WTO Agreements on Telecommunications and Information Technology: Implications for Pakistan

Birg. (Retd) Mohammad Yasin

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Mailing Address: PO Box 2342, Islamabad, Pakistan.
Telephone ++ (92-51) 2278134, 2278136, 2277146, 2270674-76
Fax ++(92-51) 2278135, URL:www.sdpi.org

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Birg. (Retd) Mohammad Yasin[i]

Abstract

For developing countries, the WTO agreements on telecommunications and information technology will offer new opportunities for development in these sectors. Under the telecommunications agreement, the signatories will open door to competition from foreign countries. The IT agreement will eliminate customs duties and other charges on IT products. Pakistan has signed the telecommunication agreement with certain exemptions and commitments. However, it will sign the IT agreement during its 9th Five Year Plan. The development of information and telecommunications infrastructure is capital intensive and foreign investment would be of great help. Similarly free trade in IT products will reduce import costs and in turn manufacturing costs. However, with poor telecommunications infrastructure in rural areas and with almost no IT production industry, Pakistan, like other developing countries will have to carefully assess implications of these agreements and devise an appropriate strategy to forestall any negative fall-out.

This paper looks at Pakistan's status viz-a-viz the two agreements, particularly the state of its IT manufacturing industry, the imbalances in its trade in IT products and suggests a strategy that it should adopt to minimise 'subjugation'.

Telecommunications

The period December 1996 to April 1997 saw the fruitful culmination of negotiations which began in 1986 between a significant number of countries on telecommunications and information technology. In February 1997, delegates from 69 countries[ii], including 40 developing countries, signed a liberalisation pact at the World Trade Organisation in Geneva. It will allow foreign operators to break domestic monopolies to supply new connections. The core obligation of the agreement is free market access to and use of public telecommunications by national and foreign operators without any discrimination. Members are required to ensure that all service suppliers seeking to take advantage of scheduled commitments are accorded access to networks and services on reasonable and non-discriminatory terms. Each

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i. Programme Coordinator, information, communications and Training, Sustainable Development Policy Institute, Islamabad.

ii. The countries that had signed the accord by 15 February 1997 are Antigua and Barbuda, Argentina, Australia, Bangladesh, Belize, Bolivia, Brazil, Brunei Darussalam, Bulgaria, Canada, Chile, Colombia, Cote d'loire, Czech Republic, Dominica, Dominican Republic, Ecuador, El Salvador, all member states of the European Community, Ghana, Grenada, Guatemala, Hong Kong, Hungary, Iceland, India, Indonesia, Israel, Jamaica, Japan, South Korea, Malaysia, Mauritius, Mexico, Morocco, New Zealand, Norway, Pakistan, Papua New Guinea, Peru, Philippines, Poland, Senegal, Singapore, Slovak Republic, South Africa, Sri Lanka, Switzerland, Thailand, Trinidad and Toba----, Tunisia, Turkey, USA and Venezuela.

member is under obligation to implement the provision whether or not it has liberalised the supply of basic telecommunications and even if it has not scheduled commitments on basic telecommunications[1] .

Pakistan's Position

Pakistan signed the agreement on telecommunications. However, like many other countries, Pakistan has included certain exemptions and has made certain commitments[2]. These exemptions and commitments are based on the provisions of the Pakistan Telecommunications (Reorganisation) Act 1996 which gives monopoly of basic telephony to the Pakistan Telecommunications Company Limited (PTCL) and PTCL's bilateral agreements with other nations/companies and the mandate given to the Pakistan Telecommunications Authority (PTA). Pakistan also included an attachment with the schedule explaining the provisions of transparency, interconnection and numbering, competition safeguards. Exemptions and commitments are given below:

- **Exemptions**
  - Pakistan will continue with different accounting rates for different operators/countries covered by International Telecommunications Services Agreements between PTCL and various foreign operators including most favoured nation (MFN) agreements.
  - PTCL will have monopoly/exclusivity of basic telephony upto 2003.

The WTO Accord[3]

A total of 69 countries have committed themselves to a World Trade Organisation agreement liberalising the US$600 billion telecoms industry by the WTO's deadline of 15 February 1997. Together, these countries account for more than 80 percent of world telecoms revenues. More than 40 developing countries signed up to the deal.

The WTO meeting in Geneva, led to the accord which marks the culmination of a process which began in 1986 when telecommunications and other 'service' sectors of the economy were first included in multilateral trade negotiations under the General Agreement on Tariffs and Trade (GATT)) in its 'Uruguay Round' of negotiations. Following pressure from some countries, particularly the US, liberalisation of telecommunications became a priority to be negotiated through an organisation linked to GATT, the General Agreement on Trade in Services (GATS).

The Uruguay Round led to the creation of the WTO in 1993. It bestowed world recognition on telecommunications as a distinct sector of economic activities, as well as an important channel of information transfer for other key economic activities. In other words, telecommunications progressed from being regarded as a facilitator of trade to being also seen as an essential component of trade and commerce in its own right.

The new WTO accord does not cover all telecommunications services, only 'basic telecoms' meaning services other than 'value added services' such as voice mail or Internet. Nor does it include the

broadcast or cable transmission of TV or radio programme. It does include voice telephony, data transmission and satellite services.

Countries signing up the liberalisation agreement have promised - to one degree or another - to allow foreign companies free access to their markets and to behave towards foreign companies in much the same manner as they would treat another domestic telecoms operator. These undertakings are intended to take effect from the 1 January 1998.

The agreement could, according to Renato Ruggiero, Director General of the WTO, lead to 'global income gains of some US$1 trillion over the next decade or so. That represents around 4 per cent of world Gross Domestic Product at today's price'. It would also lead to 'lower costs for consumers - this is good news for firms, which in aggregate spend more on telecommunications services than they do on oil', according to Ruggiero.
Liberalisation is not the same process as privatisation - the selling or licencing of a state-owned asset into private ownership. Although most countries embarking on liberalisation have already privatised traditional state-owned telecommunications monopolies, some governments have held on to ownership in the belief that state-owned companies can contend more effectively with foreign competitors. Many argue that liberalisation should not be regarded as a standards formula or blueprint but as an approach that can be tailored to suit differing circumstances and policy requirements as a result there are almost as many paths to liberalisation as there are governments to embrace it.

Source: Panos Media Briefing No. 23, London, March 1997

- **Specific Commitments**
  - **General Conditions**
    - Policy, regulatory and operation functions are separate and compliance is necessary.
    - All services to be provided in Pakistan shall require a licence from the Regulatory Authority established under the law.
    - Operators and service providers may be granted licence in accordance with the local legislation.
    - The number of operators, service providers and licensees may be limited due to technical constraints.
    - The confidentiality of International Total Accounting Rate (TAR) shall be maintained.
    - The bilateral agreements on accounting rates shall be in accordance with ITU guidelines.
    - Upto 100 per cent foreign investment in licensed services is permitted.
    - Broadcasting services are not included in the schedule.
    - Until 2004, no bypass of PTCL will be allowed and PTCL shall have exclusivity in basic telephony services.
    - 'Call back' shall not be allowed.
    - Value added services like operation of data, email, Internet and Intranet services may be licensed.
    - Following services have been licensed and further licensing could be possible:
      - Cellular mobile service

- Card pay phones and paging
- Data networks
- Voice mail
- Audio tex
- Trunk Radio
- Use of domestic satellites
- Manufacturing of telex, fax, all PABXs and modems.
- Manufacture of telephone sets, terminal equipment, fibre optic and copper cables.

- The following provisions shall be ensured.
  - Transparency of regulations.
  - Dispute resolution mechanism.
  - Competition safeguards and standards.
  - Tariff regime shall be regulated.

Information Technology

An agreement[4] to eliminate customs duties and other duties and charges on information technology (IT) products was signed at a ministerial meeting on December 13, 1996 in Singapore. Elimination of such customs duties shall take place through rate reduction in equal steps or as agreed by the participants. the reductions shall commence from July 1, 1997 and elimination of customs duties shall be completed by January 1, 2000. Two attachments containing IT products with harmonised system (HS) headings etc formed part of the agreement . Attachment A lists the HS headings or parts thereof and contains 199 items/IT components. Attachment B covers the positive list of specific products. It was agreed by the participants that they will review this product description in January 1999. (Attachments A and B are at pages 15 and 23 respectively).

The WTO IT Accord

Extracts from Ministerial Declaration on Trade in Information Technology Products, dated 13 December 1996,

Representing the following Members of the World Trade Organization (WTO), and States or separate customs territories in the process of acceding to the WTO, which have agreed in Singapore on the expansion of world trade in information technology products and which account

for well over 80 per cent of world trade in these products:

Australia	Norway
Canada	Separte Customs Territory of Taiwan,
European Communities	Penghu, Kinmen and Matsu
Hong Kong	Singapore
Iceland	Switzerland
Indonesia	Turkey
Japan	United States
Korea	

Each party's trade regime should evolve in a manner that enhances market access opportunities for information technology products.

Each party shall bind and eliminate customs duties and other duties and charges of any kind, with respect to the following:

- all products classified (or classifiable) with Harmonized System (1996)("HS") headings listed in Attachment A and
- all products specified in Attachment B whether or not they are included in Attachment A;

through equal rate reductions of customs duties beginning in 1997 and concluding in 2000, recognizing that extended staging of reductions and, before implementation, expansion of product coverage may be necessary in limited circumstances.

The concessions to be proposed by each participant as modifications to its Schedule shall bind and eliminate all customs duties and other duties and charges of any kind on information technology products as follows:

- elimination of such customs duties shall take place through rate reductions in equal steps, except as may be otherwise agreed by the participants. Unless otherwise agreed by the participants, each participant shall bind all tariffs on items listed in the Attachments no later than 1 July 1997, and shall make the first such rate reduction effective no later than 1 July 1997, the second such rate reduction no later than 1 January 1998, and the third such rate reduction no later than 1 January 1999, and the elimination of customs duties shall be completed effective no later than 1 January 2000. The participants agree to encourage autonomous elimination of customs duties prior to these dates. The reduced rate should in each stage be rounded off to the first decimal; and
- elimination of such other duties and charges of any kind, within the meaning of Article II (b) of the General Agreement, shall be completed by 1 July 1997, except as may be otherwise

specified in the participant's document provided to other participants for review. The modifications to its Schedule to be proposed by a participant in order to implement its binding and elimination of customs duties on information technology products shall achieve these results: • in the case of the HS headings listed in Attachment A, by creating, where appropriate, sub-divisions in its Schedule at the national tariff line level; and • in the case of the products specified in Attachment B, by attaching an annex to its Schedule including all products in Attachment B, which is to specify the detailed HS headings for those products at either the national tariff line level or the HS 6-digit level. Each participant shall promptly modify its national tariff schedule to reflect the modifications it has proposed, as soon as they have entered into effect. Participants shall meet periodically under the auspices of the Council on Trade in Goods to review the product coverage specified in the Attachments, with a view to agreeing, by consensus, whether in the light of technological developments, experience in applying the tariff concessions, or changes to the HS nomenclature, the Attachments should be modified to incorporate additional products, and to consult on on-tariff barriers to trade in information technology products. Such consultations shall be without prejudice to rights and obligations under the WTO Agreements. Participants shall meet as soon as practicable and in any case no later than 1 April 1997 to review the state of acceptances received and to assess the conclusions to be drawn therefrom. Participants will implement the actions foreseen in the Declaration provided that participants representing approximately 90 per cent of world trade in information technology products have by then notified their acceptance, and provided that the staging has been agreed to the participants' satisfaction. In assessing whether to implement actions foreseen in the declaration, if the percentage of world trade represented by participants fall somewhat short of 90 per cent of world trade in information technology products, participants may take into account the extent of the participation of States or separate customs territories representing for them the substantial bulk of their own trade in such products. At this meeting the participants will establish whether these criteria have been met.	

Pakistan's Position

Pakistan has not yet signed the WTO IT Agreement but plans to sign it during the 9th Five Year Development Plan (1998-2003)[5].

Although Pakistan's IT production industry dates back to 1948 when one-band and two-band radio sets were assembled from imported components yet the progress in the establishment of this industry has not been commensurate with international developments in this rapidly evolving field. It would be pertinent to review the progress made by the IT production industry in Pakistan.

The electronic industry in Pakistan can be divided in two sub-sectors namely the organised electronic industry and unorganised electronic industry.

