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## Telecommunications Development in Pakistan

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*Despite steady expansion over the past decade, Pakistan's telecommunications network remains inadequate due to a combination of under-investment, outmoded technology, and institutional constraints. With only seven direct exchange lines per 1000 population, the nation's telephone density is among the lowest in Asia, telephone services experience high failure rates, and the average waiting time for a telephone exceeds four years. The country's inadequate telecommunications network constrains economic development, particularly in industry and commerce.*

These words of an Asian Development Bank appraisal mission in 1989 summarized the dilemmas and challenges facing Pakistan's telecommunications system. The shortcomings in the country's existing network are a product of the developmental constraints facing a poor, backward nation. The decisions made by governments, politicians and administrators, private organizations, and international agencies have shaped the structure of the telecommunications system as it exists today.<sup>1</sup>

### 4.1 History, Geography, and Demographics

The region that now comprises Pakistan was part of British India until 1947. When British rule ended in 1947, India was partitioned into two independent states based on the religious composition of the population. Pakistan comprised the territories in which Muslims had been in a majority, and many non-Muslims emigrated to India, while Muslims from that country crossed over to Pakistan. Although the country originally consisted of an eastern and a western sector separated by about 1,000 miles of Indian territory, East Pakistan seceded in 1971 to form Bangladesh, while the western wing retained the name Pakistan.

The country's overall population increased from about 35 million in 1947 to over 120 million by 1995. If this 3.1% growth rate—one of the highest in the world—is maintained, the population should reach 150 million by 2000, and by 2020 Pakistan will have surpassed the present population level of the United

States. Around half will be children under 15, and a considerable proportion will suffer from poor living standards. In 1995 the per capita income stood at around \$400, which places Pakistan at the lower end of the income spectrum. Nevertheless, in the 1980s Pakistan experienced the highest annual economic growth rate in southern Asia—above 6%—and the real economy is believed to be larger than estimated by government sources, with a capacity to lift the nation into the world's middle income group.

Pakistan has a land area of around 796,000 sq km. Although there are three major cities, Karachi, Lahore, and Rawalpindi-Islamabad, and several other urban centers are home to over 1 million, more than 70% of residents live in rural areas. Geographically, it consists of two distinct zones: the flat, alluvial plains of the River Indus and its tributaries and the mountainous belt to the north and west. The plains form the agricultural backbone of the nation, a broad expanse of canal-irrigated land also fed by groundwater. The major crops are wheat, rice, and especially cotton, which is used in the production of cotton textiles, Pakistan's largest industry.

Industrial development began only in the 1950s, however, with investment largely in textiles and consumer goods. After a decade of rather unstable civilian regimes that lacked the support of any broad-based political organization comparable to India's Congress Party, an army coup in 1958 brought General Ayub Khan to power. His 11-year dictatorship witnessed an increase in both industrial growth and concentration of wealth. Under popular pressure, elections were held in 1970, Bangladesh soon seceded, and the Pakistan People's Party under Zulfikar Ali Bhutto took power, with an avowed agenda of breaking up the monopolies. The ensuing nationalization, however, also left the private sector somewhat alienated. Some deregulation and liberalization policies were instituted after 1977, when Bhutto was deposed by another army coup, but the public sector remained largely intact. In the early 1990s, however, a conservative coalition led by Nawaz Sharif replaced the government of Bhutto's daughter, Benazir, and enacted a policy of privatization and offered major incentives to both foreign and local investors. Elections in 1993 led to the defeat of Nawaz Sharif and to the return of Benazir Bhutto as Prime Minister. Pakistan's privatization process has continued under Benazir's government.

## 4.2 Evolution of Telecommunications

The foundations of the transportation and communications infrastructure in Pakistan were laid during the period of British rule. The Post and Telegraph Department, and after 1947 the Pakistan Telephone and Telegraph Department (T&T), were under the authority of their national, rather than provincial, governments. Postal operations were separated from telephone and telegraph operations in the late 1950s and were handled by a national postal department. Joint post and telegraph offices were also opened, and although the majority lacked telegraphic facilities, public telephones were available at certain centers.

Yet, the legacy of colonial rule was a virtually undeveloped telecommunications

Table 4.1. Pakistan Post and Telecommunications

Year	Number of Post Offices			Number of Telegraph Offices			Number of PCOs
	Urban	Rural	Total	Urban	Rural	Total	
1947-48	—	—	3,036	7	—	—	12,436
1948-49	—	—	3,008	7	—	—	13,302
1949-50	—	—	3,104	7	—	—	14,276
1950-51	—	—	3,678	7	—	—	15,706
1951-52	—	—	4,056	7	—	—	17,981
1952-53	—	—	4,409	7	—	—	20,643
1953-54	—	—	4,771	7	—	—	24,624
1954-55	—	—	5,089	10	—	—	31,287
1955-56	—	—	5,473	10	—	—	37,402
1956-57	—	—	5,942	10	—	—	43,704
1957-58	—	—	6,047	10	—	—	50,501
1958-59	—	—	6,151	15	—	—	54,321
1959-60	—	—	—	16	—	—	60,116
1960-61	—	—	6,313	20	—	—	68,042
1961-62	—	—	6,492	22	22	44	73,403
1962-63	—	—	6,631	40	46	86	81,246
1963-64	—	—	6,785	52	94	146	92,061
1964-65	—	—	6,996	55	119	174	101,961
1965-66	—	—	7,139	57	128	185	110,427
1966-67	—	—	7,317	58	132	190	117,249
1967-68	—	—	7,582	62	138	200	129,160
1968-69	—	—	7,821	64	139	203	140,975
1969-70	—	—	8,151	65	139	204	148,962
1970-71	1,271	6,635	7,906	67	139	206	160,103
1971-72	1,252	6,635	7,860	68	139	207	167,200
1972-73	1,289	6,615	7,904	68	141	2,909	184,103
1973-74	1,314	6,835	8,149	69	141	210	201,354

PCO, public call office.

infrastructure<sup>2</sup> (see table 4.1). At independence, only 12,436 telephone lines were in existence, and these were highly concentrated in a few urban centers. Karachi and Lahore had the only two manual exchanges and were also connected through a long-distance overhead line. With a 1947 population of around 35 million, telephone density was less than 0.355 per thousand, or roughly one telephone for every 3,000 people. Telephone density remains among the lowest in the world, even though the system has expanded almost 75 times over the past 40 years. With only 924,685 telephones for Pakistan's 115 million residents in 1991, density at the start of the decade stood at 8 per 1,000 people, or 0.8 per 100. More accelerated expansion occurred in the 1990s. In 1994 the Pakistan government claimed to have reached 2.6 million lines, with a penetration rate of 2.11 lines per 100 inhabitants. However, actual operating lines are estimated at 1.8 million, keeping the density still well below 2 per 100. The annual population growth rate is over 3%.

