

11.12. To reduce reliance on taxes, we should also explore other revenue streams such as export of our services to foreign countries. *(Under implementation)*

11.13. An independent and detailed incidence analysis of telecom taxes should be conducted to assess the burden on various segments of the society. *(Not implemented)*

11.14. A macroeconomic assessment is required to know how the current tax and regulatory regime has reduced the competition in the telecom sector. This may be undertaken by Competition Commission of Pakistan (CCP). *(Not implemented)*

12. **Spectrum Management**: Spectrum blocks (i.e. 10 MHz) made available for current auction may not be enough for utilizing full potential of Broadband (3G/4G) services. In this regard, more spectrums are made available after reforming the exiting spectrum. *(Under implementation)*

12.1. Multichannel Multipoint Distribution Services (MMDS) Spectrum (200 MHz block), currently being used by Sun TV may be vacated and used for offering Broadband Services in Pakistan. *(Under implementation. Has been marked for 5G)*

12.2. A lot of delay has already been made. Pakistan cannot afford to delay the process further. Any more delay in auction will adversely impact economic growth potential that can be
otherwise realized immediately. *(Implemented. Auction conducted)*

12.3. Base price setup for auction of spectrum is adequate as it has been derived after extensive study/consultation. It may also be kept in mind that the subject auction and subsequent implementation will generate a lot of economic activity thus resulting in value addition for the country. *(Implemented)*

12.4. The Information Memorandum (IM) may be strengthened further. It may impose strict obligations on the successful bidder in terms of roll-out, adding value to the country’s economy and Transfer of Technology. The spectrum auctioning process must not be aimed at mere generation of revenue but should place performance obligations on the licensees. *(Implemented)*

12.5. Clubbing of Spectrum Auction with Award of License has caused confusion among prospective investors. It may be more appropriate if these two processes are carried out separately. *(Implemented)*

12.6. Following factors will play an important role for making Broadband service a success story in Pakistan:

12.6.1. The cost of handsets would be very important. While 3G handsets cost around US$ 30, the cost of Long-Term Evolution (LTE) enabled sets (US$ 300) is still out of reach of many Pakistani subscribers. *(Under implementation)*

12.6.2. Tariffs of broadband services should be revised downward. *(Implemented)*

12.6.3. Awareness of subscribers regarding broadband services should be an ongoing process. *(Implemented)*

12.7. In view of current confusion over adopting 3G technologies or jumping directly to 4G technologies, it is suggested to
adopt a hybrid approach, i.e. utilizing the mix of fiber optic (for transmitting highly speed internet) and Wireless Fidelity (Wi-Fi) hotspots for providing high speed access to users. The 3G mobile broadband is an evolutionary process to optimize current assets, before moving towards new and further advanced systems network radio interfaces and spectrum. However, 4G technologies are inevitable and government must also plan a roadmap for acquiring these technologies which are currently used on trial basis in various countries including India. (Implemented)

12.8. The current national IT and Telecom policy is outdated and the government must work on framing a clear, multidimensional, stakeholder-friendly policy, plan targets and provide an implementation roadmap that can cater our both short-term and long-term objectives. (Implemented. The Ministry of IT and Telecom issued a Telecom Policy in 2015.)

12.9. There must also be an inbuilt approach and obligation for telecom operators for capacity building and training of Pakistani telecom professionals who currently are not competitive in international market due to lack of working experience on advanced technologies such as 3G/4G. (Implemented)

12.10. Government must immediately appoint a minister for IT and Telecom and consider constituting a highly competent and professional team to manage telecom entities in the country. In view of global rapid development in IT and Telecom, and an extremely competitive environment, further reliance on ad-hoc arrangements cannot serve any purpose for the country. (Implemented)

Countering Cyber Threats

13. Historically, telecom intelligence has been the primary information gathering tool most popular with the security agencies. In modern-
day forensic environment as well as in Pakistan, the terrorists bank heavily on modern telecommunication channels to communicate. However, our law-enforcement agencies are way behind in catching up with the technologies. Therefore, there is an immediate requirement for our security and intelligence agencies to be in step with the technology to be able to use it effectively. *(Implemented)*

14. The perception that SIM is the cause of all ills is misleading and without any evidence. There is a need to create an ecosystem where all the stakeholders, the law-enforcement agencies, telecom industry, and the regulator should sit together, build a trust level and take advantage of the latest trends in ICT to be ahead of the criminals. *(Implemented)*

15. Cybercrime is one of the biggest threats facing Pakistan, because the terrorists are shifting their global communication to cyber space. Pakistan is one of the few countries where the cybercrime law is yet to be implemented. Its full implementation must be ensured. *(Under implementation. Prevention of Electronic Crimes Act (PECA) is in place. However, PECA should be revised to ensure that basic rights are not infringed)*

16. Equally important is an effective cybercrime unit to ensure that the investigation and subsequent prosecutions are handled by ICT professionals. Presently, National Response Center for Cyber Crime (NR3C), a setup under FIA, is responsible for the cybercrimes. This organization is short of professionals and lack modern techniques. It is, therefore, imperative that a dedicated and an effective unit must be created with the capacity to enforce the laws. *(Not implemented. NR3C lacks capacity and experts.)*

17. **Grey Traffic.** Taxes on IT and telecom services and infrastructure are relatively highest in Pakistan. This is not only deterrence to investment, especially the foreign direct investment; it’s also an incentive for illegal gateway exchanges. The government should reduce such taxes which would result in reducing grey traffic because of reduced call rates. This core issue must be addressed sooner than later. *(Under implementation)*
SIM Related Issues

18. Repeated re-verification of SIMs must be avoided by effective planning. (*Under implementation*)

19. Deadline for re-verification of SIMs should be extended to properly conclude the process. We need to strike a balance between the vital need of re-verification/registration of SIMs and the convenience of the people, especially of rural areas. (*Implemented*)

20. To minimize loss in revenue to the mobile operators and tax loss to the government, efforts should be made to block a minimum number of SIMs. (*Implemented*)

Infrastructure Sharing

21. The study group, after an in-depth discussion, made the following recommendations for consideration by the government:

21.1. MoIT should make passive infrastructure sharing mandatory for the telecom operators in the revised policy for broadband / telecom. This would not only accelerate the spread of broadband, but it would also conserve national resources. (*Under implementation. It has been included in Telecom Policy 2015*)

21.2. PTA should be made fully independent/autonomous so that it might effectively regulate all telecom issues/matters. (*Under implementation*)

21.3. PTA should effectively play its role in facilitating infrastructure sharing in a non-discriminatory manner. It should also provide some incentives for such sharing. (*Under implementation*)

21.4. It should be made mandatory for all licensees to announce on their websites the details regarding existing and future infrastructure installations available for sharing with other service providers. (*Not implemented*)
21.5. PTA should specify a time limit for negotiations / agreement between the access seekers and access providers. *(Under implementation)*

21.6. PTA must actively check anti-competition practices of PTCL which are seriously harming smaller companies. Such practices include cross-subsidy, undercutting Digital Subscribers Line (DSL) operation in retail pricing and increasing inter-exchange bandwidth prices. *(Under implementation)*

21.7. Adequate spectrum allocations should be made for wireless broadband and problems of Right of Way (ROW) for wired broadband should be addressed. *(Under implementation. ROW has not been addressed adequately)*

21.8. MoIT needs to be more active in providing policy guidelines and reviewing earlier policies in the light of changing situations. *(Under implementation)*

22. Tariff and Duty Structures

22.1. **Lowering of Data Transmission Tariffs.** The entire PTC tariff structure and in particular the tariffs on international data transmission and cost of leased lines, should be lowered and brought in line with other countries. Access to international networks by academics should be free. The cost of this connectivity should be met by the universities who should be given liberal grants for this purpose. *(Under implementation. Whereas the tariffs are on the decline, the academia has not been given effective concessions)*

22.2. **Elimination of Import Tariff on Computers and Communications Equipment.** Although computers are subject to lower tariffs, they are still liable to various surcharges amounting to thirty per cent or more of their value. Computer software and peripherals like modems, storage and printing devices face even higher tariffs and
duties. These should be eliminated immediately to develop and promote the information industry. (Under implementation)

23. Regulatory Issues

23.1. Removal of Restrictions on Use of Data Communications Equipment. Unless directed otherwise, all equipment approved by the US Federal Communication Commission (FCC) should automatically be considered approved for Over the Counter (OTC) lines. (Not implemented. All imports of communication equipment require a No Objection Certificate from PTA.)