The Organised Electronic Industry which includes, 1) TV manufacturers based on multinational technology and 2) telecoms equipment and system manufacturers established in the public sector as joint ventures with multinational companies like Alcatel and Siemens.

The Telephone Industry of Pakistan (TIP) established in 1952 by the Pakistan Telegraph and Telephone Department in partnership with Siemens AG produces digital electronics systems and miscellaneous telecoms equipment. TIP's manufacturing capacity is given in table 1.

Table 1: TIP Capacities (1991-92)

Equipment	Yearly Capacity
Non-digital exchange lines	24,000
Digital Public exchange lines	210,000
Central Battery, magnito exchange lines	15,000
Field exchange lines	4,000
Trunk positions	50
Telephone sets	300,000
Miscellaneous typewriters	14,200

Source: Ministry of Science and Technology, Review of the Electronics Cottage Industry in Pakistan, 1993

Some years back, the Carrier Telephone Industries (Private) Limited (CTI) started producing pulse code modulated systems, digital microwave systems, multiplexing equipment and radio relay systems. The company also produced components like transistors, capacitors, coils and transformers, diodes and rectifiers.

In 1981, Micro Electronics International (Private) Limited (MEI)[6] was established in the private sector which quickly acquired the capability of manufacturing high frequency single side-band transceivers, vhf mobiles, personal computers and encryption machines. It also had the capacity of producing 20,000 ICs per day and claimed of packaging one million ICs per month. However, the company could not achieve a sustainable manufacturing and export capability because of high production costs and other policies of successive governments which hindered progress by the private sector.

Messrs Philips Consumer Electronics Factory is Karachi produces high quality TV sets and other consumer products. There are atleast 11 more TV manufacturing units which assemble other brands like National, Orion, Sanyo, Sony and Samsung[7]. These are all

assembly units. The demand of TV sets is increasing every year and the above manufacturing units are not coping with the increased demand. Please see table 2 below:

Table 2: Production of TV Sets

Year	TV Sets in use (Number)	Demand (Number)	Production (Number)
1990-91	2,174,000	387,789	181,685
1991-92	2,457,000	445,957	145,468
1992-93	2,751,800	512,851	129,728
1993-94	3,034,500	592,342	n.a

Source: Ministry of Science and Technology, Review of Electronics Cottage Industry, 1993

In public sector, there is the Precision Engineering Complex[8] Karachi managed by the PIA, which at one time claimed of manufacturing computer hardware and software but could not achieve a break through. Margala Electronics, in the Defence Sector assembles radio and RADAR equipment. Similarly, Intec Limited, Rawalpindi managed by the Fauji Foundation had the capability of IC bonding, packaging and manufacturing electronic boards for exports but nothing much came out of this set-up.

Electronic Components

No active electronic components like integrated circuits (ICs), surface mounted devices (SMDs), and microprocessors are manufactured in Pakistan. All active components being used in the domestic electronics industry are being imported or smuggled into the country. However, components like carbon resistors, various types of capacitors, printed circuit boards (PCBs), silicon diodes, selenium rectifiers, microphones, hearing devices, loudspeakers and relays are manufactured by the organised electronic industry.

Amber Capacitors (Pvt) Ltd.[9] Lahore, is the largest capacitor manufacturers. Messers Micropak (Pvt) Ltd. Islamabad produce good quality PCBs. There are a few Cathod Ray Tube (CRT) manufacturers for TV sets. However, they are unable to cope with the domestic demand.

Table 3 below shows the import of *major electronics components and products.*

Table 3:

Code	Commodity group	1992-93	1991-92	1990-91
75	Office & automatic data process machines	1,186,738	1,298,006	1,023,972
76	Telecommunication & sound recording equipment	5,333,960	1,298,006	1,023,972
761	Television receivers	273,756	289,785	210,636

7611	TV receivers (colour)	92,959	35,343	55,818
7612	TV receivers (colour)	180,797	254,442	154,817
762	Radio receivers	3,966	18,903	3,968
763	Sound recorders	10,153	26,653	56,978
764	Telecommunications equipment	5,046,085	3,610,311	3,686,036
77	Electrical mechanical appliances	4,912,707	7,469,258	4,929,375
772	Electronics circuits, resistors etc.	762,210	1,240,834	935,040
7722	Printed circuits	7,294	11,345	7,190
7723	Resistors	24,967	38,544	26,368
774	Electronics diagnostic medical appliances	282,887	436,238	353,644
776	Thermionic valves & tubes	188,679	164,499	131,495
7763	Diodes transistors	11,432	24,448	8,832
7764	Integrated circuits & microasemblies	4,780	11,208	24,215
7768	Piezo electric-crystal, mounted parts	13,248	3,445	3,133
7786	Capacitors fixed, variable	76,816	73,217	77,709
87	Scientific Instruments	2,476,850	2,957,493	2,622,874

Source: Foreign Trade Statistics of Pakistan. Imports, April-June, 1992 & March, 1993 Federal Bureau of Statistics.

The Unorganised Electronic Industry which basically focuses on consumer electronics is identified as cottage industry. This is confined to the assembly of mostly foreign patents of radios, TV sets, casette recorders and other allied consumer goods. For various reasons, the cottage industry has not been able to establish on modern lines. These reasons include lack of government support, lack of infrastructure, lack of knowledge, absence of quality control and unabated smuggling of consumer goods in the country. A list of known cottage industrial units is at Annexure A.

The Eighth Five Year Plan (1993-98)[10] recognised the importance of electronic industry as "key to industrial and economic development" and termed it as "strategic technology". The plan envisaged 9.9 per cent growth rate in the entire manufacturing sector. A meagre allocation of Rs 200 million was made for feasibility studies and equity participation for microchips, electronic components, solar panels, personal computers, new and composite materials. The National Institute of Electronics (NIE) under Ministry of Science and Technology was allocated Rs 450 million for industrial electronics design and development, bipolar IC fabrication and semiconductor design. Similarly, National Institute of Silicon Technology was allowed Rs 85 million for preparation of thin films and amorphous silicon devices and solar cells. Unfortunately none of these schemes saw the light of the day.

It is obvious that Pakistan has little IT components and equipment production capability. Its electronics industry has not received the attention in the public or the private sector that it deserved. However, Pakistan does have some capability of assembling completely knocked down kits that it imports. Some such equipment is also exported. Pakistan's imports and exports of IT products during the period

1991 to 1996 are given at Annexure B and C respectively which give harmonised system (HS) codes and description of products imported and exported. A summary of volume of trade is given in table 4.

Table 4: Import and Export of IT Products
(Value in Rupees)

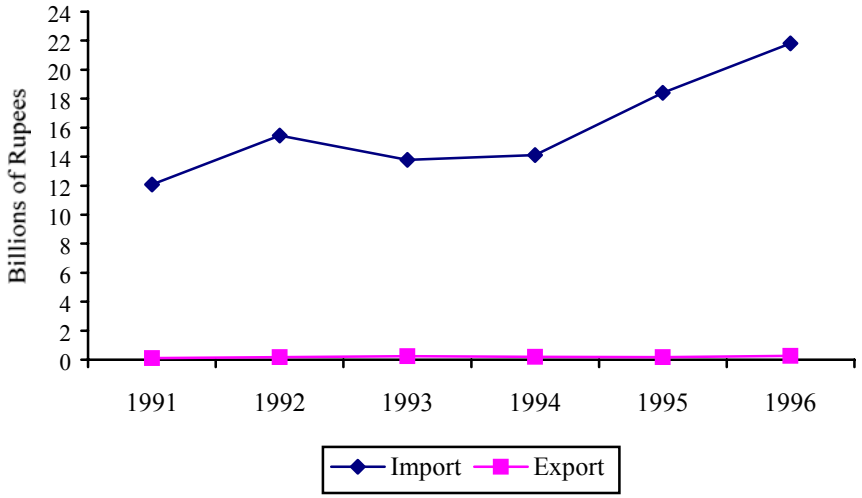
Year	Imports	Exports
1991	12,074,760,924	103,674,469
1992	15,472,659,653	183,007,136
1993	13,781,895,703	250,544,913
1994	14,110,289,173	208,297,981
1995	18,412,020,720	183,999,405
1996	21,801,014,418	267,271,993
Total:	95,652,640,591	1,196,795,897

Source: Federal Bureau of Statistics, Statistics Division, Government of Pakistan, November 1997(Summarised from Annexure B Attatched)

The import/export picture is depicted in graphical form in figure 1. The import/export ratio comes to 1:100 showing a large trade imbalance. With the signing of WTO Agreement on IT and resultant free trade in IT products, this imbalance will take a quantum jump.

It is, therefore, imperative that Pakistan takes urgent and effective measures to modernise its existing IT production industry and sets up new such industries.

Figure 1: Imports and Exports of IT Products



Source: Federal Bureau of Statistics, Statistics Division., Government of Pakistan, November 1997.

Implications for Developing Countries

"The 'North' enjoys overwhelming advantages over the 'South' in IT and telecoms. The flow of communications material is extremely asymmetrical. It is because 75 per cent of world's telephones are installed in eight industrialised countries. 51 per cent of global population accounts for 1.8 per cent of the world's telephones. In real life around 80 per cent of the world's people do not have a telephone. The information rich countries are dominating the ideological and cultural lifestyles of the developing countries"(Sampson 1996)[11]

According to Sampson,IT and telecoms firms are concentrated in less than 10 advanced countries. Some of these major companies have market capitals greater than the GDP of many developing countries and they can take over the IT and telecoms industries of the latter. For example Cables and Wireless (UK) has shares in 6 countries.

Telecoms and computer technologies have made great strides and in addition the telecoms and ITs have converged. This convergence has opened up new world markets. Sampson estimates that telecoms, computing and information activity generated US$ 1.43 trillion worth of revenues in 1994 which is 5.9 per cent of world's domestic product. In the same year, $2.3 trillion worth of funds moved through the electronic network.

Development of information and telecoms infrastructure is capital intensive and liberalisation by developing countries in this area would bring foreign investment particularly when the markets of developed countries have been saturated. The free trade in IT products will reduce imports costs with consequent reduction in manufacturing costs in the developing countries. Consumers will also benefit from this price reduction. The cost of service industries would also fall. Because of wide competition, the monopoly operators would not be able to take an unfair advantage.

The flow of foreign investment into the developing countries would enable them to accelerate the modernisation and expansion of information and telecoms infrastructure and services. This would also enable them to modernise their existing IT industries and establish new ones to jump into the bandwagon of exporting countries, reduce tariffs and be able to reduce trade imbalances.

It, therefore, appears that the developing countries stand to gain from the WTO Agreements on IT and telecoms. However, the situation will not be as bright as it looks. Liberalisations, open telecoms markets and duty free trade of IT products will not be free from serious negative implications for the developing countries. The major beneficiaries will be a relatively small group of very large firms in a few advanced countries. This could widen North South inequalities.

Developing rural communications, a dream of the developing countries, may not materialise because the foreign investors would want to invest in urban areas from where they would stand to reap the fruits of their investment. Since the developing countries would be heavily

dependent on foreign capital, therefore, they will have little manoeuvrability. Under the WTO Agreements, the developing countries will have to change their laws and regulatory regimes. This will tantamount to loss of sovereignty. There would be loss in revenues as a result of reduction in accounting rates and imbalances in trades in IT products. Indigenous products will no longer enjoy protection. Countries with low indigenous manufacturing capabilities will suffer foreign exchange loss. Consequently import of raw materials will be affected resulting in production loss.

Pressured by the developed countries in general and the USA in particular, the World Bank is pushing the developing countries into liberalisation of telecoms markets and into signing the WTO Agreements. In the wake of market forces, the developing countries have no choice but to fall in line with the world trends in the development of information and telecoms. The laggers will just be thrown out of the race. On the question of accounting rates, for example, the market forces dictate drastic reduction in tariffs. The readers would recall that in December 1996, the USA threatened to pull out of the international accounting system which divides up revenues from telephone calls. Any such action on the part of developed countries would seriously reduce the revenues of the developing countries.

What Strategy Should Pakistan Adopt?

Although Pakistan has made progress in developing and modernising its information and telecommunications infrastructure, yet a lot is still required to be done to be able to forestall a complete subjugation by the adverse implications of liberal telecoms markets and open trade in IT products. Early this year, the Government of Pakistan constituted a task force to suggest developments and targets for the 9th Five Year Plan for Telecoms (1998-2003). This task force in turn constituted a number of sub-committees[iii] which deliberated on various aspects and formulated recommendations. Some of the measures suggested here are covered in the reports submitted by the subcommittees[12,13].