Telecommunications in Pakistan has been a virtual public sector monopoly. Even the privately operated exchanges of the British period, like the Bombay Telephone Company in Karachi, were nationalized after 1947. In the absence of major private sector involvement, the government has been the chief source for capital expenditure on telecommunications, either directly or through bilateral arrangements with foreign governments or international agencies. This investment has in turn been underwritten by the net surpluses consistently generated by T&T, although only partially reinvested in the system.<sup>3</sup> Government funding has been forthcoming within the framework of the five-year development plans that have guided economic development in the country, highlighting broad economic objectives and fixing targets to be attained, including development of the telecommunications system.

As part of these plans, funding to various sectors was provided through the annual development plans, or ADPs; each government department also had its own ADPs for internal funding allocations. The government of Pakistan approved T&T annual budgets and investment programs after review by the Planning Commission, and the ministries of Communications and Finance arranged all loans, from international agencies such as the World Bank, Asian Development Bank, Kreditanstalt für Wiederaufbau (KfW) of Germany, Overseas Economic Co-operation Fund (OECE) of Japan, and the United Nations Development Programme (UNDP).

### 4.3 The Five-Year Plans

The first five-year plan covered the years 1955–1960. The breakup of the country in 1971 disrupted allocations and targets during the fourth plan, and consequently the fifth plan did not commence until 1978. Allocations for post, telephone, and telegraph were combined, with Rs219 million budgeted in the first plan compared with an actual expenditure of Rs254 million (\$1 = approximately Rs5). The system had reached 31,000 lines by 1955, and the first plan target of an additional 30,000 lines had been achieved by 1960.<sup>4</sup>

Even in these earlier years, though, the problem of excess demand plagued the telecommunications system in Pakistan, and by 1960 the shortage of telephones

was estimated at 20,000. Actual demand was undoubtedly higher, however, since the lengthy wait tended to discourage potential applicants. Financial constraints were largely responsible for problems of quality and availability, aggravated by the government's reluctance to apply full user charges for such services.

In addition to multiplying telephone lines, by 1955 the government had also installed six trunk exchanges in the cities of Rawalpindi, Lyallpur (later Faisalabad), Sargodha, Lahore, Karachi, and Quetta. Existing trunk exchanges were expanded, and closer telecommunication links were established with what was then East Pakistan. That same year six high frequency radio-telephone channels were made operational between the two halves of the country, and trunk facilities were extended to 100 new locations. An underground coaxial cable link between Karachi and Lahore, the two largest cities, took two years to complete; the 960-channel dual cable replaced the overhead lines installed by the British. In addition, wireless telephone communications were set up between several smaller towns. For international calls, direct links were also provided between Karachi and Jeddah, Kabul, Osaka, Hong Kong, and Colombo.

Under the second five-year plan, 1960–1965, the trunk system was further strengthened.<sup>5</sup> The coaxial cable was extended beyond Lahore to Lyallpur, Sargodha, and Rawalpindi, and a multichannel microwave link was established between Pakistan, Iran, and Turkey that connected Pakistan with the European communications system and through it with the United States. Pakistan, Iran, and Turkey maintained mutual links through the Central Treaty Organization (CENTO), and since 1980, after the Iranian revolution, through an organization called the Regional Cooperation for Development (RCD). Circuits between Pakistan and Afghanistan were also improved. Within Pakistan, a Subscribers Trunk Dialing (STD) service was introduced between the major cities. Telex services, which first became available in 1959 in Karachi and Lahore, were also extended to the other urban centers, with international connections through Karachi. Yet expansion still did not keep pace with demand. Some 35,000 applications for telephones were carried over to the third plan, as opposed to 24,000 transferred to the second plan.

For the third five-year plan, 1965–1970, some 150,000 lines were proposed, but with an urban/rural breakdown of 125,000:25,000,<sup>6</sup> rural telecommunications remained relatively underdeveloped, a result of highly inadequate resource allocations. Over time the rural/urban gap grew wider, despite the fact that more than two-thirds of all Pakistanis live in the countryside. Again, resource constraints were responsible; expanding servicing to rural areas was costlier than localized and more concentrated development.

The trunk system was further strengthened during this period, and microwave links between cities, established by the mid-1960s, were expanded.<sup>7</sup> The coaxial cable was extended to Peshawar in the northern part of the country. Leased circuits were provided to several departments and agencies, such as the airlines and meteorological services. Pakistan also became a member of INTELSAT in 1965.<sup>8</sup> To improve the quality of telegraphic services the "gentex" or general public telegraph system was introduced, along with combined post and telegraph offices, located primarily in rural areas. The 1960s were a period of rapid industrial growth under fiat of military rule. Yet there were no significant jumps in the pene-

tration of telecommunications services during the 1960s despite the country's rapid industrial growth, a reflection of the low priority accorded this sector by the military dictatorship.

Pakistan's telephone system expanded further during the fourth five-year plan (1970–1975). However, the division of the country in 1971, and the accompanying political turmoil and economic dislocation, slowed the implementation of the plan. The breakup also negated the efforts and resources that had gone into establishing closer telecommunications links between the eastern and western regions of Pakistan. Moreover, assets and services located in the eastern half were lost to Bangladesh. By 1971, as detailed in table 4.1, Pakistan had 160,000 telephone lines, putting density at only 0.25 per 100 population, while in 1974–1975 only 227,000 more were installed versus the 272,000 targeted.<sup>9</sup> Such shortfalls in the fourth plan targets reflect the stringencies of this period.

The rate of private investment slowed in 1971–1977 with the nationalization of large-scale industry under Zulfikar Ali Bhutto and the Pakistan People's Party. Even after a military coup overthrew him in 1977, such capital was largely unavailable. As a result, the emergent electronics industry, which contributed to the growth of East Asian economies, remained embryonic there. By 1977–1978, 160,000 applications for telephones were pending, and new applications were coming in at the rate of around 50,000 per year.<sup>10</sup> Telephone density stood at only 0.386 per 100 population in 1978, with 290,000 lines for 75 million people, and the annual growth rate of 8% was clearly insufficient to satisfy the demand. There were three telex and eight gentex exchanges, around 800 public telegraph offices, and 3,390 telex line units. (By 1991 they had exceeded 8,000.)