23.2. Removal of Restrictions on Public Information Sources: Many public information sources are subject to obsolete restrictions, mainly on grounds of security. These sources include, satellite and aerial photographs, detailed maps, and even statistical information in electronic formats, e.g. government’s statistical, financial, and meteorological data. Since these data are available from many sources anyway, they do not prevent any large organization from accessing or converting them for its own use. These restrictions, however, obstruct research scholars, analysts and others who might be able to provide useful advice to the government. (Not implemented)

23.3. Rationalization of Licensing Agreements for Private Data Networks: The present licensing agreements have too many flaws and impose harsh conditions that hinder rather than facilitate the progress towards the establishment of information and communication infrastructure in the country. The standard agreements should be reviewed to produce more balanced arrangements. (Under implementation)

23.4. Enforcement of Copyright Laws: Unless the respect of intellectual and professional property is enforced at the marketplace, local software industry will not be able to take
off. It is only a misconception that enforcement of patent and copyright laws goes to the benefit of multinational software houses only. On the contrary, companies like Microsoft (and even Warner Brothers) have already succeeded in curbing piracy of their products considerably. Even in the absence of an adequately strong public policy regarding copyright, they have accomplished it by pooling resources with the local law enforcement agencies in Karachi. These are only the much less resourceful local software developers that cannot survive the privacy. (*Under implementation*)

24. Connectivity

24.1. **Full Internet Connectivity**: Full internet connectivity should be provided through the government and private sector service provides immediately. (*Not Implemented Internet connectivity is only about 40%*)

24.2. The planned link between Karachi and submarine cable Fujaira should be installed at the earliest possible opportunity. This should be followed up by the establishment of the link to Trans Asia Europe terrestrial link. (*Implemented, Submarine link is established with Fujairah, and Pakistan is now linked with five submarine cables.*)

24.3. With the involvement of private sector, satellite communication industry should be encouraged. Low and high orbit communication satellite should be launched using Central Asian infrastructure. (*Under implementation*)

25. Support to Academics and Researchers

25.1. Supportive tariff policy for universities, research organizations, libraries, public institutions for accessing Global Database and online information services. (*Under implementation*)

25.2. **Support for Software Development Industry**. Such support can take several forms:
25.2.1 Declaring Software Development to be an industry, in order to enable it to access financial support and other privileges from financial and government sector. *(Implemented)*

25.2.2 Providing software industry with fiscal incentives. *(Implemented)*

25.2.3 Establishment of technology parks with high quality services at low costs. *(Under implementation)*

25.2.4 Support for training of professionals in this area. *(Under implementation)*

26. Institutional Development

26.1 Establishment of National Database Development Program (NDDP): In order to develop the digital content to be distributed on the proposed high speed and high capacity information infrastructure, an independent trust should be formed with an initial endowment funding. Its charter will be to develop a wide variety of indigenous databases and linkages to global information resources. Private sector should be encouraged to establish NDDP. Development should be phased out in the following way:

26.1.1 Machine Readable Data. Different types of data already exist with isolated governmental, non-governmental and corporate institutions. These include newspapers, on-line services providing information on virtually any subject ranging from stock trading, finance environment, sociocultural issues to political affairs. These data are already stored in various digital formats and can be integrated into any type of computer-based information network for public access, readily and cost effectively. *(Under implementation)*
26.1.2 **Semi-Machine-Readable Data.** The case law digests, microfilsms and audiovisual libraries from National archives and Institute of Folk Heritage should be organized into digital formats for high-fidelity storage and electronic distribution. *(Under implementation)*

26.1.3 **New Formation and Linkages.** This phase should include the development and integration of trade directories, phone book, mailing lists, opinion polls, consumer service bureaus and global employment exchange. *(Under implementation)*

27. **Launching Distant Learning Programs Online**

27.1 Several universities in different parts of the world have already started offering undergraduate to postgraduate programs on-line, besides other courses. Syracuse, Walden and Phoenix universities are a few among them; Allama Iqbal Open University (AIOU), Islamabad has a nationwide network of distance learning programmes through which it administers its curricula. In addition to using postal mail system, AIOU can offer online courses to those who own or have access to computer. Besides delivering its programmes, it will dramatically boost the awareness of life on the information highways. *(Under implementation)*

27.2 As part of the same package, this new network can also start programmes from some of the universities mentioned above. Syracuse has already evinced its keen interest to collaborate in the launch of such programmes and networks. *(Under implementation)*

28. **Provincial Infrastructure**

28.1. The provincial governments should be given go ahead to establish their own comprehensive information and communication infrastructure to cater for the needs for the
educational institutions, public sector organizations, judicial institutions, law-enforcement agencies, health sector setups, development agencies, etc. This will involve the establishment of Local Area Networks (LANs) and Wide Area Networks (WANs). (Under implementation)

28.2. The provincial governments should be allowed and encouraged to establish their own full internet nodes for external communications. These nodes could use the PTC’s infrastructure for such other infrastructure already established/ being established or the provincial governments may establish their own link for external communications. (Under implementation)

28.3. The provincial governments may establish their provincial database development programmes (PDDP) on the lines of NDDP, this way the NDDP will continuously be fed by the PDDPs. (Under implementation)

29. Telecom Policy Endorsements

29.1. Policy objective should be so framed that they are specific, measurable achievable, realistic, and time-bound, that is to say, what exactly the policy aims at achieving and in what timeframe. (Under implementation)

29.2. As long as government owns PTCL, fair play will not be possible because of conflicting goals and objectives. PTCL should be restructured, divided into multiple smaller functional units, and privatized. (Under implementation)

29.3. To ensure a level playing field, PTA should be made independent, competent and strong, unless the referee is powerful and independent. Serious investors will stay shy of the sector. (Under implementation. MoIT, Cabinet Division and others have an influence on PTA.)

29.4. A clear provision should be made in the policy whereby PTCL would not be in a position to offer discounts with the
intention of “killing” private investors. *(Under implementation)*

29.5. There is a need to provide connectivity to un-served and under-served areas. This should be closely monitored. *(Implemented, USF Company being funded by the Telecom Industry is doing well in provision of communication facilities to remote and unserved areas but still a lot has to be done.)*

29.6. In lieu of contribution to the USF, PTCL will roll out 83,000, new lines every year for un-served and under-served areas. This should be clearly monitored. *(Under implementation, fast increase in mobile sector has taken over fixed lines.)*

29.7. An appropriate procedure for interconnection among the private operators and PTCL needs to be worked out and disseminated. *(Under implementation)*

30. **Improvements in Telecom Policy**

30.1. Although the government has good reasons for not making any changes in the policy for the next five years, such policies should have built in flexibility. Any suggestions that would benefit all licensees, present and future, should be incorporated rather than maintaining the status quo for five years. *(Under implementation)*

30.2. Classifying the telecom sector, including the mobile cellular operations as an industry, is under consideration of the government. It is suggested that it should be classified as high-tech industry. *(Under implementation)*

30.3. To make payments to foreign operators for using their network services, the Pakistani mobile operators have agreement with a number of foreign operators. This requires monthly payments to foreign operators against their bills. Each payment requires approval of the State Bank of Pakistan on monthly basis. It is a cumbersome procedure which also
causes delays. It is recommended that mobile operators be given approval on annual basis separately against each agreement. This approval can be given on estimated payments subject to adjustment at the end of the year. (Under implementation)

30.4. The application of performance bond as laid down in paragraph 6.2 of the policy needs to be further clarified for the incumbent operators. (Implemented)

30.5. The policy requires coverage of 70 per cent of all Tehsils by the licensees. The target seems unrealistic and should be reviewed. Similarly, the potential demand of 25 million mobile phones by 2018 is not realistic. (All operators have fulfilled this obligation comfortably.)

30.6. When the PTA issues anti-competitive rules, it should be ensured that no license is allowed to offer any discount. (Under implementation)

30.7. Mergers and acquisitions are now a common phenomenon, but the policy is silent on such issues, a suitable provision on this matter should be incorporated in the policy. (Under implementation)

30.8. PTA should establish and enforce specific directives dealing with infrastructure sharing and national roaming. The provision should apply to both old and new mobile operators. (Under implementation. National roaming is in place.)