Convergence of Technologies

The IT is an integral part of telecoms but we tend to separate the electronic media from IT telecoms mix. Resultantly, the policies in both the sectors are framed in isolation. The telecoms wing of the Ministry of Communications should form a part of the Ministry of Information and Media Development to reap the fruits of convergence of technologies. This will be possible if we follow the world's trend in this convergence which has created a new perspective to marry-up IT and telecoms. In the same context, Pakistan, as of date, does not have a national information and telecommunication policy (NITP). This should be formulated as a first priority.

A Good Backbone and Responsive Services

Pakistan already has an optical fibre system from Karachi to Peshawar. An alternative fibre optic route (along Indus) from Karachi to Peshawar is under construction. Subsidiary routes or spurs have also been planned. This should provide a good information highway ring

iii. The writer was a member of two subcommittees.

and back-bone. The PTCL has done significant digitalization and 75 per cent installed lines are now digital. The PTCL and other private operators have introduced a number of value added services[14]. The PTCL claims that in big cities virtually there are no pending demands for telephone connections. However, the operation and services, particularly by the PTCL remain far below the standard because of poor human resource, inefficiency, incompetence and indifferent attitude towards the profession and towards the customers. Presently the domestic private sector does not have the capacity in financial and human resources to manage the privatised PTCL. Even if the private sector had the capacity, it would lack in appropriate attitude for optimum quality and comsumer friendly service. That is why management by a strategic investor is repeatedly suggested.

Reach-out to Rural Population

Although the rural population is the main-stay of our economy yet these people remain deprived of the benefits of the emerging technologies. At the moment the official estimate put one telephone line for 10,000 people[15] in rural areas. Even this low figure is hard to believe. According to a survey, the phone lines demand in rural areas is three times more than in urban areas. This is not withstanding the fact that a significant portion of the rural population does not put-in such demands because they know that in the absence of telecoms infrastructure in their areas, such demands would be an exercise in futility. The 9th Five Year Plan envisages to provide telecoms facilities to every community having a population of 500 or more persons. This target must be achieved. The foreign investors would not like to invest in rural areas because of higher investments and poor returns.

Development of rural communications would be desirable even through cross-subsidisation. It is going to bring rich dividends because such communications will provide a quantum jump to industrial development and in agriculture produce and return fron it.

Wireless Local Loop

Pakistan, has made significant progress through digitalization and establishing long distance optical fibre cable routes. However, because of low quality and poor construction and maintenance of local loop (the cable from the telephone exchange to subscribers' telephone - the last mile), the communications efficiency suffers. Besides, the laying and maintenance of local loop cables is a difficult and an expensive exercise. It causes inconvenience to the public when roads are dug-up to lay cables. Discussions with relavent organisations indicated the cost of an average length of a physical pair of local loop (2.5 Km) in urban areas as Rs 55,000 per subscriber and the cost of wireless local loop as Rs 30,000 per subscriber. The world trend now is to establish wireless local loops. The wireless technology is also being used to reach out to rural population. We must bring the rural population to the main stream of information and telecoms to prepare for the 21st Century.

Enter Information Superhighways

Although Pakistan has the option of buying capacity from global and regional satellites as it is presently doing from Intelsat, Asiasat and Panamsat. Pakistan must launch its own communications satellite because, 1) to secure its orbital slots as these may be lost due to a change

in the International Telecommunication Union regulations, 2) custom design footprints will be more useful for in-country applications, 3) it will provide ease of availability and control, 4) it can offer more cost-effective transponders, 5) it will help develop local expertise in a high technology project, 6) if launched through private sector participation, it can bring investment, 7) it is sometimes a matter of national pride and 8) domestic satellites will be economical and convenient to connect remote and inaccessible areas where laying and maintaining physical cables is difficult and costly.

Pakistan must accelerate actions required to join the two information superhighways, namely submarine optical fibre cable girding the glob and passing through the Atlantic, the Mediterranean, the Red Sea, the Indian Ocean, and the Pacific Ocean and the Trans-Asia-Europe (TAE) optical fibre cable connecting China, Central Asia and Europe[16]. Although this connectivity is catered for in the 9th Five Year Plan but without access to high-speed high capacity information superhighways, development of software and optimal utilization of IT production industry and even setting up of new IT industry will face serious limitations.

Sometimes a question is asked, why must we have a simultaneous access through satellites and fibre optics submarine cables? Fibre optics cables can supplement each other and provide redundancy. Fibre optics submarine cables are expensive to build and lay but once laid, theoretically, they have unlimited life. They are high speed and high capacity. A single strand of fibre optics can carry 25 Terahertz of information and there are a number of strands in a cable. Satellites on the other hand are comparatively less expensive and easier to launch. They have a limited life and their capacity depends on the number of transponders in the satellite. Each transponder has a capacity of 36 Megahertz. The cost limits the capacity.

Human Resource Development

Pakistan has a very weak skill base in IT and telecoms. The situation is hopeless in software. By the turn of the century, the world software market will touch US$ 1 trillion. According to an estimate, we only have 1000 software engineers and do not produce more than 200 software professionals in a year[17]. Rapidly evolving telecoms technologies require specialised staff. To fill the gap of trained personnel, telecoms engineering should be declared as a discipline of engineering and should be introduced in the engineering universities. By the year 2004, Pakistan should produce 50,000 IT experts and managers and same number of technicians and IT workers.

"Shortage of trained manpower in IT related fields is a world-wide phenomena but t he problem is drastic in Pakistan. According to the Information Technology Association of America (ITAA), in 1998, 346,000 IT related jobs will remain unfilled. The demand for trained workers in America is increasing by 95,000 IT jobs per year. Between 1994 and 2005, US business will generate a demand for more than 1.3 million additional IT professionals. The gap will cost US business $ 500 billion per year in lost revenue US companies are encouraging foreign IT professionals to migrate to USA"(Bina Shah 1998)[18].

The Private Software Export Bureau (PSEB) in Pakistan has initiated the long awaited ALCoS (Action Learning Centres of Software) programme. The programme has been approved by the Universities Grants Commission (UGC). Fifteen ALCoS[19] (four in Islamabad, three in Lahore, one in Multan, one in Jamshoro and four in Karachi) have been approved. These will be affiliated with the Universities and will

conduct one year postgraduate diploma courses in IT. The success of the programme, particularly the absorption of IT professionals, produced by these ALCoS, will be keenly observed.

Affordable Access to Information

Presently, access to Internet is limited because of higher tariffs. This requires immediate attention as do measures to popularise the use of the Internet. The increase in the number of users would facilitate inflow of knowledge and information which would enhance the skill base in the country. A network of universities and centres of higher learning should be provided Internet connectivity. This would provide the required thrust to IT.

IT Production Industry

Pakistan's IT manufacturing industry amounts to nothing, hence one cannot talk of export of IT components. When Pakistan signs the WTO Agreement on IT, the imports of raw materials and components would rapidly increase. While it would lower the manufacturing costs of IT products, it would also increase the trade imbalance. It is hard to say whether there would be any significant demand of Pakistani IT products in other countries because there would be tough competition. Pakistan should, therefore, take an urgent stock of its current IT manufacturing industry, including the software industry and take immediate measures to update its existing extremely meagre IT industry and help set up new branches. In this connection, a workable model of some developing countries such as Malaysia, can be adopted. Pakistan must also prepare the industry for the competitive onslaught and successful exports(Korean model).

Legislation to Develop IT and Telecom

Legislation is a serious business which is done after a good deal of thought. The framers of laws have to have vision and should be capable of looking into the future. Unfortunately our information and telecoms laws are based on adhocism. The Pakistan Telecommunications Act 1996[20] was drafted without much thought and passed secretively. It aims at protecting the PTCL. It is not meant to promote competition, reduce regulation, secure lower prices, ensure higher quality services, ensure consumer interests and encourage rapid development of telecoms technologies. The Electronic Media Regulatory Authority Ordinance[21], a useless piece of intended legislation has lapsed. Similarly the Freedom of Information Ordinance[22], not an ideal law but nonetheless a fair law, has also lapsed. We do not have a law on intellectual property rights. We need laws that should create an environment conducive to development of information and communications and should promote competition, reduce regulation, secure low prices, encourage expansion and modernisation of infrastructure, ensure higher quality services and larger investment. Such legislation must be put in place sooner rather than later.

National Information and Telecom Policy

As of date, Pakistan does not have a national information and telecoms policy (NITP). What we need is a comprehensive NITP which could provide the vision and the guidelines to facilitate entry into the 21st Century. The vision should be the creation of Pakistan's telecoms industry to become a leader in South Asia, an important competitor in Asia-Pacific region , and a telecoms hub for the whole region. The NITP should act as a catalyst for the development of a strategic IT manufacturing sector.

The Technology Triangle

The linkages between the universities, industry and government (the technology triangle) are non-existent. Therefore, the graduating engineers come out of the universities without any exposure to the industry. The industry does not get the benefit of university research. The policy makers (the government) have not integrated the universities and the industry into a solid economic base. To rectify the situation, strong linkages between the universities, industry and policy making should be established. Industrial establishments should be linked with universities. Graduate engineers should be required to complete a year of internship with the industry (as house job for doctors) before their degrees become effective.

Conclusion

Pakistan needs to prepare a strategy to successfully compete in the liberal global IT and telecoms market, coming up as a result of recently concluded WTO agreements. To forestall adverse implications of these agreements, we need to take effective and timely measures. As a first step, we need to prepare and adopt a comprehensive National Information and Telecoms Policy. Such a policy should provide the vision and form a basis for meaningful legistation to develop IT and telecoms infrastructure and services and protect consumers' interests. We need to follow latest trends in convergence of technologies. Pakistan must have an efficient and responsive backbone and services covering both urban and rural population adopting latest technologies like wireless local loops. It is vital that we launch our own communication satellite. and enter into the two information superhighways girding the globe. Special efforts are needed to develop our human resource in IT and telecoms. Most importantly, Pakistan must revamp its existing IT manufacturing industry and establish additional industries to be able to enter the export market. Give affordable access to information by reducing tariffs including duties on import and export of IT products.

Attachment A
Section 1

	HS 96		HS Description
	3818		Chemical elements doped for use in electronics, in form of discs, wafers or similar forms; chemical compounds doped for use in electronics
	8469	11	Word processing machines

	HS 96		HS Description
	8470		Calculating machines and pocket-sized data recording, reproducing and displaying machines with a calculating function; accounting machines, postage franking machines, ticket-issuing machines and similar machines, incorporating a calculating devices; cash registers
	8470	10	Electronic calculators capable of operating without an external source of electric power and pocket size data recording, reproducing and displaying machines with calculating functions
	8470	21	Other electronic calculating machines incorporating a printing device
	8470	29	Other
	8470	30	Other calculating machines
	8470	40	Accounting machines
	8470	50	Cash registers
	8470	90	Other
	8471		Automatic data processing machines and units thereof; magnetic or optical readers, machines for transcribing data onto data media in coded form and machines for processing such data, not elsewhere specified or included
	8471	10	Analogue or hybrid automatic data processing machines
	8471	30	Portable digital automatic data processing machines, weighing no more than 10 kg, consisting of at least a central processing unit, a keyboard and a display
	8471	41	Other digital automatic data processing machines comprising in the same housing at least a central processing unit and an input and output unit, whether or not combined
	8471	49	Other digital automatic data processing machines presented in the form of systems
	8471	50	Digital processing units other than those of subheading 8417-41 and 8417-49, whether or not in the same housing one or two of the following types of units: storage units, input units, output units
	8471	60	Input or output units, whether or not containing storage units in the same housing
	8471	70	Storage units, including central storage units, optical disk storage units, hard disk drives and magnetic tape storage units
	8471	80	Other units of automatic data processing machines
	8471	90	Other
Ex	8472	90	Automatic teller machines
	8473	21	Parts and accessories of the machines of heading No 8470 of the electronic calculating machines of subheading 8470-21 and 8470-29