The fifth five-year plan (1978–1983) targeted an increase of 200,000 lines and a density of 0.55 lines per 100, but it fell short of its target by around 50,000 lines and achieved a density of only 0.4. The fifth five-year plan also noted with some concern the virtual nonexistence of a national electronics industry.<sup>11</sup> Some small- and medium-sized businesses were engaged in assembling televisions, radio receivers, and certain electronic devices, but most of the country's electronic equipment was imported, and such trade was expected to reach Rs7 billion in the next five years unless domestic capacity grew (\$1 = approximately Rs11). Some Rs660 million were allocated for establishing new projects, of which Rs615 million were anticipated from the private sector. The plan aimed to promote the manufacture of electronic equipment for civilian and defense use through joint ventures with foreign firms; technology transfer and research development were to be included in licensed agreements.<sup>12</sup>

The sixth five-year plan (1983–1988) projected a doubling of the telephone lines, along with the completion of nationwide dialing facilities for 107 urban centers.<sup>13</sup> The expansion in telephone lines was projected almost entirely for urban centers: Rural areas were to benefit from only an increase in public call offices. The plan also proposed developing the local manufacture of sophisticated telecommunications equipment via a private sector investment of Rs3 billion (\$1 = approximately Rs15) and Rs10.1 billion from the public sector.<sup>14</sup> In fact, only Rs8.131 billion from both sources was actually spent, mainly because the planned private sector investment did not materialize. An additional Rs40 million was

allocated to research new telecommunications technology and to improve the existing network. At least 520,000 telephone lines were to be added, but by 1988 delays occurred in deciding about a digital switching system (eventually three systems were installed by Alcatel, Ericsson, and Siemens). Moreover, heavy cost overruns and tardiness in implementing ongoing projects created a shortfall of almost 40%.<sup>15</sup> By 1988 pending demand had reached 474,000 telephones, and applications were coming in at the rate of 13,750 per month. There were 0.67 telephones per 100 population, as against 0.41 in 1983.

Under the seventh five-year plan (1988–1993), density was to rise to 1.1 per 100 and the number of telephones was to grow from 692,000 to 1,342,000. Also projected was an increase in trunk traffic from 188 to 350 million calls and in telex traffic from 18 to 47 million annual paid minutes, yielding annual compounded growth rates for these two services of 13.2% and 21.1%, respectively.<sup>16</sup> In contrast, inland and overseas telegrams were to increase 2.72% and 3.71%, from 3.06 to 3.5 million messages and 3.5 to 4.2 million messages, respectively. Clearly, telegram services had matured by the late 1980s. A total investment of Rs22.95 billion for the seventh five-year plan was to include Rs8.5 billion carried forward from the sixth plan (\$1 = approximately Rs19), Rs11.85 billion in local currency, and Rs11.1 billion from foreign exchange, paid for through T&T's net surpluses, projected at Rs18.425 billion (of which Rs6.575 billion would be in foreign exchange) and foreign exchange borrowing of Rs4.525 billion. The plan also projected reorganizing T&T into an autonomous corporation, and in December 1990 it became the Pakistan Telecommunications Corporation (PTC). Significantly, the plan did not mention privatizing PTC, though the idea subsequently received much attention.

Under the new government of the Islamic Democratic Alliance or (IJI) and Prime Minister Nawaz Sharif, telecommunications development became a priority. The press publicized this renewed emphasis and raised expectations for rapid expansion. As a result, seventh plan targets were revised upward in 1990,<sup>17</sup> yielding a more ambitious goal of 1,532,400 lines, plus 500,000 lines to be provided through private sector financing under a build-lease-transfer (BLT) arrangement. Since 1991, three contracts have been awarded under the scheme to Siemens, Ericsson, and Alcatel. Another firm, Daewoo, was also considered for a contract, but failed to obtain one. The government's revised budget for telecommunications totaled around Rs31 billion, in addition to approximately Rs15 billion for ongoing sixth plan projects. In 1991 alone the government claimed to have installed 267,000 lines.<sup>18</sup> This sort of arrangement was an effort to overcome the financial constraints responsible for slow growth rates in the past. It was also an effort to end dependence on agencies like the World Bank and the Asian Development Bank, which had already funded several projects.<sup>19</sup> Significantly, the United States Agency for International Development (USAID), which has been the most prominent aid agency in Pakistan, has never been directly involved with telecommunications development in the country.

The eighth five-year plan (1993–1998) forecasts 3,759,890 lines by 1998 with a capital outlay of Rs56.7 billion, including a 60% foreign exchange component

(\$1 = approximately Rs25).<sup>20</sup> These new lines are to be installed by PTC as well as through the BLT scheme. Other goals include expanding rural telecommunications and completing a nationwide dialing network.

This overview suggests that the scenario in Pakistan was and is symptomatic of the kinds of constraints that a poor, underdeveloped country suffers in developing its telecommunications structure. Growth was largely due to the inflow of foreign funds; if these funds were country- rather than agency-based, they also led to the presence of foreign telecommunications firms, such as Siemens, Alcatel, and Ericsson. Otherwise the state remained dominant in that it owned the only operating agency. Because government control has so clearly meant sluggish growth, however, allowing greater private sector participation may be the key to a more rapid expansion of telecommunications in the future.

#### 4.4 Income and Tariff Structure

Pakistan's telecommunications tariff structure is fairly traditional. Rates are the same for commercial and domestic and rural and urban customers, and there are also no volume-based progressive rates, although energy rates do vary based on such categories. Standard rates apply to local calls placed at all times of the day. The nation-wide dialing system and the inland trunk tariff, divided into eight and ten distance zones, respectively, offer peak and off-peak rates, but the international subscriber dialing and international trunk call systems do not. By 1995, 95 countries could be dialed direct, and there were direct satellite links with 42 countries. Other calls went through the International Transit Switching Centers at Rome, Goonhilly, and New York.