30.9. MoIT to issue comprehensive telecom policy including wireless, which is already partly included. (Implemented)

30.10. Be realistic and remove entry barriers. (Under implementation)

30.11. Encourage Wireless Local Loop (WLL) & cellular with a level playing field. (Under implementation)

30.12. Use McCarthy recommendations guidelines. (Under implementation)
30.13. Cap (upper & lower) PTCL call tariff until Significant Market Player status attained by new entrant. *(Under implementation)*

30.14. Interconnect & infrastructure charges be regulated for minimum 5 years. *(Not implemented)*

30.15. Separate policy for transmission system not clubbed with LDI. *(Under implementation)*

30.16. PTA must announce initial interconnect upfront. *(Under implementation)*

30.17. Digital carrier pre-selection facility be enabled by PTCL by December 2003. *(Implemented)*

30.18. APC and new tariff for services applicable for cellular as well. *(Implemented)*

31. Regulatory Developments

31.1. Spectrum allocation is ensured at the time of award of licenses. *(Implemented)*

31.2. The contributors of R&D fund be included in the management. *(Implemented)*

31.3. Focus on universal access instead of universal service targeting affordability and accessibility. *(Implemented)*

31.4. Utility entities be bound to provide right of way (ROW). *(Under implementation)*

32. The Digital Divide

32.1. Although Pakistan is marking steady progress in ICT infrastructure and services in content and quality, our rural population (68 per cent), by and large, remains deprived of the ‘mainstream’ access to the benefits of IT revolution. With the entry of private investors in the field of obligations under the relevant policies, the unserved and under-served areas
may benefit. The government must fully involve itself in the venture. (Under implementation)

32.2. Access promotion contribution and the universal service fund must be utilized under the appropriate strategic plan to enhance telephone density in rural areas. (Under implementation)

32.3. Under the deregulation policy, PTCL, in lieu of contribution to the universal service fund, is obliged to roll out 83,000 new lines every year for un-served and under-serve areas. This must be closely monitored and implemented by the PTA. (Being monitored)

33. Fears of PTCL in the Deregulated Regime

33.1. Potential domestic investors remain fearful of PTCL because of its strong standing, which could jeopardize the entry of new competitors as the incumbent may charge high prices from the new entrants for its infrastructure use. Also, PTCL may, at will, reduce its tariffs for its consumers thus economically hitting the new entrants. The PTA should issue ‘anti-competition’ rules to safeguard the interest of new operators in the field. (Implemented)

33.2. Policy Revision. Although the government has good reasons for not making any changes in the policies for five year, suggestions that would benefit all licensees, present and future, should be incorporated rather maintaining the status quo for five years. (Implemented)

33.3. Affordability. PTCL, has, over the last couple of years, increased the bandwidth for service providers. It has also reduced international and domestic long-distance tariffs. However, local call rates have been on the increase. With the common person making mostly local calls, these rates must be reduced. In a number of countries, there is no charge for local calls. (Implemented)
34. Human Resource Development in Telecommunication

34.1. Telecommunication as a Separate Discipline. Rapidly evolving telecommunication technologies require specialized staff. To cater to such requirements and fill the gap of trained personnel, telecommunication engineering should be declared as a discipline of engineering and should be introduced in the engineering universities. *(Implemented)*

34.2. Curricula for Telecommunications. A committee(s) comprising experts from industry may be constituted to lay down curricula for telecommunications engineering at graduate and postgraduate level. The committee may also consider the programme followed by NUST and developed countries like France who have excelled in this discipline. *(Under implementation)*

34.3. Training in Software Engineering. The world software market has touched US $1 trillion. Pakistan should immediately launch training programmes in software engineering, in this connection:

34.3.1. Computer Science curricula being followed by various universities must be reviewed and brought in line with the one followed in advanced countries. *(Implemented)*

34.3.2. University faculties should be strengthened by inducting competent computer scientists and software engineering and science graduates. *(Implemented)*

34.3.3. Creation and Maintaining Technology Triangle. Strong linkages between the universities, industries and policy making should be established. Industrial establishments should be linked with universities through law. Graduate engineers should be required to complete a year of internship (as for doctors) before being awarded degrees. *(Under implementation)*

25
34.3.4. **Scholarships for Studies in Quality Institutes.**
Liberal scholarship schemes should be initiated for the poor but deserving students, who wish to undertake studies in prestigious institutes like NUST and GIK Institute of Engineering Science and Technology. *(Under implementation)*

**Hybrid Warfare**

35. Hybrid wars will target one or more of the instruments of power namely: military, political, economic, civil society and information depending on the requirements and capabilities of hybrid actors. Hybrid attacks will be well-planned and systematic. The attacker will indulge in vertical or horizontal escalation. Therefore, the response will also have to be well-planned and systematic. Victim’s vulnerabilities will be an open invitation to the attacker to act. The following recommendations, if implemented, can be a result-oriented strategy against the hybrid threats/attacks:

35.1. Although, it’s difficult for truly representative and democratic government to forcibly suppress ethnic and religious divide, there is no worthwhile alternative to such a regime.

35.2. Only, statesmen like Nelson Mandela could bring about national cohesion and harmony. Such a leadership at the helm of affairs would be able to neutralize anti-state movements and color revolutions.

35.3. What are the critical functions of the state? These must be identified and risk assessment of these functions should be carried out on a regular basis. Exploitable vulnerabilities across the military, public and private sectors should be assessed and threshold levels that would indicate hybrid threats should be laid down. Once there is even the slightest indication that any such level is likely to be crossed by the hybrid actor, action to counter it should be initiated. *(Under implementation)*
35.4. Effective coordination among the military and civil should be strengthened. Responsibility to counter hybrid attack should not be left to the military alone. The whole government and civil society should be the real defenders. *(Under implementation)*

35.5. Countering hybrid threats requires timely and sound decisions. Any delay in taking counter action will have disastrous consequences. OODA’s loop: observe-orient-decide-act should be shortened to defeat the hybrid actors. *(Under implementation)*

35.6. A well-planned and comprehensive awareness programme should be an ongoing exercise. Propaganda, fake news and espionage must be countered when detected. Any action after the damage is done will be of little use. The country must have a strong intelligence and counter intelligence infrastructure. *(Under implementation)*

35.7. A dedicated agency at the national level should ensure close coordination among stakeholders. It should formulate a national action plan with policies, laws and regulations and other actions required for effective defense against hybrid dangers. *(Not implemented)*

35.8. Hybrid warfare is now an international issue and will remain so in the future. To counter hovering cyber threats necessitates close international cooperation for a coordinated multinational approach. The United Nations should lay down necessary framework and make it mandatory for all countries. *(Not implemented)*

35.9. Pakistan cannot afford to be indifferent to hybrid warfare threats from its hostile neighbour. It must always complete the “OODA’s loop” faster than the possible hybrid actor. *(Under implementation)*
Cyber Security and Cyber Crime in a Digital Society

36. We are living in a far more technologically advanced world than we were as recently as a decade ago. Everyone is very much aware that cyber security is something nobody can afford to ignore. So, what can we do to fight against the growing threats? Therefore, the following policy recommendations are being shared with the stakeholders that can be considered for future policy formation:

36.1. **Cyber Security Capacity Development.** The capacity development for cyber security has to be at the same level as information and communication technology development. A strong cyber capacity is crucial for Pakistan to progress and develop in economic and social spheres. Cyber research must be encouraged and capacity building should be included as a concept in the field of sustainable development. This will empower individuals, industry, organizations, and government to achieve their goals by reducing security risks stemming from access and use of information and communication technologies. *(Under implementation)*

36.2. **Establishment of National Security Agency (NSA).** For collaboration between the government, military and intelligence stakeholders, there is an immediate requirement to establish NSA. The agency should formulate a national security strategy framework aimed at defending economic assets and preparation against cyber threats. The agency needs to implement national cyber security strategies, policies, laws, regulations, and other national approaches. *(Under implementation)*

36.3. **Dynamic Planning, Exercises and Simulations.** Cyber-attacks are varied and diffused. Every such attack may be different from the previous one. Therefore, a static plan will not be effective for all times to come. It’s important that exercises and simulations to test the effectiveness of plans and procedures are included in standard operating procedures. Each practice will result in important lessons. The repetitions
will allow cyber security professionals and other staff to learn from failures. This will help keep the plans dynamic. Effective security has to follow an ordered, proactive and structured program rather than a haphazard and reactive undertaking. Vulnerability tests and practice exercises are valuable. In fact, these should be carried out on the pattern of “war-gaming”. Exercises don’t just test the defenses, they also help better understand the effects of plans and procedures. (Under implementation)

36.4. Establishment of Cyber Security Certification Board (CSCB). Risk assessment to reduce or eliminate vulnerabilities of critical information and infrastructure is important for the regulators, researchers and industry. The effectiveness will depend to a certain extent on important administrative, economic and legal factors such as the dependence on cyber space, the way in which government activities are conducted and the existing state of cyber security risk management. Therefore, CSCB should be established to conduct assessment of key organizations to identify, evaluate and recommend protection levels. (Not implemented)

36.5. Review of Prevention of Electronic Crimes Act 2016 (PECA) and Other Laws. Technology developments are outpacing the laws being proposed and implemented. The Government is struggling to amend existing laws that seek to ensure the regulation of cyber security. PECA has faced a lot of criticism for violating the fundamental right of freedom of speech under Article 19 of the constitution. It also tends to encroach upon the right to privacy and lacks futuristic technology upgrades. There is a dire need to revamp PECA and other laws in order to ensure not only the citizen’s right to privacy and freedom of speech, but most importantly the need to address wide spectrum of problems relating to the cyber space. (Under implementation)
36.6. **Establishment of Triservice Cyber Command.** The development of military cyberspace capabilities, has progressively revealed the need to move beyond thinking of military roles in the simplistic terms of “conventional war” and to focus instead on the appropriate role for the military’s defensive and offensive cyberspace capabilities across a variety of situations, ranging from supporting civil authorities in disaster relief to responding to threats against critical infrastructure. Like any conventional military capability, they need to be organized, equipped, trained, and sustained at a high level of readiness. Therefore, in order to coordinate the cyber security efforts there is a requirement to establish a unified Triservice Cyber Command. *(Under Implementation)*