	HS 96		HS Description
	8473	29	Parts and accessories of the machines of heading No 8470 other than the electronic calculating machines of subheading 847-10,8470-21 and 8470-29
	8473	30	Parts and accessories of the machines of heading No 8471
	8473	50	Parts and accessories equally suitable for use with machines of two or more of the headings Nos. 8469 to 8472
ex	8504	40	Static converters for automatic data processing machines and units thereof, and telecommunication apparatus
ex	8504	50	Other inductors for power supplies for automatic data processing machines and units thereof, and telecommunications apparatus
	8517		Electrical apparatus for line telephony or line telegraphy, including line telephone sets with cordless handsets and telecommunication apparatus for carrier-current line systems or for digital line systems; video phones
	8517	11	Line telephone sets with cordless handsets
	8517	19	Other telephone sets and video phones
	8517	21	Facsimile machines
	8517	22	Teleprinters
	8517	30	Telephonic or telegraphic switching apparatus
	8517	50	Other apparatus, for carrier-current line systems or for digital line systems
	8517	80	Other apparatus including entry-phone systems
	8517	90	Parts of apparatus of heading 8517
ex	8518	10	Microphones having a frequency range of 300 Hz to 3.4 KHz with a diameter of not exceeding 10 mm and a height not exceeding 3 mm, for telecommunication use
ex	8518	30	Line telephone handsets
ex	8518	29	Loudspeakers, without housing, having a frequency range of 300 Hz to 3.4 KHz with diameter of not exceeding 50 mm, for telecommunication use
	8520	20	Telephone answering machines
	8523	11	Magnetic tapes of width not exceeding 4 mm
	8523	12	Magnetic tapes of a width exceeding 4 mm but not exceeding 6.5 mm
	8523	13	Magnetic tapes of a width exceeding 6.5 mm
	8523	20	Magnetic discs
	8523	90	Other
	8524	31	Discs for laser reading systems for reproducing phenomena other than sound or image

	HS 96		HS Description
ex	8524	39	Other: for reproducing representations of instructions, data ,sound, and image, recorded in a machine readable binary form, and capable of being manipulated or providing interactivity to a user, by means of an automatic data processing machine
	8524	40	Magnetic tapes for reproducing phenomena other than sound or image
	8524	91	Media for reproducing phenomena other than sound or image
ex	8524	99	Other: for reproducing representations of instructions, data, sound, and image, recorded in a machine readable binary form, and capable of being manipulated or providing interactivity to a user, by means of an automatic data processing machine
ex	8525	10	Transmission apparatus other than apparatus for radio-broadcasting or television
	8525	20	Transmission apparatus incorporating reception apparatus
ex	8525	40	Digital still image video cameras
ex	8527	90	Portable receivers for calling, alerting or paging
ex	8529	10	Aerials or antennae of a kind used with apparatus for radio-telephony and radio-telegraphy
ex	8529	90	Parts of: transmission apparatus other than apparatus for radio-broadcasting or television transmission apparatus incorporating reception apparatus digital still image video cameras, portable receivers for calling, alerting or paging
	8531	20	Indicator panels incorporating liquid crystal devices (LCD) or light emitting diodes (LED)
	8531	90	Parts of apparatus of subheading 8531-20
	8532		Electrical capacitors, fixed, variable or adjustable (pre-set)
	8532	10	Fixed capacitors designed for use in 50-60 Hz circuits and having a reactive power handling capacity of not less than 0.5 kvar (power capacitors)
	8532	21	Tantalum fixed capacitors
	8532	22	Aluminium electrolytic fixed capacitors
	8532	23	Ceramic dielectric, single layer fixed capacitors
	8532	24	Ceramic dielectric, multilayer fixed capacitors
	8532	25	Dielectric fixed capacitors of paper or plastics
	8532	29	Other fixed capacitors
	8532	30	Variable or adjustable (pre-set) capacitors
	8532	90	Parts
	8533		Electrical resistors (including rheostats and potentiometers), other than heating resistors

	HS 96		HS Description
	8533	10	Fixed carbon resistors, composition or film types
	8533	21	Other fixed resistors for a power handling capacity not exceeding 20 W
	8533	29	Other fixed resistors for a power handling capacity of 20 W or more
	8533	31	Wirewound variable resistors, including rheostats and potentiometers, for a power handling capacity not exceeding 20 W
	8533	39	Wirewound variable resistors, including rheostats and potentiometers, for a power handling capacity not exceeding 20 W or more
	8533	40	Other variable resistors, including rheostats and potentiometers
	8533	90	Parts
	8534		Printed circuits
	8536	50	Electronic AC switches consisting of optically coupled input and output circuits (Insulated thyristor AC switches)
	8536	50	Electronic switches, including temperature protected electronic witches, consisting of a transistor and a logic chip (chip-on-chip technology) for a voltage not exceeding 1000 volts
	8536	50	Electromechanical snap-action switches for a current not exceeding 11 amps
	8536	69	Plugs and sockets for co-axial cables and printed circuits
	8536	90	Connection and contact elements for wires and cables
	8541		Diodes, transistors and similar semiconductor devices; photosensitive semiconductor devices, including photovoltaic cells whether or not assembled in modules or made up into panels; light-emitting diodes; mounted piezo-electric crystals
	8541	10	Diodes other than photosensitive or light-emitting diodes
	8541	21	Transistors, other than photosensitive transistors, with a dissipation rate of less than I W
	8541	29	Transistors, other than photosensitive transistors, with a dissipation rate of I W or more
	8541	30	Thyristors, diacs and triacs, other than photosensitive devices
	8541	40	Photosensitive semiconductor devices, including photovoltaic cells whether or not assembled in modules or made up into panels; light emitting diodes
	8541	50	Other semiconductor devices
	8541	60	Mounted piezo-electric crystals
	8541	90	Parts
	8542		Electronic integrated circuits and microassemblies
	8542	12	Cards incorporating an electronic integrated circuit (smart cards)
	8542	13	Metal oxide semiconductors (MOS technology)

	HS 96		HS Description
	8542	14	Circuits obtained by bipolar technology
	8542	19	Other monolithic digital integrated circuits, including circuits obtained by a combination of bipolar and MOA technologies (BIMOS technology)
	8542	30	Other monolithic integrated circuits
	8542	40	Hybrid integrated circuits
	8542	50	Electronic microassemblies
	8542	90	Parts
	8543	81	Proximity cards and tags
Ex	8543	89	Electrical machines with translation or dictionary functions
Ex	8544	41	Other electric conductors, for a voltage not exceeding 80 V, fitted with connectors, of a kind used for telecommunications
Ex	8544	49	Other electric conductors, for a voltage not exceeding 80 V, not fitted with connectors, of a kind used for telecommunications
Ex	8544	51	Other electric conductors, for a voltage not exceeding 80 V but not fitted with connectors, of a kind used for telecommunications
	8544	70	Optical fibre cables
	9009	11	Electrostatic photocopying apparatus, operating by reproducing the original image directly onto the copy (direct process)
	9009	21	Other photocopying apparatus, incorporating an optical system
	9009	90	Parts and accessories
	9026		Instruments and apparatus for measuring or checking the flow, level, pressure or other variables of liquids or gases (for example, flow meters, level gauges, manometers, heat meters), excluding instruments and apparatus of heading No 9014,9028 or 9032
	9026	10	Instruments for measuring or checking the flow or level of liquids
	9026	20	Instruments and apparatus for measuring or checking pressure
	9026	80	Other instruments and apparatus for measuring or checking of heading 9026
	9026	90	Parts and accessories of instruments and apparatus of heading 9026
	9027	20	Chromatographs and electrophoresis instruments
	9027	30	Spectrometers, spectrophotometers and spectrographs using optical radiations (UV, visible, IR)
	9027	50	Other instruments and apparatus using optical radiations (UV, visible, IR) of heading No 9097
	9027	80	Other instruments and apparatus of heading No 9097 (other than those of heading no 9027-10)
Ex	9027	90	Parts and accessories of products of heading 9027, other than for gas or smoke analysis apparatus and microtomes

	HS 96		HS Description
	9030	40	Instruments and apparatus for measuring and checking, specially designed for telecommunications (for example, cross-talk meters, gain measuring instruments, distortion factor meters, psophometers)

Attachment A
Section 2

	HS Code		Description	Comments
Ex	7017	10	Quartz reactor tubes and holders designed for insertion into diffusion and oxidation furnaces for production of semiconductor wafers	For Attachment B
Ex	8419	89	Chemical vapor deposition apparatus for semiconductor production	For Attachment B
Ex	8419	90	Parts of chemical vapor deposition apparatus for semiconductor production	For Attachment B
Ex	8421	19	Spin dryers for semiconductor wafer processing	
Ex	8421	91	Parts of spin dryers for semiconductor wafer processing	
ex	8424	89	Deflash machines for cleaning and removing contaminants from the metal leads of semiconductor packages prior to the electroplating process	
ex	8424	89	Spraying appliances for etching, stripping or cleaning semiconductor wafers	
ex	8424	90	Parts of spraying appliances for etching, stripping or cleaning semiconductor wafers	
ex	8456	10	Machines for working any material by removal of material, by laser or other light or photo beam in the production of semiconductor wafers	
ex	8456	91	Apparatus for stripping or cleaning semiconductor wafers	For Attachment B
ex	8456	91	Machines for dry-etching patterns of semiconductor materials	
ex	8456	99	Focused ion beam milling machines to produce or repair masks and reticles for patterns on semiconductor devices	
ex	8456	99	Lasercutters for cutting contacting tracks in semiconductor production by laser beam	For Attachment B

	HS Code		Description	Comments
ex	8464	10	Machines for sawing monocrystal semiconductor boules into slices, or wafers into chips	For Attachment B
ex	8464	20	Grinding, polishing and lapping machines for processing of semiconductor wafers	
ex	8464	90	Dicing machines for scribing or scoring semiconductor wafers	
ex	8466	91	Parts for machines for sawing monocrystal semiconductor boules into slices, or wafers into chips	For Attachment B
ex	8466	91	Parts of dicing machines for scribing or scoring semiconductor wafers	For Attachment B
ex	8466	91	Parts of girding, polishing and lapping machines for processing of semiconductor wafers	
ex	8466	93	Parts of focused ion beam milling machines to produce or repair masks and reticles for patterns on semiconductor devices	
ex	8466	93	Parts of lasercutters for cutting contacting tracks in semiconductor production by laser beam	For Attachment B
ex	8466	93	Parts of machines for working any material by removal of material, by laser or other light or photo beam in the production of semiconductor wafers	
ex	8456	93	Parts of apparatus for stripping or cleaning semiconductor wafers	For Attachment B
ex	8466	93	Parts of machines for dry-etching patterns on semiconductor materials	
ex	8477	10	Encapsulation equipment for assembly of semiconductors	For Attachment B
ex	8477	90	Parts of encapsulation equipment	For Attachment B
ex	8479	50	Automated machines for transport, handling and storage of semiconductor wafers, wafer cassettes, wafer boxes and other material for semiconductor devices	For Attachment B
ex	8479	89	Apparatus for growing or pulling monocrystal semiconductor boules	
ex	8479	89	Apparatus for physical deposition by sputtering on semiconductor wafers	For Attachment B

	HS Code		Description	Comments
ex	8479	89	Apparatus for wet etching, developing, stripping or cleaning semiconductor wafers and flat panel displays	For Attachment B
ex	8479	89	Die attach apparatus, tape automated bonders, and wire bonders for assembly of semiconductors	For Attachment B
ex	8479	89	Encapsulation equipment for assembly of semiconductors	For Attachment B
ex	8479	89	Epitaxial deposition machines for semiconductor wafers	
ex	8479	89	Machines for bending, folding and straightening semiconductor leads	For Attachment B
ex	8479	89	Physical deposition apparatus for semiconductor production	For Attachment B
ex	8479	89	Spinners for coating photographic emulsions on semiconductor wafers	For Attachment B
ex	8479	90	Part of apparatus for physical deposition by sputtering on semiconductor wafers	For Attachment B
ex	8479	90	Parts for die attach apparatus, tape automated bonders, and wire bonders for assembly of semiconductors	For Attachment B
ex	8479	90	Parts for spinners for coating photographic emulsions on semiconductor wafers	For Attachment B
ex	8479	90	Parts of apparatus for growing or pulling monocrystal semiconductor boules	
ex	8479	90	Parts of apparatus for wet etching, developing, stripping or cleaning semiconductor wafers and flat panel displays	For Attachment B
ex	8479	90	Parts of automated machines for transport, handling and storage of semiconductor wafers, wafer cassettes, wafer boxes and other material for semiconductor devices	For Attachment B
ex	8479	90	Parts of encapsulation equipment for assembly of semiconductors	For Attachment B
ex	8479	90	Parts of epitaxial deposition machines for semiconductor wafers	
ex	8479	90	Parts of machines for bending, folding and straightening semiconductor leads	For Attachment B