Rates themselves remained virtually unchanged in nominal terms during 1980–1985,<sup>21</sup> but with inflation increasing operating costs, real income per line started falling. In 1990 the monthly telephone rental went up by 66.6%. In addition, since 1986 tariffs on both local and long-distance calls have been raised by 10% to 15% annually in consultation with the ministries of Communications and Finance along with the Planning Commission and with the required central cabinet approval. In 1987 international call rates were increased by 23% to 85% for about 40 selected countries.<sup>22</sup> Tariffs for local calls were also raised by 56% to Rs1.56 (\$0.06) per call in 1991, and a continuing excise duty of 60% was levied on local and domestic long-distance calls. Due to the high call failure rate, some estimates put the cost to subscribers of each completed call at Rs5.<sup>23</sup>

International routes are clearly the money earners, however, and they subsidize the local networks and customers. For example, in PTC's income statement for the fiscal year ending 30 June 1990 the total telephone revenue of Rs9.288 billion was derived from rentals (3.5%), domestic call charges (61.9%), international call charges (32.9%), and installation fees (1.7%). Thus, a far smaller volume of calls yielded over 50% more income than local calls. Domestic long-distance calls are also more profitable for PTC than local calls.

#### 4.5 Equipment Manufacture

Telecommunications equipment in Pakistan is both imported and locally produced. Siemens AG of Germany has been intimately involved with its development in Pakistan and for many years enjoyed a monopoly on equipment manufacture, owing to German industry's reputation for quality and, according to some sources, a desire to escape the colonial orientation toward Great Britain. In what was probably the company's first postwar international venture, Telephone Industries of Pakistan (TIP) was set up in 1952 in Hazara, northern Pakistan, as a joint venture between Siemens and the Pakistan government, establishing in-country production facilities for the first time. The Federal Republic of Germany backed the venture with soft loans. Equity shares have varied, beginning with 49% and 51%, respectively; Siemens's share fell to 16% by 1985 but rose after an infusion of fresh funds and has remained at around 25% since 1988.<sup>24</sup>

Telephone Industries of Pakistan first produced electromechanical equipment for exchanges and telephone lines for T&T and later began making some electronic equipment, too. Products included electromechanical switching equipment, telephone sets, trunk exchanges, private automatic exchanges, and teleprinters. Manual exchanges, which are still produced, were followed by automatic exchanges, initially first generation and then from the mid-1960s, second generation. In addition, TIP has always made telecommunications equipment for Pakistan's defense forces, like field telephones and exchanges. It has an annual manufacturing capacity of 250,000 telephone sets and 210,000 digital public exchange lines.<sup>25</sup> A German-assisted factory began producing digital switching equipment in 1989 and by 1995 had supplied TIP with equipment for 400,000 lines. Electromechanical equipment accounted for 90% of T&T's installed exchange capacity until 1990.<sup>26</sup> This type of equipment will not begin to be substantially phased out until the late 1990s, and indeed since 1990, TIP has expanded production of electromechanical equipment. Despite this increase, current expansion is largely in digital equipment. By 1995 the telephone system had achieved over 40% digitalization.

The government of Pakistan and Siemens initiated a second joint venture in 1969, called Carrier Telephone Industries (CTI). Equity shares were 53% and 47%, respectively. This venture manufactured carrier multiplex equipment, voice frequency telegraph, ultrahigh frequency (UHF) multichannel radio transmission systems, and electronic components.<sup>27</sup> Carrier Telephone Industries continued to update its manufacturing facilities and product line, moving into digital microwave and optical line equipment as well as digital multiplex systems. In the future it plans a major expansion into digital microwave (broad and narrow bands and rural) as well as optical fiber, cellular mobile, and switching systems. Equipment has been produced under license from Siemens (Germany) as well as from Databit (United States) and GTE (Italy), and was also developed by CTI's own research and development facilities.

Apart from Siemens, two other multinational companies have been involved with equipment manufacture in Pakistan. These are LF Ericsson of Sweden and CIT Alcatel of France. Ericsson has installed several digital exchanges and supplied a diverse range of telecommunications equipment over the past 20 years; it

has also obtained one of the recent BLT contracts.<sup>28</sup> Alcatel's involvement began in the late 1980s when the government decided to select a second supplier rather than relying solely on Siemens. An international tender was floated, in which Siemens was not allowed to participate. Alcatel was awarded the contract after President François Mitterand of France went to Pakistan, just as Telecom Australia won the contract for a major fiber-optic link after Prime Minister Bob Hawke of Australia paid a visit.

Alcatel's Pakistani partner in the \$20 million project is the Agha Khan Foundation. Like Siemens, the French company was required to set up a production unit in Pakistan to manufacture Alcatel's E-10B digital telephone switching as well as 120,000 lines per year. A \$40 million contract has also been awarded to Italtel Telematica of Italy for the local production of 1.5 million electronic telephone sets over five years.<sup>29</sup> The Japanese company NEC has installed switching and exchange equipment in Pakistan, and Daewoo of South Korea also applied, although unsuccessfully, for a BLT contract, which would have brought further diversity to the network.

Some local industry analysts feared that these multiple systems would result in inefficiencies and standardization problems. Whereas most advanced countries have adopted no more than two systems, Pakistan was faced with the prospect of coping with five or more. Daewoo had apparently never installed a complete exchange line system, and PTC effectively resisted its inclusion along with the World Bank, which was also averse to having five separate systems. However, Daewoo appeared to have the strong support of some influential members of the Nawaz Sharif government. When this government changed in 1993, Daewoo's efforts also proved abortive. The BLT schemes are accompanied by soft loans from the parent governments, and this financing factor is one reason for the system's diversity.

In addition to its collaboration with Siemens, the Pakistani government also owns another firm in the telecommunications sector, the National Radio and Telecommunication Corporation (NRTC). Established in 1965–1966 near Islamabad, NRTC has collaborated with foreign companies to produce professional, field radio, and telecommunications equipment, primarily for the military.<sup>30</sup>

The private sector in telecommunications has been far weaker than the state-owned sector, namely T&T, the government monopoly operator, which was converted to PTC. Nevertheless, the past decade has seen a greater receptivity to private sector involvement. This was reflected in the sixth and seventh five-year plans, though with few results. Current efforts at deregulation are expected to create more opportunities for private enterprise; this has already occurred in the cellular segment. The ongoing process of privatizing PTC is intended to have a major impact on opening up telecommunications to the private sector.

#### 4.6 Import Restrictions on Computers and Electronics

The shortcomings in telecommunications have been compounded by the weakness of the electronics industry, which despite the strategies proposed in the five-year plans, failed to establish a notable presence in the country. Today, for exam-

ple, not a single company quoted on Pakistan's stock exchange deals primarily in electronics, and the only sizable production units assemble consumer electronics. The nation has no chip manufacturing capability or any production facilities for computer hardware; the electronics boom in East Asia has not reached this far.