36.7. **Deployment of National Computer Emergency Response Team (CERT).** The International Telecom Union in the recent publication "Global Cyber Security Index and Cyber Wellness Profiles" ranked Pakistan at 94th place. The report points out that everywhere in the world nations seems to have done more work on legal aspects of cyber security but lack capacity to counter cyber-attacks. The report indicates that Pakistan lacks criminal legislation, and, while some private institutions have developed their own CERT there is none at national level to coordinate and implement cyber security. It's time that Pakistan should have a CERT Headquarters at Ministry of Information Technology with regional offices in all provinces for the protection of national cyberspace. *(Under Implementation)*

36.8. **Cyber Security Professional Degrees Through HEC.** Talent and training constraints have a significant impact on security organizations. Resultantly, advanced cyberspace technology is required to be deployed to offset the lack of cyber security experts. Pakistan has limited itself to the traditional understanding of Information Security. Very few of the reputable institutes have cyber security specialization
courses, let alone full degree programmes. The demand for specialists in the field is high. Job postings for openings in cyber security have grown many times faster than those for IT job. Therefore, to equip Pakistan with adequate professionals, HEC should introduce professional degrees in all the universities. (*Under implementation*)

36.9. **Judicial Setup.** An appropriate judicial set up should be created to deal with the cyber security violations and cyber-crimes. (*Not implemented*)

36.10. **International Cooperation on Cyber Security.** Pakistan is one of the most cyber spied upon country. There are clearly identifiable hurdles in establishing meaningful cyber security architecture to coordinate the efforts. Pakistan is represented at the UN Group of Governmental Experts on Information Security, but the national theme is not shared with internal stakeholders. There is no mechanism of interstate understanding or sharing of best practices on regional basis. Pakistan should be an active partner in the efforts under the UN like Budapest Convention and Shanghai Cooperation Organization. (*Under implementation*)

37. **Hovering Cyber Threats and Our Preparedness**

37.1. Developing a comprehensive legislation covering individual and state sponsored cyber-attacks / Cyber Warfare (Although we have laws on cyber-crimes, they do not cover organized cyber-attacks and state-sponsored attacks.) (*Not implemented*)

37.2. Developing a cyber security policy (This will include the required strategy with goals, objectives, systems, organizations and responsibilities.) (*Not implemented*)

37.3. Building a cyber-workforce (A full-time workforce involving all stakeholders from the armed forces and civil organizations needs to be raised and trained.) (*Not implemented*)
37.4 Computer Emergency Response Team (CERT) – Pakistan Telecom Sector Implementation Plan prepared by the Pakistan Telecom Authority should be annexed with Prevention of Electronic Crimes Act, 2016 through legislation (if considered appropriate). *(Not implemented)*

37.5 A combined full-time civil and military cyber – workforce should be established. *(Not implemented)*

37.6 A military cyber command should be established (if not already done). A suitable existing model of some advanced country can be adopted. *(Under implementation)*

37.7 Universities should start programmes to produce cyber security leaders and managers. Here again curricula followed by some international universities can be adopted. A future generation of technically proficient cyber security specialists should be prepared. *(Under implementation)*

37.8 Security audits carried out by PTA CERT, weakness observed and guidance for corrective actions should be shared with all users of information technology. *(Not implemented)*

37.9 Organizations should aim at resilient and “intrusion tolerant” computer networks. *(Under implementation)*

37.10 Inter-agency and intra-agency Intelligence sharing must be ensured. The key advantage of information is that it allows more complete view of emerging threats and patterns and lessons learned from experience. *(Under implementation)*

37.11 There should be an international agreement on the fair and lawful use of cyberspace on the lines of Geneva agreements and agreements on telecommunications that are facilitated by the International Telecommunications Union. *(Not implemented)*
38. Indigenous Telecom Manufacturing

38.1. There has to be an investment friendly regulatory regime to encourage foreign and local investors. *(Under implementation)*

38.2. To enhance indigenous manufacturing in Pakistan, Telephone Industries of Pakistan Haripur should be privatized with lucrative incentives to local and foreign investors. *(Not implemented)*

38.3. Foreign investors should be bound to employ at least 90 per cent of human resource from Pakistan. *(Not implemented)*

38.4. To facilitate employment, there should be close collaboration between the telecom industry, academia, and other institutions concerned to invent and innovate. *(Under implementation)*

38.5. To facilitate the telecom manufacturing and services sector, skill development should be made in such a way that employment opportunities for Pakistani nationals are available in the country and abroad. *(Under implementation)*

38.6. Telecom equipment manufacturing zones should be established to overcome infrastructural limitations. *(Not implemented)*

38.7. Investors should be facilitated by introducing duty-free import of capital goods and components. *(Under implementation)*

38.8. “The emerging ICTs have made the economic borders between nations virtually irrelevant. It is, therefore, essential that the Government of Pakistan create an environment in which the ICTs development reaches its full potential”. *(Under implementation)*

38.9. “To reduce ‘digital divide’ in the country, the government should review and reduce the value added taxes imposed on
telecom services, which are currently second highest in the region”. *(Under implementation)*

**Conclusion**

Telecommunication and the ability to connect and communicate is a fundamental part of how our society operates. In today’s digital ecosystem, telecommunication has become the foundation for business, governments, communities, and families to connect and share information. From a security perspective, telecommunication is of the most crucial infrastructure for protection from natural disasters initiatives to military needs. There is a wide spectrum of instructions that depend on telecom to provide safety.

SDPI’s study group on IT and Telecom has remained vibrant and progressive by keeping a close look on the development of new technologies and their impact on the society. Over the years, the study group has been providing policy advice to the government, facilitating and organizing forums for policy dialogue, and bringing the government experts of policy implementers together. The study group has organized innumerable seminars, conferences, and meetings. Besides, the group under the umbrella of SDPI’s Sustainable Development Conference series has formulated a number of recommendations sharing them with the government to achieve its policy development goals. This document highlights major conclusions and their implementation status.
Development of the Information and Communications Sector in Pakistan

1. Introduction

In an age increasingly reliant on computers and electronic information processing tools, the ability to rapidly transmit large amounts of data over large distances is becoming an essential prerequisite of a developed economy. For this purpose, special purpose data networks are employed which can exchange computer data efficiently and instantaneously on a global basis over telephone, microwave, radio, and satellite links. Present trends indicate that electronic information is destined to become one of the most vital and strategic economic resources and that such data communications facility will form the essential underlying foundation on which all economic activity will function. Already electronic interchange permeates almost all aspects of the economies of industrialized states to an extent not often realized because of its inherent "invisible" nature. It is therefore imperative for developing countries to also attach equal importance to the provision of data communications infrastructure if they are to realize their development objectives. In Pakistan, despite a

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2 Submitted to the Prime Minister on May 13, 1993

The Study Group on Information and Communications of the Prime Minister's committee for Research and Analysis has recently held a series of nine seminars over a period of twenty months on the subject. It is the considered view of the Study Group that the country urgently needs the establishment of such "electronic highways" in much the same way that it requires modern motor ways and road networks for its economic progress. A summary of the recommendations of the Study Group relating to data networks are given in Section 3 below.
revolutionary expansion of the telecommunications industry which is
currently underway, the crucial area of data communications has not
received due attention. Unless immediate steps are taken to correct the
situation, the short-term effects of this will be a constraint on expanding
Pakistan's ties with the global economy and attracting foreign
investment. The long-term effects, however, will be even more serious as
the nation's development objectives will be jeopardized by its inability to
take proper advantage of economic opportunities.

However, the situation can be readily corrected if necessary measures are
taken now. Fortunately, these measures do not require extensive outlays,
but rather consist largely of policy and regulatory changes that will
eliminate unnecessary and outdated restrictions that have prevented the
development of data networks in Pakistan in the past. They will also
provide a great boost to the country's telecommunications industry, as
data transmissions are predicted to become the main revenue earning
service of the industry worldwide.