	HS Code		Description	Comments
ex	8479	90	Parts of physical deposition apparatus for semiconductor production	For Attachment B
ex	8480	71	Injection and compression moulds for the manufacture of semiconductor devices	
ex	8514	10	Resistance heated furnaces and ovens for the manufacture of semiconductor devices on semiconductor wafers	
ex	8514	20	Inductance or dielectric furnaces and ovens for the manufacture of semiconductor devices on semiconductors wafers	
ex	8514	30	Apparatus for rapid heating of semiconductor wafers	For Attachment B
ex	8514	30	Parts of resistance heated furnaces and ovens for the manufacture of semiconductor devices on semiconductor wafers	
ex	8514	90	Parts of apparatus for rapid heating of wafers	For Attachment B
ex	8514	90	Parts of furnaces and ovens of Heading No 8514-10 to No 8514-30	
ex	8536	90	Wafer probers	For Attachment B
	8543	11	Ion implanters for doping semiconductor materials	
ex	8543	30	Apparatus for wet etching, developing, stripping or cleaning semiconductor wafers and flat panel displays	For Attachment B
ex	8543	90	Parts of apparatus for wet etching, developing, stripping or cleaning semiconductor wafers and flat panel displays	For Attachment B
ex	8543	90	Parts of ion implanters for doping semiconductor materials	
	9010	41-49	Apparatus for projection, drawing or plating circuit patterns on sensitised semiconductor materials and flat panel displays	
ex	9010	90	Parts and accessories of the apparatus of Headings No 9010-41 to 9010-49	
ex	9011	10	Optical stereoscopic microscopes fitted with equipment specifically designed for the handling and transport of semiconductor wafers of reticles	For Attachment B

	HS Code		Description	Comments
ex	9011	20	Photomicrographic microscopes fitted with equipment specifically designed for the handling and transport of semiconductor wafers or reticles	For Attachment B
ex	9011	90	Parts and accessories of optical stereoscopic microscopes fitted with equipment specifically designed for the handling and transport of semiconductor wafers or reticles	For Attachment B
ex	9011	90	Parts and accessories of photomicrographic microscopes fitted with equipment specifically designed for the handling and transport of semiconductor wafers or reticles	For Attachment B
ex	9012	10	Electron beam microscopes fitted with equipment specifically designed for the handling and transport of semiconductor wafers or reticles	For Attachment B
ex	9012	90	Parts and accessories of electron beam microscopes fitted with equipment specifically designed for the handling and transport of semiconductor wafers or reticles	For Attachment B
ex	9017	20	Pattern generating apparatus of a kind used for producing masks or reticles from photoresist coated substrates	For Attachment B
ex	9017	90	Parts and accessories for pattern generating apparatus of a kind used for producing masks or reticles from photoresist coated substrates	For Attachment B
ex	9017	90	Parts of such pattern generating apparatus	
	9030	82	Instruments and apparatus for measuring or checking semiconductor wafers or devices	
ex	9030	90	Parts and accessories of instruments and apparatus for measuring or checking semiconductor wafers or devices	
ex	9030	90	Parts of instruments and appliances for measuring or checking semiconductor wafers or devices	

	HS Code		Description	Comments
	9031	41	Optical instruments and appliances for inspecting semiconductor wafers or devices or for inspecting masks, photomasks or reticles used in manufacturing semiconductor devices	
ex	9031	49	Optical instruments and appliances for measuring surface particulate contamination on semiconductor wafers	
ex	9031	90	Parts and accessories of optical instruments and appliances for inspecting semiconductor wafers or devices or for inspecting masks, phtomasks or reticles used in manufacturing semiconductor devices	
ex	9031	90	Parts and accessories of optical instruments and appliances for measuring surface particulate contamination on semiconductor wafers	

Attachment B
Positive list of specific products to be covered by this agreement wherever they are classified in the HS.

Where parts are spedified, they are to be covered in accordance with HS Notes 2(b) to Section XVI and Chapter 90, respectively.

Computers: automatic data processing machines capable of 1) storing the processing program or programs and at least the data immediately necessary for the execution of the program; 2) being freely programmed in accordance with the requirements of the user; 3) performing arithmetical computations specified by the user; 4) executing, without human intervention, a processing program which requires them to modify their execution, by logical decision during the processing run. The agreement cover such automatic data processing machines whether or not they are able to receive and process with the assistance of central processing unit, telephony signals, television signals, or other analogue or digitally processed audio or video signals. Machines performing a specific function other than data processing, or incorporating or working in conjunction with an automatic data processing machine, and not otherwise specified under Attachment A or B, are not covered by this agreement.
Electric amplifiers when used as repeaters in line telephony products falling within this agreement, and parts thereof .
Flat panel display (including LCD, Electro Luminescence, Plasma and other technologies) for products falling within this agreement, and parts thereof.

Network equipment: Local Area Network (LAN) and Wide Area Network (WAN) apparatus, including those products dedicated for use solely or principally to permit the interconnection of automatic data processing machines and units thereof for a network that is used primarily for the sharing of resources such as central processor units, data storage devices and input or output units - including adapters, hubs, in-line repeaters, converters, concentrators, bridges and routers, and printed circuit assemblies for physical incorporation into automatic data processing machines and units thereof.
Monitors: display units of automatic data processing machines with a cathode raytube with a dot screen pitch smaller than 0.4 mm not capable of receiving and processing television signals or other analogue or digitally processed audio or video signals without assistance of a central processing unit of a computer as defined in this agreement. The agreement does not, therefore, cover television, including high definition television*.
Optical disc storage units for automatic data processing machines (including CD drives and DVD-drives), whether or not having the capability of writing/recording as well as reading, whether or not in their own housings.
Paging alert devices and parts thereof
Plotter whether input or output units of HS heading No 8417 or drawing or drafting machines of HS heading No 9017
Printed Circuit Assemblies for products falling within this agreement, including such assemblies for external concoctions such as cards that conform to the PCMCIA standard. Such printed circuit assemblies consist of one or more printed circuits of heading 8534 with one or more active elements assembled thereon, with or without passive elements "Active elements" means diodes, transistors, and similar semiconductor devices, whether or not photosensitive, of heading 8541, and integrated circuits and micro assemblies of heading 8542
Projection type flat panel display units used with automatic data processing machine which can display digital information generated by the central processing unit.
Proprietary format storage devices including media therefor for automatic data processing machines, with or without removable media and whether magnetic, optical or other technology, including Bemoulli Box, Syquest, or Zipdrive cartridge storage units.
Multimedia upgrade kits for automatic data processing machines, and units thereof, put up for retail sale, consisting of, at least, speakers and/or microphones as well as a printed circuit assembly that enables the ADP machines and units thereof to process audio signals (sound cards).
Set top boxes which have a communication function: a microprocessor-based device incorporating a modern for gaining access to the Internet, and having a function of interactive information exchange

* Participants will conduct a review of this product description in January 1999 under the consultation provisions of paragraph 3 of the Declaration

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Annex A

Electronics Cottage Industrial Units

S. No.	Unit	No. of empl.	Products manufacture	Annual production
1.	Al-Najum Enterprises, Karachi	15	Car tape radio radio/tape radio	6,000 3,000 6,000
2.	Joy Electronics, Karachi	10	radio	12,000
3.	Hamid Electronics, Karachi	4	TV-booster	2,000
4.	Akhtar Shah Khan, Karachi	5.	TV-flyback transformers	-
5.	National Intercom Industries, Karachi	-	door intercom.	-
6.	Barlex Radio, Lahore	5	antenna booster gate phone	- -
7.	Electronics Oriental, Karachi-33	14	tape/radio	15,000
8.	Haroon Brothers, Karachi	14	radio/tape	1,200
9.	Ideal Industries, Karachi	44	loudspeakers	1,200,000
10.	Gauba Engineering Karachi	15	loudspeakers	40,000
11.	Disco Electronics, Karachi	20	loudspeakers	100,000
12.	Paras Electronics, Karachi-18	13	radio/tape	3,000
13.	Sultan Electronics Corporation, Karachi	15	black & white TV	14, 000
14.	Mashkoor Brothers, Karachi-13	15	radio car tape amplifier stereo battery chargers	12,000 3,000 2,400 300
15	Pakistan International Electronics, Lahore-16	10	radio	20,000
16.	Ali Electronics, Lahore-15	10	radio	20,000
17.	Tariq Electronics, Lahore-15	10	TV-booster telephone lock	2,000 2,000
18.	Music King, Lahore-6	15	deck	2,000
19.	Arif Electronics, Lahore	10	radio	20,000
20.	Sahi Electronics, Lahore	10	radio	2,000
21.	Ali Electronics, Renala Khurd	10	radio	12,000
22.	Mohammad Yousaf & Co., Lahore	9	radio	10,000
23.	Sarwar Electronics, Lahore	5	radio	5,000
24.	Arif Electronics, Lahore	15	radio	20,000
25.	Rolo Electronics, Lahore Cantt.	7	loudspeaker	20,000
26.	Rainbown Traders, Lahore-7	15	radio	30, 000
27.	Mughal Electronics Lahore	8	radio	10,000

28.	Kamran Electronics, Lahore-16	7	radio	10,000
29.	Muzaffar Electronics, Lahore	9	radio	15,000
30.	Leza Electronics, Lahore-6	15	radio	24 000
31.	Tele Radio, Lahore	7	radio	10,000
32.	Shokat Electronics, Lahore	8	deck	2,000
33.	Ameer Electronics, Lahore	6	deck	1,200
34.	Hybrid Technics, Lahore	30	swithes, flashers for car industry	250,000 units per month
35.	Mirza & Co., Lahore	6	inter commum. photo block	- -
36.	Print Tech, Lahore	10	PCBs	100 sq.m per month

Continued…..

S. No.	Unit	No. of empl.	Products manufacture	Annual production
37.	B.S. Magnetic, Karachi	50	LN60 and 90- magnetic tape	15 million
38.	Excelsior Plastic, Hatar	25	VHS video cassettes	1,000 per day
39.	Industrial Technologies Islamabad	20	Custom oriented electronic equip., Plugging UPS, modem	n.a
40.	Integrated Engineering System	5	Software development	n.a
41.	Sipka Manufacturing, Haripur	20	mobile radio walki talki equip., power supply.	n.a

Source: Ministry of Science and Technology, Islamabad, Review of Electronics Cottage Industry,1993

Annex B

Import of IT Products

(Value in Pak Rupees)

#	HS Code	Description	Imports					
			1991	1992	1993	1994	1995	1996
1	3818	Chemical elements doped for use in electronics, in form of discs, wafers or similar forms; chemical compounds doped for use in electronics	2,471,059	1,423,677	8,868,111	6,384,294	1,014,369	1,056,300
2	7017-10	Quartz reactor tubes and holders designed for insertion into diffusion and oxidation furnaces for production of semiconductor wafers	13,961,835	32,227,523	33,161,810	20,150,708	38,993,161	85,714,856
3	8464-10&20&90	Machines for sawing monocrystal semiconductor boules into slices; or wafers into chips; Grinding, polishing and lapping machines for processing of semiconductor wafers; Dicing machines for scribing or scoring semiconductor wafers	18,314,765	77,154,101	19,708,611	29,503,994	107,578,471	124,571,720
4	8466-91	Parts for machines for sawing monocrystal semiconductor boules into slices, or wafers into chips; Parts of dicing machines for scribing or scoring semiconductor wafers; Parts of grinding, polishing and lapping machines for processing of semiconductor wafers	4,357,921	6,784,004	2,806,127	13,347,716	4,456,199	4,540,679
5	8477-10	Encapsulation equipment for assembly of semiconductors	273,335,301	292,244,996	399,633,261	273,742,494	555,049,603	194,135,930

Continued....

6	8479-89	Apparatus for growing or pulling monocrystal semiconductor boules; Apparatus for physical deposition by sputtering on semiconductor wafers; Apparatus for wet etching, developing, stripping or cleaning semiconductor wafers and flat panel displays; Die attach apparatus, tape automated bonders, and wire bonders for assembly of semiconductors; Encapsulation equipment for assembly of semiconductors; Epitaxial deposition machines for semiconductor wafers; Machines for bending, folding and straightening semiconductor leads; Physical deposition apparatus for for semiconductor production; Spinners for coating photographic emulsions on semiconductor wafers	2,141,949,240	2,257,974,868	1,234,537,080	2,474,113,931	3,898,789,794	2,953,703,723
7	8477-90	Parts of encapsulation equipment	30,463,227	34,945,115	35,989,311	21,920,007	21,653,223	32,537,500

Continued....