Furthermore, at the time when Pakistan might have kept abreast of this emerging industry, the government failed to liberalize imports of electronics components to stimulate local manufacture. Prior to 1970 the electronics industry was not recognized as qualifying for any concessions on import duties. On components like transistors and diodes a customs duty of 102.5% was levied; on computers a 47.5% duty was levied in addition to sales tax.<sup>31</sup> In 1970 customs duty exemption was granted for some imported items used in local manufacture, provided evidence of consumption was produced within six months of import. This period proved too short in many cases, but all efforts to extend it failed, revealing the government's lack of vision as to the scope and potential of the electronics industry. It was not until after 1985, under more liberal import policies, that duty and sales tax exemptions and reductions on a number of electronics items were instituted. The current government is committed to progressive import liberalization, but in practice it has tried, as in its 1994 budget, to balance reductions in import duties with increases in sales tax and other surcharges.

Computer imports were similarly retarded. Pakistan's first computer, an IBM 1401, was installed in 1964. By 1979 the country had a mere 14 minicomputers and by 1984 only 103, of which 68 were IBMs. Until 1979, a computer could only be imported after an exhaustive review by a mechanization committee. Import duties and controls were relaxed in 1982 and removed by 1984.<sup>32</sup> Since 1985, computer sales have increased more rapidly, and several service companies have been established. Earlier domination by IBM has been somewhat curtailed, and the lower-end microcomputer market has seen the entry of producers from eastern Asia. Among the larger machines, NCR has some strength in banking, while DEC has made important inroads, with orders from such public agencies as the Census Bureau and the country's largest energy parastatal, the Water and Power Development Authority (WAPDA). Both DEC and NCR work through country representative firms. At first IBM marketed directly through its own sales organization but now uses its sale force to support a two-part distribution channel: authorized dealers for PCs and for minicomputers, general marketing agents who also develop or sell related software. Despite these developments, however, Pakistan cannot yet manufacture computers to meet its needs.

#### **4.7 Private Sector Telecommunications Ventures**

There do exist several private sector companies dealing in the supply of telecommunications equipment. A large number of companies cater to the procurement needs of PTC, TIP, and CTI, either on their own account or as representatives of foreign firms. Despite Siemens's equity share in TIP and CTI, the supply of components and raw materials to them are not a Siemens monopoly. These supplies are normally procured by competitive quotes through tender. Under the tender

process, contract specifications are obtained, and quotes are then forwarded by a specified date. Firms of suppliers put in such tenders either directly or through their indenting or representative agents. Such agents are mostly family-owned Pakistani companies, which over time have established financial, service, or kinship ties with procurement officials in the manufacturing organizations.<sup>33</sup>

Pakistan does have some firms that assemble such products as small PABXs, intercom sets, and VHF radio telephones. Among the more notable is Digital Communications. Headquartered in Karachi, this company pioneered the development of PABX in Pakistan, employs 450 people, and can produce over 50,000 lines per year.<sup>34</sup> Its products include specialized software for Telecom, small-sized message switches, plug-in cards for PCs, telephone sets, and key systems. In 1989 the government gave Digital a national paging license—supposedly the Bhutto government's way of acknowledging close company links with the People's Party—and Digital now has a monopoly on this facility. Native Enterprises and Innovative Ltd. also produce PABXs. Microelectronics International (MEI) at Lahore once produced electronics equipment for defense use and tried unsuccessfully to enter the PC and VCR markets. The company has virtually ceased production, and efforts to revive operations through a change in management have failed.<sup>35</sup> Another company, Sipka Manufacturing of Karachi, employs 70 and assembles radio telephones, under license from Motorola and Radios of USA, as well as mobile telephones and alarm systems. Also active in the industry are some satellite TV antenna and receiver manufacturers, such as Video Shack, Aghaz, and Wavetech. Among others with the potential to manufacture telecommunications equipment are Precision Engineering, Micropole, Margalla Electronics, Solid State Systems, Al-Teknite, Institute of Optronics, Hybrid Technologies, and Arfeen International.<sup>36</sup>

A private sector telecommunications cable company, Pakistan Telephone Cables, began production in 1986. The sixth five-year plan noted the need for such a unit, and credit for it was provided by the Asian Development Bank.<sup>37</sup> The company was sponsored by the Bawany business group, but by 1988 another entrepreneur, A. A. Alrae, had taken over its management. When competition from foreign suppliers forced the company to suspend production in 1988, a public share subscription was floated. Production was resumed, but the share price has throughout remained well below its par value of Rs10. Per share losses have also been recorded each year since 1987. The company has achieved operating profits since 1992, but these have remained under Rs2 million annually and are still completely overshadowed by the company's accumulated losses of Rs183 million by 1994.<sup>38</sup>

Laying the 2,500-kilometer optical fiber cable link between Karachi and Islamabad also brought in international participation.<sup>39</sup> The contract, worth \$25 million, was awarded to a joint venture between Telecom Australia (International) (TAI) and the Olex division of the Pacific Dunlop Corporation; Olex's role was to provide the cables, while TAI managed the project. Substantial delays were experienced, but the fiber-optic link was completed by 1993. Even with this link and the most modern exchanges in place, service will remain poor until the quality of exchange to unit outlets is improved. This requires extensive infrastructural

improvements, which are still pending. Nevertheless, there is now a 565 Mbit optical fiber backbone network linking all major and minor cities over its 2,500-km route, with optical fiber spur routes along the way. This has considerably boosted capacity and allowed for increased data transmission services. The existing link connects population centers mostly east of the Indus River, the region where most of Pakistan's population is concentrated. A second fiber-optic link to areas west of the Indus River is also under consideration.