2. Background

With the phenomenal progress being made in computers and electronic
data processing in recent years, the capacity to utilize large amounts of
stored and "real time" (i.e., as it is made available) information is also
increasing exponentially. Along with this increased ability to process and
distribute information has come an increasing realization of the strategic
importance of information as a resource by itself. This is because while
previously information of economic, scientific, or military significance
was accessible to only a few advanced societies, the global sharing of all
types of such information resulting from the recent, advances in
computing and communications technology is continuing to make greater
amounts of this resource available to even the most underdeveloped
regions of the world. Thus, competitive advantage, and hence economic
development, now belongs to that country which can tap into the global
information resource and utilize it most effectively. Indeed, the ability to
generate, access and effectively use information is being viewed as the
single most important economic resource in the next century; the most
advanced countries will be those that are able to produce and understand
the knowledge required to, for instance, manufacture goods, while the actual means of production, such as factories, will be of secondary importance and relegated to lesser developed nations. There is therefore an intense effort underway in all progressive nations to develop their information and communications systems, stay abreast of the rapid technological advances that typify this area, and raise their educational standards so that the workforce can remain literate in the use of such a sophisticated resource.

In the light of this background, the Committee for Research and Analysis constituted a Study Group on Information and Communications in October 1991 comprising of individuals from relevant public and private sector organizations as well as visiting expatriates, who would meet regularly and discuss recent trends in this vital area and their implications for Pakistan. Over the course of the past twenty months, the Group has held nine seminars on topics ranging from computing and data processing, software development, networking, library automation, information retrieval, and satellite communications to policy and planning measures required to promote the sector in Pakistan. The Group has also undertaken small-scale experiments to demonstrate the viability of some of the suggestions and ideas resulting from the Seminars.

The seminars have greatly helped in delineating the present status of information and communications technology and infrastructure in Pakistan. With a few notable exceptions, such as the present government's commitment to greatly expanding the telecommunications network and the earlier decision to eliminate import duties on computer equipment, the consensus reached so far has been that urgent action needs to be taken by the government on several fronts in order to bring the country's information and communications infrastructure and policy environment at par with international standards. The Group's findings relate to both the specific topical issues raised at the Seminars as well as the overall infrastructure and policy environment pertaining in the country at the present. It was also generally agreed that the latter concerns must be adequately addressed before any substantial progress
can be made in promoting specific applications of information technology in the country.

This memorandum highlights some of the basic infrastructure and policy issues relating to an important facet of modern information and communications technology, i.e. data transmission.

The underlying infrastructural requirement for modern communications systems is an ability to exchange and transmit digital data over long distances, which is accomplished through "electronic network". These are specialized systems comprising of a complex diversity of devices, connections, signals, protocols, and software applications which enable computer data to be transmitted over terrestrial telephone lines, microwave and radio links, and satellite channels. While "local area networks" (LANs) link computers located in close proximity to each other, such as within a building, and can be installed by computer users themselves, "wide area networks" (WANs), which provide connections between computers located in different buildings, cities, or even continents, are more expensive to install and are usually operated by public utilities and independent private companies. A large number of such networks connect millions of computers in the West and many serve specialized functions: Several networks are dedicated exclusively to financial services and banking, stock and commodity markets, defence, scientific research, electronic mail and bulletin board services, travel and hotel reservations, on-line databases, retailing, manufacturing, and so on. In fact, virtually all sectors of the modern industrialized economy rely on such electronic data interchange (EDI) to operate successfully to the extent that no business can afford not to be networked and still remain competitive (example: all Fortune 100 companies in the US rely on EDI links to their trading partners). Indeed, a new order is emerging where all economic activity is increasingly centered around the ability 'to commerce in electronic information and also conform to the growing numbers of data standards that are being established to regulate it: thus, in a few years all suppliers wishing to sell to the manufacturing sector in the US, Europe, and Australia will need to comply with the CALS system to electronically receive orders over networks, publishers
will be required to submit their electronic documents in SGML format for printing, and so forth. Clearly, businesses and countries unable to access international data networks, let alone be conversant in such new trading standards, will be left out of the mainstream of business activity. The situation is made even more pressing by the explosive growth of electronic information exchange worldwide: The INTERNET, the world's largest electronic network, grew from less than 10,000 hosts in 1986 to over 750,000 connecting millions of computers in only six years.

Unfortunately, in Pakistan the status of data networks is, most inadequate. Apart from PIA which operates its own wide area network for reservations and PakNet, a small and unreliable experimental public data network of the PTC, no network exists to link a computer user to another within the country or outside. In fact, if a global disruption were to suddenly stall all networks, the economies of the developed world would come to a crashing halt while the event would hardly be noticed within Pakistan! In other words, the country is already out of synchronization with the developed world and the situation will only worsen as the global economy becomes even more data-reliant.

That this situation is already imposing a constraint on the nation's economic development can be gauged from a few illustrative examples in the banking sector alone: While automatic teller machines (ATMs) elsewhere can provide instant banking on a global basis (example: the Hong Kong Bank currently offers 100,000 ATM points worldwide), the ATMs installed in local banks cannot even provide access to a different branch in the same city in Pakistan; credit card operations cannot be introduced on a large scale in the country for lack of instant verification services; future options cannot be traded freely because different stock exchanges cannot communicate; and inordinate delays are encountered in processing cheques, loan and insurance applications, and virtually all other financial services for the simple reason that data networks do not exist in the country that can efficiently and quickly provide the necessary information on an instant basis. A similar state exists in other areas of the economy systems and operations which are common place in other countries and are indeed considered necessary for
modern economic activity to proceed efficiently simply cannot be employed in Pakistan due to the lack of appropriate data networks. The government, being the single largest producer and user of information in any country, correspondingly suffers the most from the absence of such systems: trade legislature, revenue collection, administrative data, law enforcement, and a host of other critical government functions cannot benefit from automated information systems without proper data networks to link their various offices and operations.

The absence of networking infrastructure not only deprives the country's inhabitants from gaining from the large worldwide information resource that it makes available to them (example: it is now possible for an individual anywhere in the networked world to electronically access any of the over 13 million volumes in the largest single information repository of the world, the Library of Congress in the US), but it also effectively removes Pakistan from the map of international economic opportunity: many overseas businesses simply by pass the country because they cannot obtain the necessary information about it in the electronic world in which they operate. As an example, some of the biggest computer software names in the business are investing in increasing numbers in India partly for the reason that the country now can provide excellent data links to other countries through a host of WANs*, although it still has a comparatively inferior voice telephone network, with the result that Indian software exports presently amount to over US$200 million and are expected to reach US$1 Billion by 1996. In sharp contrast, the Study Group has heard from many potential expatriate software investors wishing to set up facilities in Pakistan who have been frustrated not by lack of programming talent but by the inability to transmit data to their overseas bases from here. In fact, many foreign business houses in Pakistan transmit to their respective Indian offices for onward communication overseas (example: Pakistan, along with Bangladesh, is one of the only two countries from where the Associated Press operates without a dedicated computer data link). It is not surprising, therefore, that Pakistani software exports are nonexistent and efforts to promote the industry in the past that have overlooked the crucial role of data transmission have repeatedly failed.
3. **Recommendations**

In the light of the present situation discussed in more detail in Section 2 above, it is essential for the Government to initiate immediate efforts to bring the country in line with the requirement soft he modern electronic age. Specifically, the government must:

- Allow the private sector to freely participate in the establishment and operation of additional public data networks using either PTC's terrestrial telephone lines or independent radio or VSAT based systems. The present monopoly of the PTC is the single biggest hindrance to the development of the data and ancillary communications services in the country and must be ended forthwith. This potentially extremely lucrative and powerful monopoly must also not be allowed to pass on to a single, possibly foreign vendor once the process of the privatization of the PTC is completed. The success of the decision to license cellular and card phone businesses to private operators is a positive indicator of the viability of inducting private capital and efficiency in this important sector as well.

- Invest in the creation of a full-fledged public data network that can serve the needs of the individual user. This network can serve as an infrastructural backbone through which private data networks can interconnect initially. As a start, the Pak Net network must be quickly upgraded and expanded beyond its presently meager 300-line capacity and its service and technical standards improved significantly. The PTC must give priority to the development of data networks, as it will bring greater future economic rewards to the Corporation and the country if properly nourished. It will also relieve some of the strain off the installed voice telephone circuits which are inadvertently and increasingly being used by businesses for data transmission because of the lack of appropriate data circuits.

- In addition to improved service levels, PTC's data tariffs on PakNet must be rationalized. The present cost of leasing an international line on even a low grade voice circuit from the PTC in Pakistan is
approximately US$10,000 per month at only the local end, which is more than the total cost of an elaborate fully digital high speed transcontinental link at 27 times the throughput capacity between the US and Europe. Comparable costs in countries such as India are even lower. PTC's rates must be brought in line with prevailing international levels to enable local users to be able to connect to the global business community on a competitive basis.

- Allow the creation of special – purpose wide area networks in both the private and public sectors. In the private sector, banks, travel agencies, and traders have long been seeking such authorization, while in the public sector the military, the State Bank of Pakistan, the Board of Revenue, Pakistan Railways, public utilities, and a large number of government departments collecting official statistics would benefit tremendously from EDI services.