8	8479-90	Part of apparatus for physical deposition by sputtering on semiconductor; Parts for die attach apparatus, tape automated bonders, and wire bonders for assembly of semiconductors; Parts for spinners for coating photographic emulsions on semiconductor wafers; Parts of apparatus for growing or pulling monocrystal semiconductor boules; Parts of apparatus for wet etching, developing, stripping or cleaning semiconductor wafers and flat panel displays; Parts of automated machines for transport, handling and storage of semiconductor wafers, wafer cassettes, wafer boxes and other material for semiconductor devices; Parts of encapsulation equipment for assembly of semiconductors; Parts of epitaxial deposition machines for semiconductor wafers; Parts of machines for bending, folding and straightening semiconductor leads; Parts of physical deposition apparatus for for semiconductor production	1,254,929,788	2,201,717,851	934,955,262	920,549,158	1,509,392,229	4,733,771,692
9	8465-10&91&93				670,092	224,557	14,773,761	
10	8456-99	Focused ion beam milling machines to produce or repair masks and reticles for patterns on semiconductor devices; Lasercutters for cutting contacting tracks in semiconductor production by laser beam	376,419	840,444	965,481	1,297,198	3,342,807	222,819
11	8456	Laser cutters	14,299,108	5,533,458	12,373,406	9,658,854	2,530,979	9,481,495
12	8456	Laser cutters	1,114,320	353,970	248,899		2,116,668	541,301

Continued....

13	8466-93	Parts of focused ion beam milling machines to produce or repair masks and reticles for patterns on semiconductor devices; Parts of lasercutters for cutting contacting tracks in semiconductor production by laser beam; Parts of machines for working any material by removal of material, by laser or other light or photo beam in the production of semiconductor wafers; Parts of apparatus for stripping or cleaning semiconductor wafers; Parts of machines for dry-etching patterns on semiconductor materials	19,004,499	27,963,372	12,495,233	20,412,939	7,894,932	29,710,068
14	8514-10	Resistance heated furnaces and ovens for the manufacture of semiconductor devices on semiconductors wafers	22,357,007	1,121,293	127,618	503,802	820,671	60,239
15	8514-20	Inductance or dielectric furnaces and ovens for the manufacture of semiconductor devices on semiconductors wafers	10,420,247	11,175,944	20,181,207	3,513,615	122,632	311,004
16	8514-30	Apparatus for rapid heating of semiconductor wafers; Parts of resistance heated furnaces and ovens for the manufacture of semiconductor devices on semiconductor wafers	5,396,018	15,434,709	6,875,748	30,048,053	19,613,288	6,949,212
17	8514-90	Parts of apparatus for rapid heating of wafers; Parts of furnaces and ovens of headings no 8514-10 to no 8514-30; Wafer probers	9,613,742	1,820,534	4,839,524	34,917,397	11,477,162	39,678,079
18	8419-89	Chemical vapor deposition apparatus for semiconductor production	381,649,587	782,174,418	394,456,548	1,106,149,714	699,445,843	1,296,832,478
19	8419-90	Parts of chemical vapor deposition apparatus for semiconductor production	65,447,401	154,301,421	107,371,804	168,338,843	130,417,138	521,235,935
20	8421-19	Spin dryers for semiconductor wafer processing	100,436,512	125,722,708	45,500,397	45,592,750	62,862,148	117,189,400
21	8421-91	Parts of spin dryers for semiconductor wafer processing	53,938,626	45,307,944	58,858,701	51,369,441	49,157,517	26,789,030

Continued....

22	8424-89	Spraying appliances for etching, stripping or cleaning semiconductor wafers	46,351,675	34,258,212	38,433,668	27,294,859	75,846,152	66,252,336
23	8424-90	Parts of spraying appliances for etching, stripping or cleaning semiconductor wafers	11,881,118	8,950,063	9,744,931	11,888,232	33,803,468	63,684,551
24	8480-71	Injection and compression moulds for the manufacture of semiconductor devices	100,543,953	75,590,280	67,343,108	49,524,010	101,322,872	80,965,839
25	8469,8470	Word processing machines; Calculating machines and pocket-size data recording, reproducing and displaying machines with a calculating function; accounting machines, postage franking machines, ticket-issuing machines and similar machines, incorporating a calculating devices; cash registers	163,577,790	245,041,547	249,345,424	225,739,666	281,356,340	254,562,986
26	9009-11	Electrostatic photocopying apparatus, operating by reproducing the original image directly onto the copy (direct process)	43,151,351	80,676,982	99,637,415	115,023,094	131,665,443	107,701,652
27	9009-21	Other photocopying apparatus, incorporating an optical system	15,212,697	32,489,115	38,309,565	9,433,404	23,239,681	15,852,420
28	8472-90	Automatic teller machines	20,909,388	43,661,480	27,047,192	33,060,535	34,681,243	41,156,126
29	8471	Automatic data processing machines and units thereof; magnetic or optical readers, machines for transcribing data onto data media in coded form and machines for processing such data, not elsewhere specified or included:	758,549,110	1,116,544,817	1,284,872,789	1432,512,999	1,880,557,316	1,254,723,171
30	9009-90	Parts and accessories	14,500,898	16,410,894	22,405,962	17,654,199	26,798,890	30,463,913
31	8473-21&29	Parts and accessories of the machines of heading No 8470 of the electronic calculating machines of subheading 8470-10, 8470-21 and 8470-29; Parts and accessories of the machines of heading no 8470 of the electronic calculating machines of subheading 840-10, 8470-21 and 8470-29	7,596,557	14,264,779	19,844,616	43,646,900	5,496,202	4,773,422

Continued....

32	8473-30&50	Parts and accessories of the machines of heading no 8471; Parts and accessories equally suitable for use with machines of two or more of the headings nos. 8469 to 8472	195,385,408	165,605,314	164,386,336	190,933,803	451,938,661	431,786,870
33	8520-20	Telephone answering machines	19,775,442	6,194,549	4,226,727	11,482,886	18,793,687	26,444,551
34	8517	Electrical apparatus for line telephony or line telegraphy, including line telephone sets with cordless handsets and telecommunications apparatus for carrier-current line systems or for digital line systems; video phones:	416,897	62,422,503	229,335,970	50,378,465	60,602,453	2,750,657
35	8518-10	Microphones having a frequency range of 300 Hz to 3,4 KHz with a diameter of not exceeding 10 mm and a height not exceeding 3 mm, for telecommunication use	2,000,809	2,645,499	5,422,030	1,823,476	12,083,421	6,012,487
36	8518-29	Loudspeakers, without housing, having a frequency range of 300 Hz to 3,4 KHz with a diameter of not exceeding 50 mm, for telecommunications use	13,720,655	19,090,062	32,775,441	29,175,125	48,327,344	63,627,032
37	8518-30	Line telephone handsets	950,115	1,244,677	1,717,155	5,711,344	2,193,825	3,073,283
38	8525-10	Transmission apparatus other than apparatus for radio-broadcasting or television	37,968,933	24,810,024	15,703,481	30,923,739	14,805,760	86,091,287
39	8525-20	Transmission apparatus incorporating reception apparatus	229,531,281	85,519,844	66,689,683	291,987,523	133,306,443	485,523,442
40	8527-90	Portable receivers for calling, alerting or paging	34,709,207	25,348,165	9,822,192	86,302,117	106,844,145	34,138,341
41	8525-40	Digital still image video cameras	4,635,014	2,181,4621	315,039	,821,843	1,351,869	2,177,488
42	8517-90	Parts of apparatus of heading 8517	1,652,317,561	3,154,419,907	4,417,633,527	3021,128,317	2,872,279,872	1,868,656,590

Continued....

43	8529-10&90	Aerials or antennae of a kind used with apparatus for radio-telephony and radio-telegraphy; Parts of: transmission apparatus other than apparatus for radio-broadcasting or television transmission apparatus incorporating reception apparatus; digital still image video cameras, portable receivers for calling, alerting or paging	939,610,562	803,191,434	772,654,943	753,094,804	1,373,763,886	1,320,074,145
44	8504-40	Static converters for automatic data processing machines and units thereof, and telecommunication apparatus	11,923,030	17,463,747	11,925,782	28,162,558	22,107,573	73,684,184
45	8504-50	Other inductors for power supplies for automatic data processing machines and units thereof, and telecommunication apparatus	53,823,649	6,924,678	19,808,316	219,987,104	2,419,167	14,376,078
46	8534	Printed circuits	8,133,406	11,562,058	13,862,899	9,745,617	90,546,379	14,124,239
47	8533-10	Fixed carbon resistors, composition or film types	4,062,967	5,534,201	9,517,033	11,942,271	14,944,777	10,910,212
48	8533-21	Other fixed resistors for a power handling capacity not exceeding 20 W	4,656,219	5,396,795	1,509,444	3,171,252	1,595,886	7,680,936
49	8533-29	Other fixed resistors for a power handling capacity of 20 W or more	950,735	889,759	883,304	984,023	334,383	611,690
50	8533-31	Wire wound variable resistors, including rheostats and potentiometers, for a power handling capacity not exceeding 20 W						
51	8533-39	Wire wound variable resistors, including rheostats and potentiometers, for a power handling capacity exceeding of 20 W or more	22,107,216	24,258,850	40,320,720	48,174,375	37,926,512	60,676,724
52	8533-40	Other variable resistors, including rheostats and potentiometers						
53	8533-90	Parts						
54			2,679,786	1,772,108	20,096,296	31,294,438	3,683,249	3,664,515

Continued....

55	8536-50	Electronic AC switches consisting of optically coupled input and output circuits (Insulated thyristor AC switches)	101,368,330	23,970,708	30,751,296	24,540,047	63,525,252	115,906,581
56	8536-50	Electronic switches, including temperature protected electronic switches, consisting of a transistor and a logic chip (chip-on-chip technology) for a voltage not exceeding 1000 volts						
57	8536-50	Electromechanical snap-action switches for a current not exceeding 11 amps	6,221,393	4,127,961	4,085,734	7,880,209	8,306,616	6,046,752
58	8536-69	Plugs and sockets for co-axial cables and printed circuits	6,011,610	7,892,886	6,590,762	7,498,674	14,958,531	12,890,779
59	8536-90	Connection and contact elements for wires and cables	109,557,477	143,642,325	132,992,700	110,919,432	155,395,004	179,993,900
60	8543-81&89 8544-41&49	Proximity cards and tags; Electrical machines with translation or dictionary functions; Other electric conductors, for a voltage not exceeding 80 V, fitted with connectors, of a kind used for telecommunications; Other electric conductors, for a voltage not exceeding 80 V, not fitted with connectors, of a kind used for telecommunications	1,358,659,247	1,567,754,469	1,048,722,800	280,611,734	425,411,443	1,502,516,381
61	8544-51	Other electric conductors, for a voltage exceeding 80 V but not exceeding 1000 V, fitted with connectors, of a kind used for telecommunications	336,602,942	426,588,114	151,973,127	194,873,230	642,306,612	1,426,759,260
62	8544-70	Optical fibre cables	173,564,353	1,490,433	78,158,305	114,583,230	91,068,670	113,931,296
63	8541-10	Diodes, other than photosensitive or fight-emitting diodes	4,898,001	3,789,801	5,998,180	8,392,911	14,858,392	11,697,799
64	8541-21	Transistors, other than photosensitive transistors, with a dissipation rate of less than 1 W	935,119	723,987	74,758	189,025	1,750,167	416,497
65	8541-29	Transistors, other than photosensitive transistors, with a dissipation rate of less than 1 W or more	1,519,885	2,703,058	4,222,023	3,801,032	15,133,876	2,670,879

Continued....