Telecom Australia has developed a reputation for innovative design and has benefited from being a "second mover" in adopting new telecommunications technology from the advanced industrial nations. But while it has been awarded over 200 contracts in some 40 countries, including management of Saudi Arabia's telecommunications network,<sup>40</sup> it will not make a profit on this optical fiber project, which might dissuade it from further involvement with Pakistan. Project managers at TAI have complained of excessive interference and obstruction by middle management at PTC, while TAI's technicians seemed more knowledgeable than PTC's senior managers.<sup>41</sup> Further, TAI felt that PTC's network design and strategic planning were inadequate. These problems may set an unfavorable precedent for PTC's collaboration with foreign companies. However, TAI, which has recently been renamed as Telstra International, has viewed this first project as an important positioning opportunity for future contracts in Pakistan. In 1994 Telstra formed a joint venture, called Infosat Communications, with the Muslim Commercial Bank, one of Pakistan's recently privatized banks. Infosat aims to provide a range of data communications services to the corporate sector in Pakistan. Telstra thus remains an important contender for any further divestment of telecommunications operations to the private sector.<sup>42</sup>

An innovation in telecommunications, and an important new area for private enterprise, emerged with the introduction of cellular mobile systems in Pakistan. The government decided to open this segment to the private sector, making it the first major departure from the public sector's operating monopoly over telecommunications in Pakistan. At present there are three operators under license: Paktel, Pakcom, and Pakistan Mobile Communications Limited (PMCL). Unlike other cellular operations, these three companies also sell user equipment, owing to the infancy of the industry. In time, mobile telephones will be sold by both distributors and retailers, with these three companies remaining as system operators.

Paktel is a joint venture between Cable and Wireless (C&W) of the United Kingdom, with 80% equity, and a Pakistani businessman, Farooq Hassan, who has a minority share of 20%. Cable and Wireless also handles Paktel management. The company has two mobile switching centers (MSC), purchased from Ericsson; they have a capacity of 65,000 lines each and are located at Karachi and Lahore.<sup>43</sup> Paktel has a network of 23 radio base stations (RBS) providing coverage by 1995 to 15 major urban centers. By contrast, Pakcom covered seven, and PMCL covered two cities. Paktel was the first to achieve this kind of national coverage, from which it hopes to retain a strategic advantage over its competitors.<sup>44</sup> Paktel also remains the largest of the three companies. It reported an 80% market share in 1991, and by late 1994 it still held a 65% share, with Pakcom at 32% and PMCL at 3%. Traditionally well represented in the Middle East,<sup>45</sup> C&W was

seeking overseas ventures and is now well placed for gaining a major equity share in PTC privatization. Paktel operations have appeal in their own right: The company was able to declare a profit in the second year of operations. However, in 1992 it ran into major deficits, largely owing to uncollected bills from errant customers. It was bailed out through a \$5 million injection from the parent company and has now considerably tightened up its bill collection system.

Pakcom, which operates under its trademark, Instaphone, is a joint venture between Millicom International Cellular (MIC), based in Luxembourg, and Arfeen International, a Pakistani firm. Millicom has a 53% and Arfeen a 47% equity share. In January 1991 MIC was incorporated with the merger of Millicom International Holdings Ltd. of the United States and a sister company, Comvile International AB of Sweden. Comvile was previously a subsidiary of Industriforvaltnings Kinnevik of Sweden, which held the major share in the Asian operations, while Millicom handled the Central and South American operations. Now, MIC has cellular operations through subsidiary companies in several countries,<sup>46</sup> while Arfeen International, the local partner, has been involved with cement, chemicals, and telecommunication businesses.<sup>47</sup> Pakcom has three CMS 88 switches purchased from Ericsson, located at Islamabad, Karachi, and Quetta, and a total of 13 RBSs to service the seven cities that it currently accesses.

Pakcom's early weakness in relation to Paktel was that it lacked the nationwide coverage so important in this business. It commenced operations in Karachi and Islamabad, in the south and north of the country, and it was late to enter the sizable central Pakistan market, based around Lahore. It did so in 1992, after which the intensity of competition between the two companies has increased. They both operate in most major cities, and almost 30% of the target population is covered. Both operators have indicated aggressive roll-out plans to extend this coverage to 75% by 1996.<sup>48</sup> By 1995 Pakistan had only about 26,000 cellular users, although market projections are for a minimum of 130,000 users in the next five years. However, even the existing subscribers are high-usage customers, with about 85% belonging to the business community. On a per-subscriber revenue-earning basis, they are estimated to be equivalent to about 120,000 cellular users in the United States.

Paktel and Pakcom were given licenses for cellular operations in 1990 on the understanding that their duopoly would prevail for 15 years. However, in 1991 the government granted a third cellular license, to Pakistan Mobile Communications Limited. This was a local company with foreign backing, and it was headed by the family of a federal minister, who was also the son-in-law of the president of Pakistan. Paktel and Pakcom protested this apparent nepotism to the government and also took the issue to court. In response to similar criticism in the local press, PMCL argued that it was actually the first company to make an unsolicited proposal to the then T&T Department, in 1985–1986, to establish and operate a pilot cellular phone project in the federal capital area.<sup>49</sup> At that time the government did not anticipate the emergence of private telecommunications operating companies. The Telephone and Telegraph Department first sought to identify companies interested in cellular systems in 1989, and about 13 responded, of which only Paktel and PMCL made the short list. The People's Party government of Benazir Bhutto

removed PMCL from consideration, however, and licenses were subsequently issued to Paktel and Pakcom; PMCL then appealed for redress to the office of the ombudsman, who asked the government to resolve the issue amicably. Finally, in August 1991 PMCL obtained the third license. Such confusion at a time when the cellular business was in its earliest infancy provides a useful case study of the interface of market forces, political patronage, and the legal system in a less developed country such as Pakistan.

Ultimately, this controversy in the cellular segment might well be determined by market forces. In 1994 PMCL began operations under its trademark, Mobilink. The company has a 67:33 equity ratio between Motorola and the Saifullah Group. It conceded a lead of over three years to its two rivals. If it attempts to establish a nation-wide network, it will face major barriers to entry from marketing, service, and coverage strengths gained by the two existing competitors.<sup>50</sup> If it maintains a regional focus it might lose market acceptance because of inadequate coverage. A further complicating factor is that PMCL operates on General System for Mobile (GSM), which is digital, while Paktel and Pakcom operate on Advanced Mobile Phone System (AMPS), which is analog. Thus Pakistan already has two distinct systems in its cellular segment.<sup>51</sup>

#### 4.8 T&T and the Need for Government Regulation

To avoid confusion the government could have provided standardized specifications as well as consistent investment and licensing criteria. System diversity, which is now emerging in the wider telecommunications network, leads to differences in equipment, protocols, styles, and training. Uncertainty or ineptitude in government policy will make it all the more difficult to combine this disparate network into a cohesive system. Another example is governmental decisions since 1990 to grant card pay phone licenses to 11 companies and audio tex/voice mail service licenses to 22 companies, concessions perhaps motivated only by the desire for short-term political benefits. Market rationalization has tempered this imbalance: In 1995 only three card pay phone and two audio tex/voice mail services were actually operational.