- Allow the free use of modems (devices required by computers to communicate over which PTC presently exercises unnecessary control through NOC requirements) on telephone lines as per international practice through the establishment of acceptable minimum device specifications (as is done, for example, by the FTC in the US) so that users can purchase and install their own equipment rather than being forced to buy one of only two brand names presently accepted by PTC. It was similar unwarranted PTC control which delayed the introduction of the fax machine in Pakistan for no explicable reason by over two years after their worldwide acceptance.

- Establish network nodes in universities, research organizations, libraries and public institutions to allow access to international data bases and on–line information service. At present, only three such node exists in the country which operates only on a dial up basis. Given PTC's high transmission charges, even these meager facilities are used extremely sparingly and do not provide the kind of freely available online research facility which they are meant for. There is a pressing need for a government subsidized academic and research data network in the country with a dedicated international link.
Planned and managed effectively, it has all the potential for opening up a new world of knowledge and educational opportunities for our resource starved academic community. It must be remembered that universities and research institutions in the West were responsible for the initial development and wide-spread use of data networks and still constitute the single largest user group whose expertise is widely sought by the business community there for developing and adapting them for commercial data applications. The economic and educational opportunities afforded to the individual through access to such large reservoirs of knowledge cannot and must not be denied.

- Government import policies on computer and communications equipment must be rationalized. One of the single most important factors responsible for the relatively widespread use of computers in the country has been the exemption of such equipment from customs duties. However, duties still apply on computer peripherals (devices such as printers, data storage units and modems), software, and parts which make the cost of buying or upgrading to more powerful systems or networks beyond the reach of a majority of individuals. In addition, even in the absence of duties on computers, various surcharges still add up to 30% of the unit cost, and in some cases, such as computers with multimedia capabilities (those including sound, video, etc.) arbitrarily high rates are applied. The world trend is to eliminate duties altogether from such items as they are considered too vital a commodity to "protect" the local industry against. Furthermore, if high technology is to be promoted in Pakistan, as is the professed aim of the government, then it must not be viewed as a source of direct revenue.
4. Conclusion

It is imperative for the government to make a start in promoting and developing an infrastructure and policy environment aimed at upgrading data transmission services in the country on an immediate basis. In addition, a fresh approach, involving equal participation at the planning stage from the private sector, must be adopted rather than entrusting the task to existing agencies which partly due to ignorance and partly to vested interests, have failed miserably to carry out their functions in this regard. Such a start can only be made “If the government realizes that just as first rail road and high way networks are important for economic development today, data networks are destined to become the "electronic highways” to future prosperity and must be developed now."
Access to International Information Networks\(^3\)

**Introduction**

1. The world has entered the information age. Until now, economic advance was determined by industrial strength. From now onwards, it will be determined by the ability to produce, access, analyze, distribute, and use information. In the industrial age, dynamic countries specialized in industrial production, leaving the production of cheap raw materials to poor countries. Similarly, in the information age, dynamic countries are trying to specialize in the production of information and information systems, and letting poorer countries produce cheap industrial goods.

2. This shift has not been recognized in Pakistan, which lags far behind even those countries which are at the same stage of scientific and industrial development e.g., India, China, Iran, Turkey, Malaysia, Indonesia, and the Gulf countries. If this does not change, these countries will grow faster, and Pakistan will be relegated to an even more inferior position in the comity of nations.

3. Major obstacles to the development of the information industry in Pakistan include misguided policies and governmental neglect. Therefore, a change in the policy framework is essential to enable the information sector to play its strategic role in the economic and social development of the country. In view of its strategic importance, the subject of information and communications deserves the personal attention of policy makers at the highest levels of the government.

\(^3\) Submitted to the Government in April 1995
What is meant by information?

4. Information is a commodity that is produced and disseminated like any other commodity, but unlike other commodities, it is an input into decision making. It enables government functionaries, business managers, and private citizens to make better and more informed decisions. It increases production efficiency as well as the quality of the goods or service produced. It reduces production costs, and thus enhances competitiveness. It covers virtually all sectors: industrial goods, retail services, health, education and transport systems, government decision making, environmental services and conservation efforts, worker and consumer safety, and of course the production of information itself. It is the key ingredient in the improvement in the quality of life of consumers, workers, and citizens.

5. The term information covers both hardware and software. It includes the large magnitude of records books, reports, pamphlets, correspondence, official records that are produced daily. It includes the infrastructure telephones, telephone lines, modems, computers, satellites, radio and television, and the print media which seeks to disseminate this information from one place to another. It includes systems computer software, library cataloguing systems, filing systems, and others which are meant to organize the information in order to make it accessible and retrievable. Finally, it includes international electronic networks, most not ably the INTERNET, which enables people to communicate and search across long distance with very little effort and at very low costs.

6. In the past, records were maintained on paper, and organized through filing or cataloguing systems. Accession and retrieval was a time consuming process, in addition to being somewhat unreliable. As the volume of information has increased, these systems have
deteriorated further, with the result that information is available only on a patchy basis to most individuals. This means that on the one hand, most decisions are made on the basis of considerable ignorance; and on the other hand, that individuals acquire an incentive to "hoard" information, since it is not available freely and reliably everywhere.

**Research**: Third world research suffers because of weak library systems, unreliable access to new literature; and databases; and difficulty of communication with peers. Elsewhere, the INTERNET has reduced the cost of communication practically to zero; and enabled access to data sources, literature, research indexes and library catalogues. Pakistan. Unlike even China and India, is not on the INTERNET yet.

**Government**: Weak information systems make it difficult for policy makers to monitor and control the implementation of decisions as well as the performance of subordinate officials. The result is ad hoc decision-making favoritism, corruption, and a loss of credibility.

**Exports**: Information has become a major export industry. Indian exports of computer software rose from $ 25 million in 1986-87 to $ 330 million in 1993-94 and will cross $ 1 Billion by 1997-98. Reasons include strong support by the government through low cost electronic communications, high speed data communication facilities, training facilities, income tax exemption, and technology parks.

**Environment**: In industrial countries, the bulk of the investment in pollution control is in the form of waste reduction through computer aided processes. These ensure that virtually all the raw materials are actually used, and the mount discarded as waste is minimized. In general, better information and monitoring systems (e.g., remote sensing) ensure that environmental regulations are followed strictly.

**Production**: Better organization and distribution of information enhances managerial efficiency, gives a boost to competitiveness, helps produce qualitative improvements, and reduces the competitive handicap of small-scale units. Better systems facilitate communication with fellow producers, field offices, clients, and vendors; access to on-line services
enables business to monitor market trends nationally as well as internationally; data networks and indexes provide information on investment opportunities, sources of technical assistance, new developments, and future trends; teleconferencing reduces travel costs.

Health: Networking assists in diagnosis emergency assistance, consultation, the widespread sharing of standards, more efficient insurance cover, and a sustained improvement in the quality of medical services.

Education: Networking has broadened the possibilities of distance learning, to help small towns and villages, and small and medium companies, and a sustained improvement in the quality of medical services.

Women: Electronic networking is beginning to enable a larger proportion of women to enter the labour force and become financially independent, by opening up possibilities of flexible hours, and teleworking (i.e., working at home, albeit connected to the office through a modem).

Transport: The current anarchy in transport systems in the Third World can be reduced somewhat by the creation and maintenance of electronic records, traffic management software.

Retail and Services Networks: In France, the Minitel system has provided consumers with direct access to retail and other services. Which are the greatest sources of frustration in Third World countries.

7. Of particular importance in this respect is the famous INTERNET, a decentralized electronic computer network of more than 30 million information users in 150 countries. This network of networks allows users to communicate with each other cheaply, distribute information to interested people, access the latest developments in a field, seek advice and assistance from people with expertise in an area, and search for information in data bases, bulletin boards, research indexes, and library catalogues. Thus, the INTERNET has become an efficient and cheap substitute for a number of things, including on-line information services, data bases, letters and faxes,
mailing lists, mass mailings, library card catalogues, neighborhood, experts, professional journals, and official document repositories. It is said that the INTERNET and the information superhighway, of which it is the precursor, is the most significant revolution since the birth of the computer.

**Problems in Pakistan**

8. There are many obvious reasons for Pakistan's backwardness in this area. They include the (still) poor information infrastructure, the fact that Pakistan is still not connected directly to the INTERNET, the unduly high cost of electronic communication, the excessive restrictions on private enterprise in networking and communications, the absence of incentives for software development, poor training facilities in computer systems, and the absence of subsidies to research and academic users of electronic channels.