66	8541-30	Thyristors, diacs and triacs, other than photosensitive devices	10,872,788	3,018,698	3,482,023	3,142,469	5,145,849	248,202
67	8541-40	Photosensitive semiconductor devices, including photovoltaic cells whether or not assembled in modules or made up into panels; light emitting diodes	3,608,380	4,262,040	3,157,706	7,275,770	19,434,748	14,085,621
68	8541-50	Other semiconductor devices						
69	8542	Electronic integrated circuits and micro assemblies	280,937	218,496	585,916	1,547,455	4,946,893	302,520
70	8542	Electronic integrated circuits and micro assemblies	5,434,008	5,973,504	13,311,038	70,355,030	186,878,234	38,363,694
71	8542	Electronic integrated circuits and micro assemblies	1,357,643	565,160	26,878,095	23,344,052	4,650,956	7,063,514
72	8542	Electronic integrated circuits and micro assemblies	2,221,602	6,132,584	6,310,341	5,806,036	15,199,868	7,371,646
73	8541-60	Mounted piezo-electric crystals	53,831	69,088	89,602	6,658	17,354	
74	8541-90	Parts	2,502,400	1,132,956	55,801,637	222,503,013	40,463,585	32,871,312
75	8532-10	Fixed capacitors designed for use in 50/60 Hz circuits and having a reactive power handling capacity of not less than 0,5 kvar (power capacitors)	12,281,328	6,141,097	6,418,665	664,121	4,682,987	7,550,522
76	8532-21	Tantalum fixed capacitors	3,542,100	7,149,636	2,249,016	2,183,617	8,235,639	77,153
77	8532-22	Aluminium electrolytic fixed capacitors	19,077,794	23,955,925	33,189,354	30,898,796	22,234,453	18,742,303
78	8532-23	Ceramic dielectric, single layer fixed capacitors		41,150		569,007	2,293,041	8,171,949
79	8532-24	Ceramic dielectric, multilayer fixed capacitors						435,504
80	8532-25	Dielectric fixed capacitors of paper or plastics	1,786,102	1,987,860	966,885	49,068	212,224	1,053,458
81	8532-29	Other fixed capacitors	31,330,903	40,516,226	28,659,046	32,615,595	66,070,462	31,091,767
82	8532-30	Variable or adjustable (pre-set) capacitors	5,168,490	2,590,298	1,405,477	803,040	2,328,765	3,029,308
83	8532-90	Parts	6,930,466	4,158,793	6,168,415	4,427,435	10,646,462	4,970,004
84	8543-11&30	Ion implanters for doping semiconductor materials; Apparatus for wet etching, developing, stripping or cleaning semiconductor wafers and flat panel displays	68,608,305	9,240,438	11,297,715	17,458,342	519,115,607	151,042,610

Continued....

85	8543-90	Parts of apparatus for wet etching, developing, stripping or cleaning semiconductor wafers and flat panel displays	12,230,084	4,285,973	7,881,072	6,056,704	5,389,466	233,084,938
86	8531-20	Indicator panels incorporating liquid crystal devices (LCD) or light emitting diodes (LED)	8,865,206	14,982,882	15,248,539	6,976,216	49,626,566	28,122,467
87	8531-90	Parts of apparatus of subheading 8531-20	8,328,040	2,262,583	9,645,098	5,965,021	16,243,918	10,864,662
88	9012-10	Electron beam microscopes fitted with equipment specifically designed for the handling and transport of semiconductor wafers or reticles	6,866,417	13,601,062	4,059,711	6,098,157	3,530,985	17,069,762
89	9012-90	Parts and accessories of electron beam microscopes fitted with equipment specifically designed for the handling and transport of semiconductor wafers or reticles	293,522	586,618	2,232,157	16,781,563	15,128	725,041
90	9011-10	Optical stereoscopic microscopes fitted with equipment specifically designed for the handling and transport of semiconductor wafers or reticles	304,126	913,796	1,455,593	1,974,327	1,001,894	1,153,468
91	9011-20	Photomicrographic microscopes fitted with equipment specifically designed for the handling and transport of semiconductor wafers or reticles	174,506	653,398	1,557,664	9,268,247	7,156,986	2,027,986
92	9011-90	Parts and accessories of optical stereoscopic microscopes fitted with equipment specifically designed for the handling and transport of semiconductor wafers or reticles; Parts and accessories of photomicrographic microscopes fitted with equipment specifically designed for the handling and transport of semiconductor wafers or reticles	187,827	703,755	694,738	3,975,783	1,863,504	2,979,060

Continued....

93	9017-20	Pattern generating apparatus of a kind used for producing masks or reticles from photoresist coated substrates	9,409,956	15,375,172	21,324,814	14,408,229	11,638,523	16,517,288
94	9017-90	Parts and accessories for pattern generating apparatus of a kind used for producing masks or reticles from photoresist coated substrates; Parts of such pattern generating apparatus	1,783,457	1,051,893	9,105,141	3,038,663	1,198,254	9,239,270
95	9031-41	Optical instruments and appliances for inspecting semiconductor wafers or devices or for inspecting masks, photomasks or reticles used in manufacturing semiconductor devices	272,193,310	251,144,226	360,533,297	199,715,388	158,454,720	136,331,683
96	9031-49&90	Optical instruments and appliances for measuring surface particulate contamination on semiconductor wafers; Parts and accessories of optical instruments and appliances for inspecting semiconductor wafers or devices or for inspecting masks, photomasks or reticles used in manufacturing semiconductor devices	13,554,107	10,564,695	16,494,419	6,063,997	10,801,801	11,465,878
97	9026-10	Instruments for measuring or checking the flow or level of liquids	24,988,984	22,458,201	37,435,990	21,924,552	49,216,934	126,796,820
98	9026-20	Instruments and apparatus for measuring or checking pressure						
99	9026-80	Other instruments and apparatus for measuring or checking of heading 9026						
100	9026-90	Parts and accessories of instruments and apparatus of heading 9026						
101			24,002,719	26,531,533	29,603,842	40,310,828	32,976,298	47,761,097
102								
103			34,085,833	80,301,081	30,585,041	50,289,711	45,482,891	48,509,499
104								
105			13,828,356	21,947,806	33,580,968	27,998,630	31,115,977	98,119,072

Continued....

106	9027-20	Chromatographs and electrophoresis instruments	13,491,059	9,145,538	11,463,549	12,540,278	12,689,337	24,441,700
107	9027-30	Spectrometers, spectrophotometers and spectrographs using optical radiations (UV, visible, IR)	16,801,544	25,122,524	28,825,867	43,812,870	25,083,945	53,601,924
108	9027-50	Other instruments and apparatus using optical radiations (UV, visible, IR) of heading No 9027	11,920,877	5,325,642	7,049,301	6,802,735	3,077,858	14,570,961
109	9027-80	Other instruments and apparatus of heading No 9027 (other than those of heading no 9027-10)	138,198,134	116,404,739	110,387,856	103,707,060	130,917,977	98,758,694
110	9027-90	Parts and accessories of products of heading 9027, other than for gas or smoke analysis apparatus and microtomes	17,092,283	45,925,363	18,130,803	24,348,269	43,650,281	57,738,742
111	9030-40	Instruments and apparatus for measuring and checking, specially designed for telecommunications (for example, cross-talk meters, gain measuring instruments, distortion factor meters, psophometers)	873,184	13,919,589	2,969,313	18,214,036	2,925,028	6,611,908
112	9030-82&90	Instruments and apparatus for measuring or checking semiconductor wafers or devices; Parts and accessories of instruments and apparatus for measuring or checking semiconductor wafers or devices; Parts of instruments and appliances for measuring or checking semiconductor wafers or devices	16,292,971	6,309,387	9,730,581	4,787,492	28,487,483	9,301,387
113	9010-41 to 49	Apparatus for projection, drawing or plating circuit patterns on sensitized semiconductor materials and flat panel displays	39,878,268	34,156,657	35,278,065	31,993,089	40,901,371	35,630,803
114	9010-90	Parts and accessories of the apparatus of headings no 9010-41 to 9010-49	2,443,368	2,043,511	4,586,351	2,287,309	6,212,891	3,303,336

Continued....

115	8523-11	Magnetic tapes of a width not exceeding 4 mm	15,565,612	16,980,284	4,141,244	12,474,149	14,477,894	11,979,350
116	8523-12	Magnetic tapes of a width exceeding 4 mm but not exceeding 6,5 mm	30,175,270	31,472,996	20,688,830	14,597,322	2,765,071	5,033,149
117	8323-13	Magnetic tapes of a width exceeding 6,5 mm	66,758,630	49,348,279	86,666,511	60,188,977	61,238,476	151,956,321
118	8523-20	Magnetic discs	24,188,226	25,729,970	25,744,074	35,824,363	63,857,525	35,036,139
119	8523-90	Other	79,029,673	52,065,312	39,616,660	34,465,930	74,401,867	72,499,295
120	8524-39	Other: for reproducing representations of instructions, data, sound, and image, recorded in a machine readable binary form, and capable of being manipulated or providing interactivity to a user, by means of an automatic data processing machine	9,041	18,733	1,050	1,005,272	363,616	144,346
121	8524-40	Magnetic tapes for reproducing phenomena other than sound or image		540	68,699	484,108		
122	8524-91	Media for reproducing phenomena other than sound or image	45,076,543	73,083,031	91,622,959	62,591,569	70,003,416	38,798,931
123	8524-31	Discs for laser reading systems for reproducing phenomena other than sound or image	35,599			1,400	521,504	
124	8524-99	Tapes and other recorded media	5,968,707	8,185,879	9,730,071	17,635,458	53,340,151	76,283,603
Total			12,074,760,924	15,472,659,653	13,781,895,703	14,110,289,173	18,412,020,720	21,801,014,418

Annex C

Export of IT Products

(Value in Pak Rupees)

#	HS Code	Description	Exports					
			1991	1992	1993	1994	1995	1996
1	3818	Chemical elements doped for use in electronics, in form of discs, wafers or similar forms; chemical compounds doped for use in electronics						
2	7017-10	Quartz reactor tubes and holders designed for insertion into diffusion and oxidation furnaces for production of semiconductor wafers					684,184	508,144
3	8464-10&20&90	Machines for sawing monocrystal semiconductor boules into slices; or wafers into chips; Grinding, polishing and lapping machines for processing of semiconductor wafers; Dicing machines for scribing or scoring semiconductor wafers						
4	8466-91	Parts for machines for sawing monocrystal semiconductor boules into slices, or wafers into chips; Parts of dicing machines for scribing or scoring semiconductor wafers; Parts of grinding, polishing and lapping machines for processing of semiconductor wafers	619,506	3,267,606	1,900,397	2,227,096	1,344,397	11,934,471
5	8477-10	Encapsulation equipment for assembly of semiconductors	627,564	5,560,331	947,173	1,647,219		607,438
6	8479-89	Apparatus for growing or pulling monocrystal semiconductor boules; Apparatus for physical deposition by sputtering on semiconductor wafers; Apparatus for wet etching, developing, stripping or cleaning semiconductor wafers and flat panel displays; Die attach apparatus, tape automated bonders, and wire bonders for assembly of semiconductors; Encapsulation equipment for assembly of semiconductors; Epitaxial deposition machines for semiconductor wafers; Machines for bending, folding and straightening semiconductor leads; Physical deposition apparatus for for semiconductor production; Spinners for coating photographic emulsions on semiconductor wafers	28,806,693	93,773,928	80,105,678	107,499,738	83,764,591	174,362,468
7	8477-90	Parts of encapsulation equipment						

Continued....

8	8479-90	Part of apparatus for physical deposition by sputtering on semiconductor; Parts for die attach apparatus, tape automated bonders, and wire bonders for assembly of semiconductors; Parts for spinners for coating photographic emulsions on semiconductor wafers; Parts of apparatus for growing or pulling monocrystal semiconductor boules; Parts of apparatus for wet etching, developing, stripping or cleaning semiconductor wafers and flat panel displays; Parts of automated machines for transport, handling and storage of semiconductor wafers, wafer cassettes, wafer boxes and other material for semiconductor devices; Parts of encapsulation equipment for assembly of semiconductors; Parts of epitaxial deposition machines for semiconductor wafers; Parts of machines for bending, folding and straightening semiconductor leads; Parts of physical deposition apparatus for for semiconductor production	4,335,954	4,180,296	95,935,812	16,141,865	15,652,246	22,899,278
9	8465-10&91&93							
10	8456-99	Focused ion beam milling machines to produce or repair masks and reticles for patterns on semiconductor devices; Lasercutters for cutting contacting tracks in semiconductor production by laser beam						
11	8456	Laser cutters						
12	8456	Laser cutters						
13	8466-93	Parts of focused ion beam milling machines to produce or repair masks and reticles for patterns on semiconductor devices; Parts of lasercutters for cutting contacting tracks in semiconductor production by laser beam; Parts of machines for working any material by removal of material, by laser or other light or photo beam in the production of semiconductor wafers; Parts of apparatus for stripping or cleaning semiconductor wafers; Parts of machines for dry-etching patterns on semiconductor materials		326,058	601,263	62,340		
14	8514-10	Resistance heated furnaces and ovens for the manufacture of semiconductor devices on semiconductors wafers						
15	8514-20	Inductance or dielectric furnaces and ovens for the manufacture of semiconductor devices on semiconductors wafers	1,043,124					
16	8514-30	Apparatus for rapid heating of semiconductor wafers; Parts of resistance heated furnaces and ovens for the manufacture of semiconductor devices on semiconductor wafers						
17	8514-90	Parts of apparatus for rapid heating of wafers; Parts of furnaces and ovens of headings no 8514-10 to no 8514-30; Wafer probers						
18	8419-89	Chemical vapor deposition apparatus for semiconductor production						
19	8419-90	Parts of chemical vapor deposition apparatus for semiconductor production						

Continued....