With the increasing complexity in telecommunications, an urgent need exists to establish a strong regulatory authority that will provide clearly defined guidelines under which private and public enterprises can operate smoothly. The only office now performing such a function is the Government Inspector of Telephone and Telegraph (GITT) within the Ministry of Communications; to date it has been staffed only by T&T engineers who lack both the power and the ability to perform a regulatory function. The controversy over cellular licensing underlines the need for clearer formulation of sector policy. Its absence can have adverse effects on both foreign investment and system efficiency. Happily, the first major reform has already occurred: the transition from T&T to PTC.

Over the years T&T as a government department remained essentially subordinate to the Ministry of Communications and to the needs of some other ministries, most importantly Finance. The Telephone and Telegraph Department was headed

by a director-general, who was invariably an engineer, while the ministries were controlled by the federal civil service, which had inherited the mantle of authority from British colonial administrators. These civil servants were generalists who were nominally accountable to the political government but in practice exercised considerable authority, especially during the extended periods of nondemocratic, military rule. The other major influence on T&T has been the army, because of the strategic importance of telecommunications and because it is itself a major user. Otherwise, outside influence on the T&T was rare. Engineers were recruited by examination through the federal public service commission, and if successful, they joined the central engineering services as class I officers.<sup>52</sup> Because their pay was based on a government salary scale, there was no monetary incentive to operate efficiently.

The structure of T&T was not unlike that of other government departments. Under the director-general was a financial adviser as well as six major departments, each headed by a chief engineer. The network itself was divided into eight telephone regions, each administered by a general manager: Karachi, Southern, Central, Lahore, Islamabad, Northern, Western, and Overseas.

Finally, there were six special services divisions, each with its own director. One of these was the Central Telephone Research Laboratory, established in Islamabad in 1980 with Japanese assistance. Its predecessor was the Telecom Research Center at Haripur, organized in 1964. Their common goal was to provide in-house design capability and conduct applied research. Central Telephone Research Laboratory failed to maintain a dedicated research staff, however, and operated instead with T&T engineers.<sup>53</sup> As a result, the quality of work suffered, and over the years the center has failed to deliver the kind of indigenous research that could provide an impetus for the further development of telecommunications in Pakistan.

#### 4.9 From T&T to PTC

The transition from T&T to PTC was first attempted through legislation. By the mid-1980s the government was committed to deregulating telecommunications in order to make the sector more efficient and more responsive to market needs. One option was to open up greater spheres of activity for the private sector, such as providing outside plant and mobile systems. The other was to establish PTC as an autonomous corporation, wholly owned by the government, but possibly to be privatized at some future date. The T&T Department itself realized that conversion to corporate status would improve services and performance. More rapid expansion would also be possible, especially if the corporation retained net profits rather than transferring them to the public treasury. The transition was also seen as clearing the way for eventual privatization.

The legal context under which this sector operates was established by the Telegraph Act of 1885. Another regulatory act still extant was the Wireless Telegraphy Act of 1933.<sup>54</sup> New telecommunications legislation was under consideration since the mid-1980s, under the military regime of General Zia-ul-Haq. The drafting of the required legislation began in 1986, and a bill to establish the corporation was

first submitted to the national assembly in 1987. Political changes, however, continued to impede legislative action. Since General Zia's demise in 1988, frequent changes in civilian governments have occurred. However, the PTC bill was debated in parliament, referred to committees, and by November 1991 it had been adopted by both parliamentary houses, the national assembly, and the senate.<sup>55</sup> Meanwhile, PTC was established through a presidential order on 15 December 1990.<sup>56</sup> This measure is known as Ordinance No. X of 1991, or the Pakistan Telecommunications Ordinance, 1991.

Another important law that affects the telecommunications sector is the Companies Act of 1984, which regulates private and public limited firms in Pakistan; the Foreign Private Investment (Promotion and Protection) Act of 1976 does the same for foreign companies. Repatriation of profits is still formally subject to the provisions of the Foreign Exchange Regulation Act of 1947. However, government controls over foreign investment in general, as well as currency conversion and repatriation of profits and capital, have been considerably liberalized since 1991 in order to provide investment incentives.

The PTC board consists of a chairman/chief executive and up to eight directors. The net worth of T&T was transferred to the new corporation's opening balance sheet of 1 July 1992. It consists of fixed and current assets, less liabilities and paid up shares by government, which total around 35% of capital with 65% as debt capital. The authorized capitalization was Rs30 billion—3 billion shares at Rs10 each, of which 1 billion shares were subscribed and paid up.<sup>57</sup> The government was to receive a dividend of 15%.

Unlike T&T, however, the PTC can keep its net profits. Overall financial performance of T&T has been good, and in recent years it has consistently achieved nearly a 25% return on revalued assets, so for years it has contributed large amounts to the national exchequer. These earnings now exceed the substantial sums that the PTC still has to turn over to the government for debt service payments and dividends, so they are retained by PTC in the form of cash surpluses. Since 1991, the government has actually charged PTC a flat levy of Rs7.6 billion annually as the fee for the government's investment in the system.<sup>58</sup> The financial status of PTC was also helped by its exemption from income tax and wealth tax for three years. It is hoped that PTC will adopt a longer-term planning perspective than T&T, which was constrained by uncertainty about the level of funding in the government's annual development plan.

Thus we can see that policy making was under government control. Not only was the telecommunications structure owned entirely by the state, but it also operated as a government department, which meant that the civil bureaucracy dominated the policy-making process. Another important participant in policy making has been the military, because of the prolonged periods of military rule and also because it is a major user of the telecommunications network. Until such time as the military develops a dedicated system of its own, it will continue to have a major stake in the policy-making process. Work on separating the civil and military networks has been in progress since 1992, but the two networks are currently still working together, and it is estimated that they will continue to do so for at least another year. The chief of army signals, for example, sits on major commit-

tees that influence policy, such as the committee on telecommunications that provides input for the five-year plans. By contrast, private business, including its representatives such as trade associations and chambers of commerce, has not enjoyed the same degree of influence in helping to shape policy. With more private sector involvement, however, this role can only grow. The introduction of the mobile cellular system is an example, since it is clearly designed to serve business interests, and the great majority of users are businessmen and executives rather than government or military functionaries.