9. While considerable progress has been made in improving the telecommunications system in Pakistan, both in terms of quantity and quality, there has been virtually no progress in setting up the infrastructure for information networks. Even the telephone system will take quite some time to reach acceptable levels. The "tele density" in Pakistan has increased rapidly from about 1.06 telephone lines per 100 people on 30 June, 1992, to about 2 lines per 100 people today. However, even the higher figure compares unfavorably with the density of 16 lines per 100 people in Turkey and 40 lines per 100 people in Western Europe. Even on PTC's conservative estimates, the cost of raising the density to these levels will be Rs 342 billion and Rs 846 billion, respectively. Also, the existing services are very poorly distributed, with 90 percent of the lines in urban areas (which house only 30 percent of the population), and 63 percent in four major cities. It should be realized that investment of such an order of magnitude is beyond the scope of a single agency. This is an argument for allowing private telco operators to soak up the excess demand and to provide service at cost in areas where PTC is unable to extend its operations.
10. Opening up the information area to private operations will create the need for monitoring, regulation, and mechanisms to protect the interests of consumers. This will not be possible without the creation of a regulatory authority that is genuinely independent of different interest groups including PTC. It should be constituted as a broad-based board consisting of public figures, international consultants, and eminent professionals in telecommunications, law, finance, social science, and economics. The body needs to be dynamic. The regulations in today's telecommunications world need to be carried out in real time, not five years after the event.

11. For data networks, the most significant problem is that Pakistan is not yet on the INTERNET. In fact, even China has allowed a direct INTERNET connection recently. Not only does this deprive Pakistanis of access to global information resources, it also discourages foreign investors who view such facilities as indispensable for the conduct of business. Lastly, it also denies the government and the people of the country an invaluable and direct channel for projecting Pakistan and its perspective on important issues in the international community.

12. There are several obstacles to a full INTERNET connection. The first is the absence of a high-speed link with the rest of the world. The submarine optical fibre cables girdling the globe pass through the Atlantic, the Mediterranean, the Red Sea, the Indian Ocean, on to the Pacific Ocean. They touch the Middle East and Bombay, but not Pakistan. The most direct connection to the international system is by establishing a spur between Karachi and Fujaira in the Gulf. This is being planned but needs to be expedited. In addition, there is an ambitious new plan to lay the Trans Asia Europe (TAE) optical fibre cable between Shanghai and Frankfurt, which will touch almost all the major cities in the Central Asian Republics, and in Iran and Turkey. If a link is also established between Pakistan and the TAE, Pakistan could eventually act as a bridge between the submarine and terrestrial cables.
13. Second, besides the absence of a high-speed link, a major deterrent to full INTERNET connectivity is the high cost of dedicated phone lines. The annual cost of leasing a full circuit of 64 kilo bytes per second (kbps) to the US is $30,000 in India, and even less in Iran. In Pakistan in contrast, the lease of only half a circuit to the US costs $160,000 annually. The cost in India is six times lower than in Pakistan simply because the Indian government is not trying to make huge profits in a monopolistic setting at the expense of the national scientific programme. The facilitation of two-way flow of information has helped develop the academic and scientific base in India, and has contributed to the dramatic expansion of the software industry, which received export earnings of $330 million last year. In addition, many large scale data entry operations (such as airline reservations services, and medical and legal transcription for US clients) is carried out routinely in India, taking advantage of the time difference and the high speed data links. This is a labour intensive service which provides jobs to thousands of college graduates.

14. Third, even the cost of an ordinary phone call is higher in Pakistan than in other countries. The recent growth of the telecommunications sector, in capacity as well as quality, should have resulted in lower call rates as in other countries. Last year, Belgium reduced the charges of trans-Atlantic leased lines between 9 – 35 percent; Singapore lowered the charges for international phone calls by up to 37.5 percent, Italy slashed phone charges by 20 percent on average; British Telecomm cut its international business rates for phone calls to select areas. The result of all this is a growing discrepancy between Pakistani and other rates. To take just one example, a phone call between Pakistan and the US costs Rs 52 per minute from Pakistan and, depending on the nature of the service, between Rs 22 and 38 from the US.

15. Fourth, the import of equipment and leasing of communication channels is also more expensive in Pakistan than elsewhere. One reason is the high import duty levied on these items. Another reason
is that data communication equipment is subject to unnecessary and antiquated legislative restrictions. Fax machines were considered illegal and a threat to national security until well into the 1980s. Even now, most of the world's most popular modems cannot be connected to PTC lines without violating the "law". It might be worthwhile to consider whether all equipment approved by, say the US Federal Communications Commission, be automatically considered approved for use in Pakistan, unless a specific order is passed to the contrary.

16. Fifth, compounding the problem is the weak basis of the service provided with in Pakistan. Currently, Pakistan's international connectivity depends exclusively on a public data network managed by the Pakistan Telecomm. The level of service provided by this network is extremely inadequate: It is of low capacity, low speed and low quality. While the government has taken a wise decision to allow private data networks, the impact of this decision has been undermined by the extremely stringent and often impractical conditions attached to these licensing. Not a single one of the 15 licensees has been able to set up a service network thus far. The conditions seem designed to deter a challenge to the monopoly of the public agency.

17. Sixth, is a need to support the software industry. The simplest thing is to declare software development to be an industry, in order that entrepreneurs can borrow investment capital from DFIs and commercial banks. This needs to be followed up with the decision to support the establishment of technology parks and training programmes. However, these need to be done with the involvement of professionals and private sector experts. The dividends from investment in information networks come quite quickly. Take the example of India. It has made great strides in software development and computer networking. They have one of the largest computerized railway systems. When the London Underground Railway and the British Rail were looking for new software to control and run their systems, they selected an Indian
company. India has a large number of networks catering to the needs of different users—bankers, government officials, development workers, and academics.

18. Seventh, the information sector has also suffered because of the low importance attached to information management in the country. As a result, the quality of secretarial, library management and data base management services is indifferent. These professions are incapable of attracting good students. Professional training facilities are either not available, and where available are of poor quality. It is necessary that these skills be upgraded to the appropriate level.

19. The result is that the data communications environment is so unexciting in Pakistan that not a single international data service provider (Compuserve, AOL, etc.) has thought it justified to offer its services in Pakistan. By this index, Pakistan is ranked at least 110th in the world in terms of information sector development.

Other Considerations

20. The information and communications sector has other ramifications as well, and these will have to be taken in to account in future policies. The most important of these is the issue of national security. Most countries have opted for rapid technological development because technological back wardness poses a far greater threat to security than the free availability of the latest technologies. Also, the general experience is that while government support for research and development is critical, successful technological development cannot take place in the government sector. Finally, there is the question of the proper role of the public and private sectors. Again, while the present climate of opinion seems to favour the private sector and privatization, many issues of detail will have to be analyzed further before a definitive opinion can be advanced.

21. Given the strategic nature of the information and telecommunications sector, as well as the large number of overlapping interests and issues involved, it is essential that the
entire gamut of concerns be examined by a high powered task force consisting of the top professionals, researchers, experts, private sector representatives, government officials, and media representatives. The task force would be charged with holding consultations, commissioning background studies where necessary, and soliciting advice in order to frame detailed recommendations for government policy in this sector. It should be required to complete its task within three months after establishment.

Recommen dations
Access to international networks of information and knowledge must become one of the top priorities of the nation. It is an essential prerequisite for moving in to the 21st century with dignity. This goal needs urgent attention from the highest level in the country. In view of this, the following actions are recommended:

1. President’s task force on electronic communications
The task force should be constituted to frame policy on electronic communications, with the following mandate:
   a. To take stock of the current status of the telecommunications infrastructure in Pakistan and other related issues, including the relevant policies and plans.
   b. To formulate a course of action, taking into account the market forces and with a view to making rapid acquisition of new technologies in the field of telecommunications.
   c. To recommend an appropriate legislative framework to regulate future telecommunications services.

2. Creation of a Regulatory Body
A regulatory body i.e., the Pakistan Telecommunications Authority (PTA) has been created. However, its membership and mandate is not as yet clear. It should be an independent body, consisting of eminent professionals in telecommunications, engineering, law, finance,
economics and other related disciplines, which could respond to the changing needs and requirements of society.

3. **Full INTERNET Connectivity**

Full INTERNET connectivity should be provided immediately.

4. **Establishment of a High Speed International Link**

The planned link between Karachi and the submarine cable at Fujaira should be installed at the earliest possible opportunity. This should be followed up by the establishment of the link to the Trans Asia Europe terrestrial cable.

5. **Lowering of Data Transmission Tariffs**

The entire PTC tariff structure, and in particular the tariffs on international data transmission and cost of leased lines, should be lowered and brought in line with other countries. Access to the international networks by academics should be free. The cost for this should be met by the universities who should be given liberal grants for this purpose.

6. **Free or Subsidized Access for Universities, Research Organizations, Libraries and Public Institutions to International Data Bases and On-Line Information Services**

At present, only three such nodes exist in the country which operates on a dial-up basis. Given PTC's high transmission charges, even these meager facilities are used extremely sparingly.