20	8421-19	Spin dryers for semiconductor wafer processing						
21	8421-91	Parts of spin dryers for semiconductor wafer processing						
22	8424-89	Spraying appliances for etching, stripping or cleaning semiconductor wafers						
23	8424-90	Parts of spraying appliances for etching, stripping or cleaning semiconductor wafers	15,000			50,860		
24	8480-71	Injection and compression moulds for the manufacture of semiconductor devices		4,500				
25	8469,8470	Word processing machines; Calculating machines and pocket-size data recording, reproducing and displaying machines with a calculating function; accounting machines, postage franking machines, ticket-issuing machines and similar machines, incorporating a calculating devices; cash registers	3,318,965	4,245,299	6,596,107	4,210,840		
26	9009-11	Electrostatic photocopying apparatus, operating by reproducing the original image directly onto the copy (direct process)						
27	9009-21	Other photocopying apparatus, incorporating an optical system						
28	8472-90	Automatic teller machines						
29	8471	Automatic data processing machines and units thereof; magnetic or optical readers, machines for transcribing data onto data media in coded form and machines for processing such data, not elsewhere specified or included:	420,413	59,645				
30	9009-90	Parts and accessories						
31	8473-21&29	Parts and accessories of the machines of heading No 8470 of the electronic calculating machines of subheading 8470-10, 8470-21 and 8470-29; Parts and accessories of the machines of heading no 8470 of the electronic calculating machines of subheading 840-10, 8470-21 and 8470-29						
32	8473-30&50	Parts and accessories of the machines of heading no 8471; Parts and accessories equally suitable for use with machines of two or more of the headings nos. 8469 to 8472	3,012,326	2,650,242	838,013	451,099	183,850	23,960
33	8520-20	Telephone answering machines	155,994	1,266,417	82,425	12,092	471,630	202,331
34	8517	Electrical apparatus for line telephony or line telegraphy, including line telephone sets with cordless handsets and telecommunications apparatus for carrier-current line systems or for digital line systems; video phones:						
35	8518-10	Microphones having a frequency range of 300 Hz to 3,4 KHz with a diameter of not exceeding 10 mm and a height not exceeding 3 mm, for telecommunication use		20,515				
36	8518-29	Loudspeakers, without housing, having a frequency range of 300 Hz to 3,4 KHz with a diameter of not exceeding 50 mm, for telecommunications use						
37	8518-30	Line telephone handsets						

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38	8525-10	Transmission apparatus other than apparatus for radio-broadcasting or television	543,091	94,500	1,115,749	56,405	8,143	
39	8525-20	Transmission apparatus incorporating reception apparatus						
40	8527-90	Portable receivers for calling, alerting or paging						
41	8525-40	Digital still image video cameras						
42	8517-90	Parts of apparatus of heading 8517				6,889,574	3,598,077	2,067,711
43	8529-10&90	Aerials or antennae of a kind used with apparatus for radio-telephony and radio-telegraphy; Parts of: transmission apparatus other than apparatus for radio-broadcasting or television transmission apparatus incorporating reception apparatus; digital still image video cameras, portable receivers for calling, alerting or paging	19,315,242	5,743,612	8,910,777	11,760,905	9,731,079	36,673
44	8504-40	Static converters for automatic data processing machines and units thereof, and telecommunication apparatus	110,146		308,621			159,470
45	8504-50	Other inductors for power supplies for automatic data processing machines and units thereof, and telecommunication apparatus						
46	8534	Printed circuits						
47	8533-10	Fixed carbon resistors, composition or film types						
48	8533-21	Other fixed resistors for a power handling capacity not exceeding 20 W						
49	8533-29	Other fixed resistors for a power handling capacity of 20 W or more						
50	8533-31	Wire wound variable resistors, including rheostats and potentiometers, for a power handling capacity not exceeding 20 W						
51	8533-39	Wire wound variable resistors, including rheostats and potentiometers, for a power handling capacity exceeding of 20 W or more						
52	8533-40	Other variable resistors, including rheostats and potentiometers						
53	8533-90	Parts						
54								
55	8536-50	Electronic AC switches consisting of optically coupled input and output circuits (Insulated thyristor AC switches)	12,100	148,500				
56	8536-50	Electronic switches, including temperature protected electronic switches, consisting of a transistor and a logic chip (chip-on-chip technology) for a voltage not exceeding 1000 volts						
57	8536-50	Electromechanical snap-action switches for a current not exceeding 11 amps						
58	8536-69	Plugs and sockets for co-axial cables and printed circuits			30,000			

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59	8536-90	Connection and contact elements for wires and cables		308,900	1,228,727	273,894	2,057,331	17,006,813
60	8543-81&89 8544-41&49	Proximity cards and tags; Electrical machines with translation or dictionary functions; Other electric conductors, for a voltage not exceeding 80 V, fitted with connectors, of a kind used for telecommunications; Other electric conductors, for a voltage not exceeding 80 V, not fitted with connectors, of a kind used for telecommunications	4,021,296					
61	8544-51	Other electric conductors, for a voltage exceeding 80 V but not exceeding 1000 V, fitted with connectors, of a kind used for telecommunications		15,638,865	118,856			
62	8544-70	Optical fibre cables						
63	8541-10	Diodes, other than photosensitive or fight-emitting diodes						
64	8541-21	Transistors, other than photosensitive transistors, with a dissipation rate of less than 1 W						
65	8541-29	Transistors, other than photosensitive transistors, with a dissipation rate of less than 1 W or more						
66	8541-30	Thyristors, diacs and triacs, other than photosensitive devices						
67	8541-40	Photosensitive semiconductor devices, including photovoltaic cells whether or not assembled in modules or made up into panels; light emitting diodes						
68	8541-50	Other semiconductor devices						
69	8542	Electronic integrated circuits and micro assemblies						
70	8542	Electronic integrated circuits and micro assemblies						
71	8542	Electronic integrated circuits and micro assemblies						
72	8542	Electronic integrated circuits and micro assemblies		246,290				
73	8541-60	Mounted piezo-electric crystals						
74	8541-90	Parts						203,611
75	8532-10	Fixed capacitors designed for use in 50/60 Hz circuits and having a reactive power handling capacity of not less than 0,5 kvar (power capacitors)						
76	8532-21	Tantalum fixed capacitors						
77	8532-22	Aluminium electrolytic fixed capacitors						
78	8532-23	Ceramic dielectric, single layer fixed capacitors						
79	8532-24	Ceramic dielectric, multilayer fixed capacitors						
80	8532-25	Dielectric fixed capacitors of paper or plastics						
81	8532-29	Other fixed capacitors			106,725			
82	8532-30	Variable or adjustable (pre-set) capacitors						
83	8532-90	Parts				530,345		

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84	8543-11&30	Ion implanters for doping semiconductor materials; Apparatus for wet etching, developing, stripping or cleaning semiconductor wafers and flat panel displays						
85	8543-90	Parts of apparatus for wet etching, developing, stripping or cleaning semiconductor wafers and flat panel displays					57,293	
86	8531-20	Indicator panels incorporating liquid crystal devices (LCD) or light emitting diodes (LED)			122,652			102,250
87	8531-90	Parts of apparatus of subheading 8531-20						
88	9012-10	Electron beam microscopes fitted with equipment specifically designed for the handling and transport of semiconductor wafers or reticles						
89	9012-90	Parts and accessories of electron beam microscopes fitted with equipment specifically designed for the handling and transport of semiconductor wafers or reticles						
90	9011-10	Optical stereoscopic microscopes fitted with equipment specifically designed for the handling and transport of semiconductor wafers or reticles	219,384					
91	9011-20	Photomicrographic microscopes fitted with equipment specifically designed for the handling and transport of semiconductor wafers or reticles						
92	9011-90	Parts and accessories of optical stereoscopic microscopes fitted with equipment specifically designed for the handling and transport of semiconductor wafers or reticles; Parts and accessories of photomicrographic microscopes fitted with equipment specifically designed for the handling and transport of semiconductor wafers or reticles						
93	9017-20	Pattern generating apparatus of a kind used for producing masks or reticles from photoresist coated substrates	127,423					544,050
94	9017-90	Parts and accessories for pattern generating apparatus of a kind used for producing masks or reticles from photoresist coated substrates; Parts of such pattern generating apparatus						388,500
95	9031-41	Optical instruments and appliances for inspecting semiconductor wafers or devices or for inspecting masks, photomasks or reticles used in manufacturing semiconductor devices		441,876				
96	9031-49&90	Optical instruments and appliances for measuring surface particulate contamination on semiconductor wafers; Parts and accessories of optical instruments and appliances for inspecting semiconductor wafers or devices or for inspecting masks, photomasks or reticles used in manufacturing semiconductor devices						
97	9026-10	Instruments for measuring or checking the flow or level of liquids		5,000		408,857		

98	9026-20	Instruments and apparatus for measuring or checking pressure						

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99	9026-80	Other instruments and apparatus for measuring or checking of heading 9026						
100	9026-90	Parts and accessories of instruments and apparatus of heading 9026						
101								
102								
103			344,254	31,050	271,424	240,410	152,389	370,037
104								
105					631	184,839		565,998
106	9027-20	Chromatographs and electrophoresis instruments						
107	9027-30	Spectrometers, spectrophotometers and spectrographs using optical radiations (UV, visible, IR)		30,000				
108	9027-50	Other instruments and apparatus using optical radiations (UV, visible, IR) of heading No 9027						
109	9027-80	Other instruments and apparatus of heading No 9027 (other than those of heading no 9027-10)		1,332,510	603,377	70,492	213,593	25,954
110	9027-90	Parts and accessories of products of heading 9027, other than for gas or smoke analysis apparatus and microtomes						
111	9030-40	Instruments and apparatus for measuring and checking, specially designed for telecommunications (for example, cross-talk meters, gain measuring instruments, distortion factor meters, psophometers)			700,830		150,000	
112	9030-82&90	Instruments and apparatus for measuring or checking semiconductor wafers or devices; Parts and accessories of instruments and apparatus for measuring or checking semiconductor wafers or devices; Parts of instruments and appliances for measuring or checking semiconductor wafers or devices						
113	9010-41 to 49	Apparatus for projection, drawing or plating circuit patterns on sensitized semiconductor materials and flat panel displays						
114	9010-90	Parts and accessories of the apparatus of headings no 9010-41 to 9010-49						
115	8523-11	Magnetic tapes of a width not exceeding 4 mm					2,445,887	45,903
116	8523-12	Magnetic tapes of a width exceeding 4 mm but not exceeding 6,5 mm					1,885,290	
117	8323-13	Magnetic tapes of a width exceeding 6,5 mm					29,724	
118	8523-20	Magnetic discs	73,678		61,230			
119	8523-90	Other	32,234,280	27,593,485	24,487,346	19,074,786	32,907,761	15,099,820
120	8524-39	Other: for reproducing representations of instructions, data, sound, and image, recorded in a machine readable binary form, and capable of being manipulated or providing interactivity to a user, by means of an automatic data processing machine						

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121	8524-40	Magnetic tapes for reproducing phenomena other than sound or image						944,008
122	8524-91	Media for reproducing phenomena other than sound or image					1,554,074	
123	8524-31	Discs for laser reading systems for reproducing phenomena other than sound or image						
124	8524-99	Tapes and other recorded media	4,318,036	16,037,711	25,471,100	36,504,325	27,107,866	19,173,105
Total			**103,674,469**	**183,007,136**	**250,544,913**	**208,297,981**	**183,999,405**	**267,271,993**