7. **Elimination of Import Tariffs on Computers and Communications Equipment**

Although computers are subject to lower tariffs, they are still liable to various surcharges amounting to 30 percent of the value. Besides this, computer software, computer peripherals (such devices as printers, data storage units and modems), and upgradation accessories are subject to
higher tariff duties. These duties and surcharges should be eliminated to encourage the information industry.

8. Rationalization of Licensing Agreements for Private Data Networks

Present licensing agreements have too many flaws and impose harsh conditions which would hinder rather than facilitate the progress towards the establishment of information and communications infrastructure in the country. The standard agreements should be reviewed to produce more balanced arrangements.

9. Support for the Software Development Industry

Such support can take the following forms:

a. Declaring software development to be an industry, in order to enable it to access financial support from the financial sector.

b. Providing software industry with fiscal incentives.

c. Establishment of technology parks, with high quality services at low cost.

d. Support for training of professionals in this area.

10. Removal of Restrictions on Use of Data Communication Equipment

Unless directed otherwise, all equipment approved by the US FCC should automatically be considered approved for use on PTC lines.

11. Removal of Restrictions on Public Information Sources

Many public information sources are subject to restrictions, mainly obsolete, on grounds of security. These sources include satellite and aerial photographs, detailed maps, and even statistical information on electronic format (e.g., government statistical, meteorological, and financial data). Since these data are available from many sources, they do not prevent any large organization from accessing or converting them for
its own use. They only obstruct research scholars, analysts and others who might be able to provide useful advice to the government.

**Telecommunications in Pakistan**

In the present age, information technology is one of the most important sectors facilitating national development and it should not be left to the discretion of non-professionals for short term gains on issues which are very important in helping shape the destiny of our Country in years to come.

PTC is one of the most dynamic public sector organizations in the country and although it has problems which exist by default in most government organizations, it is still providing a useful service in many ways and has tried to keep pace with developments in international market place by incorporating useful technologies and products.

The last 5-6 years have seen tremendous growth in the telecommunications sector and Public in general seems to have appreciated the expansion. At present, it is possible to get a phone connection in most urban areas in reasonable time. The service has also improved due to incorporation of modern digital technology. It appears that, for now, this organization is headed in the right direction with expansion of local and international circuits, fiber optic and alternate fiber optic nationwide links, data communications (PDN) links availability and their expansion to channels of higher capacity, satellite communications and so on...

The major problem is that most of these services are priced very high without taking in to consideration the consumers' input and level to which market can absorb these prices, making expensive for ordinary consumer to use the services. Although PTC claims, that the charges are based on international arrangements and agreements, but have somehow failed to realize that although this is true as far as International tariffs are concerned, their main territory of operation is with in Pakistan and local market forces have to be taken in to account when determining tariffs.
The expansion in number of operational lines should have brought the tariffs down so that revenue generation be driven by traffic volume, but the reverse has happened and the prices use these services have increased and excise duty has been levied on them by the federal government. This has resulted in decrease in overall revenue. The PTC did introduce incentives, such as increasing reduced price evening I night time slots for long distance calling etc.

Same is true for International dialing where the charges are very high. A comparison between charging of PTC compared with long distance carriers in USA shows that a call to US costs Rs.52/- per minute from Pakistan, while a person in USA pays about $ 1.20 (Rs.38) per minute to a regular company and about 70-90 cents (Rs.22-28) per minute to a discount long distance carrier for calling a destination in Pakistan. A call with in U.S, between, say East and West Coast, thousands of miles apart costs about 12 cents (Rs.4) per minute during evening I weekend with a suitable calling plan and across the Atlantic, call to U.K., about 50-60 cents per minute (Rs.15-19), and these, mind you, are charges for domestic consumers. Corporate users are offered extremely attractive calling packages I plans by these companies. Compare these with the prices PTC charges its customers. Again, compare this with the global trend. In the light of growing competition, there is a strong trend in the world telecommunications markets to reduce tariffs to enhance volume. Few Examples follow: Belgium telecomm operator cut the charges of trans-Atlantic leased lines between 8.5-34.6% last year. British Telecom has cut its international business rates for phone calls to select areas. Calls to Japan cut by 30%, Calls to Ireland cut by 33%, Calls to Hong Kong / Israel I Sweden cut by 10% last year. Singapore Telecomm has cut charges for international telephone calls by up to 37.5% last year. In Italy, their carrier "SIP" slashed charges by about 20% on the average last year. Compare this with Pakistan. While the global trend is to reduce prices, ours has been completely out of tune in the past 5 years.

So, the bottom line is, to make the service really useful for all cross-section of consumers and to develop the kind of dynamism in business and the system in general, as is there in the developed countries,
Telecommunications has to play a very significant role and the first incentive would be to cut the tariffs across the board so that even ordinary domestic users won't hesitate calling long distance (national I international), at any hour of the day which will help in creating new economic opportunities and providing the much needed stimulus for opening up and pick up of a sagging industrial I trade sector, where small players can be exposed to new opportunities. This will also help in giving momentum to the emerging data-communications and networking revolution in this country.

Now, let us address some of the issues regarding the "PTC privatization". Complete integrity and transparency is required while handling such an important project of immense national importance. This can only be done if due care is exercised when going ahead with the process of privatization and eminent professionals (engineers, legal experts, financial wizards, social scientists, economists), public figures and international consultants of repute are made part of the team which oversees in PTC privatization. Any objections I conflicting points raised by these people or public in general should be responded to and a consensus be developed for facilitating transition from government to private sector management.

There are numerous other issues that need to be addressed in the context of Telecommunications marketplace in Pakistan, such as:

- Will the consumers really benefit from this kind of privatization where only the management changes and monopoly still remains for at least 7 years. It is important that the monopoly is kept in check and a situation does not arise like the one in which all phone companies have formed a sort of joint cartel for fleecing customers without check.

- Creation of a regulatory body is an important issue, and it is suggested that it should be formed as an independent autonomous body, because any government organization is prone to interference, pressures and hurdles. A bad example is the existing Corporate Law Authority, a regulatory body to oversee I regulate the corporate
sector. While an independent CLA would really be able to protect consumers at large, the existing CLA has not come up to the expectations. Time and again the investors have suffered. We don't want such compromising situations to arise in the Telecommunications sector which is growing very rapidly and if this authority is not dynamic and independent enough to respond to the changing needs and requirements, it would mean difference between road to prosperity and complete backwardness for the whole country.

- In this context, the proposed German or Danish model of regulatory body can be adapted with modifications. In Germany, a new regulatory board was proposed, following privatization, consisting of 2 MP's each from its 16 Federal States with substantial powers to regulate the telecommunication sector. The proposed autonomous regulatory authority for Indian telecommunications industry should also be looked into. In addition to the regulatory bodies in the EU countries which face a major task when their markets are thrown open to competition I deregulation in 1998. The PTA should be constituted as a broad-based board consisting of eminent professionals in telecommunications, engineering, law, finance, social science, economics, public figures and international consultants. In addition, it should have a hierarchical structure to employ professionals with different level of experience. The authority should have a good pay structure, autonomous status and legal I judicial powers to enforce regulations, penalties, minimum service quality criteria and can respond to complaints, etc.

- The telecommunications sector should be allowed to function as an open market and not be restricted to a monopoly in the private I public sector if consumers are to gain the most. Here again Indian example is worth quoting where, as the government relaxed communications legislation, way was cleared for private and foreign companies to participate in basic telephone services. One such consortium consisting of RPG Telecomm of India, Pacific Telesis, Qualcomm USA, Fujitsu and Itochu Techno Sciences submitted
proposal to build and operate a regional basic telephone services network in India. Other such proposals are by British Telecomm to add to the value-added services it offers in India; by Reliance Industries to build and operate a large nationwide network etc. A pilot license has been awarded by Indian government to US WEST India (Ltd), enabling it to become the country's first private operator of a public telecommunications network. This group will operate a pilot network in Southern India to provide 1 million lines over a 10 years period.

Other such examples where PTT monopolies are shaking in anticipation of competition by aggressively priced services provided by alternate carriers are in Western Europe and even in some East European countries. Consumers who have a choice are the ultimate winners. Good examples of de-regulated markets are Finland, UK and USA. In Finland, the PTT leader is, Telecommunications Finland facing competition by an association of country's 49 regional companies and also by a power company which owns an extensive fiber-optic network in the country. This competition has really driven prices down and raised quality of services. Same is true for USA. There are other countries seriously looking at allowing alternate carriers to enter the market as they have realized that (1) The monopoly PTT cannot invest all their sources necessary for large scale expansion. (An article by Solomon Brothers suggests that only in the Asia-Pacific region, large-scale expansion in telecommunications industry requires 90 Billion Dollars in the next decade). (2) Alternate carriers can provide competition and improve quality of service offered. Some of the countries on this bandwagon are; UK- which has allowed a third long distance carrier Energis Communications Ltd.