Despite the formal granting of autonomy, and perhaps until such time as more complete privatization is achieved, the PTC remains very much under the control of government and the Ministry of Communications. For instance, the external members of the board are top-level state officials: the secretaries of the federal departments of communication, finance and economic affairs, and the chief of army signals. The current chairman is an engineer from within T&T's ranks, while the directors of finance and administration have been mostly from the civil service. Major restructuring will need to occur before PTC can become a profit-oriented, efficient organization based on modern management practices. The transition should entail such measures as significant personnel turnover and major retraining.<sup>59</sup> Such reforms have yet to be undertaken, although PTC has been in existence for around five years.

#### 4.10 Moving Toward Privatization

Once the PTC was formed, the government almost immediately declared that it wanted to privatize the entire corporation. The newly elected government of the Islamic Democratic Alliance, with Nawaz Sharif as prime minister, had since early 1991 been committed to a major privatization of public sector companies. Many were nationalized during the 1970s, including those in the cement, vegetable oil, automotive, and engineering industries; those producing other products, such as fertilizers, remained in the public sector.

As a former government department, however, PTC represented the most extreme shift to private ownership. About 70 organizations, including several major international telecommunication companies,<sup>60</sup> attended the prebid moot, which was held in Islamabad in June 1991. The terms offered were 51% equity to such buyers, with 49% to be offered to the public and PTC employees. It soon became apparent that the sale of PTC would entail a lengthy process. The size of the purchase would probably require a combination of companies or alternatively a divestment by services or regions to single companies.<sup>61</sup> The privatization of PTC is currently in the process of being implemented.

A number of interests were aligned against privatization. Some were philosophically opposed to it, while others objected to the rapid and almost peremptory manner in which it was initially being attempted. Management in PTC did not like the idea, fearing that the demand for greater competence and productivity might threaten careers. Corruption has been rife in PTC, and commissions and kickbacks are said to accompany every tender or purchase agreement—perquisites

likely to be threatened under private ownership. Since 1990, management buyouts have been attempted for some Pakistani public sector organizations, but given the size of PTC, this option seemed remote. Labor unions were against privatization for much the same reasons, demanding either job security or compensation for any job lost. The extreme difficulty in firing personnel has resulted in low productivity. At PTC, unions have been organized not only for the central headquarters but also by region, city, and type of service, forming an interlocking nation-wide network. Meanwhile, employment has burgeoned in PTC as in other noncommercial organizations. Employees per 1,000 telephones stood at an abnormal 115 in 1978, dropping to 53 by 1991—still high compared with less than 10 in affluent countries and under 30 in most middle-income countries.<sup>62</sup> Another problem is periodic strikes, such as the one in 1991, which ended when management threatened to invoke an essential services clause. While labor agitation against PTC's privatization has continued, this has not yet led to strike action. Since 1994, however, the government has followed a more active privatization policy for PTC, and this has been challenged in court by the labor unions.<sup>63</sup>

Certain interests resisting rapid privatization included the army, which makes extensive use of the public telecommunications network and considers it of strategic importance. The civil bureaucracy also appeared lukewarm because privatization threatened to loosen its hold over the operation of the nation's economy and industrial production. The World Bank, too, seemed to want to slow the pace of change.<sup>64</sup> It advised caution and realism, pointing out that the privatization of British Telecom spanned almost 15 years and that even allowing for a "learning curve" the same process took up to six years in Argentina, Mexico, and Malaysia.

Clearly, successful privatization could only be assured by careful planning, with guidelines for a proper regulatory and contractual environment, an analysis of both international and domestic capital markets, and a strategy for addressing those affected, especially labor.<sup>65</sup> A clear telecommunications policy was needed, rather than contingency measures. This would avoid situations such as the one in 1991 in which bidders were told, for example, that the government would fix a reserve price for PTC despite the lack of reliable information on the value of the corporation's assets. A consolidated statement of inventories had still not been prepared and the PTC was even said to be grossly inflating its asset value in order to dissuade foreign buyers. Moreover, there had as yet been no external audit; until 1992 the rudimentary annual income statements and balance sheets were not prepared by a qualified firm of chartered accountants but were done in-house by the government's own auditing facility.<sup>66</sup> This lack of transparency remained a defensive tool for entrenched interests, and trying to achieve almost instant privatization under such conditions was hardly realistic.

One step toward easing the transition was the establishment in 1991 of Telecom Foundation, the proceeds of which will go toward the welfare of ex-employees of PTC. Since 1992, the foundation has been capitalizing on the expertise of its engineers to win civil contracts for telecommunications projects as part of the BLT-planned expansion; Siemens, Alcatel, and Ericsson are using its services. The foundation does not plan to diversify into other businesses, as the largest

such organization in the country, the Fauji Foundation for ex-army personnel, has done. Fauji has invested in food processing and fertilizers and also runs schools and hospitals.

#### 4.11 PTC Privatization

Since 1992, a more planned process was initiated for PTC's privatization. Through assistance from the World Bank, a consultancy was awarded to Coopers and Lybrand of the United Kingdom to help modernize PTC's accounting system. The report on this was prepared during 1993. In 1994 the government took further policy initiatives. In July 1994 it promulgated the Pakistan Telecommunications Ordinance to start the implementation of the privatization process and to develop an appropriate regulatory environment. Under this 1994 ordinance the Pakistan Telecommunications Authority (PTA), Frequency Allocation Board (FAB), and National Telecommunications Corporation (NTC) were established. The current PTC became the Pakistan Telecommunications Corporation Limited (PTCL), a company limited by shares and registered under the Companies Ordinance.

Among the responsibilities of PTA included acting as the new regulatory regime for the provision of telecommunications services in Pakistan.<sup>67</sup> Its role was to regulate and oversee the performance of telecommunications operators, to grant licenses to public and private operators, to regulate tariffs of licensees, and to act as a vigilance commission regarding public complaints of telecommunications services. The PTA was also charged with overseeing the privatization of PTC in accordance with the decisions of the federal government. It was envisioned that the PTA would consist of three members appointed by the government for a period of four years each. One would be a telecommunications engineer and one a financial expert; the members would not be linked to any telecommunications firms. Thus, the legal framework for a regulatory authority now exists in Pakistan, but the government has yet to make the PTA operational, or even to appoint its members.

Regarding other aspects of the 1994 ordinance, the FAB took over the functions of the Pakistan Wireless Board. It will have the exclusive authority to allocate parts of the radio frequency spectrum to commercial telecommunications services, radio and television broadcasting operations, and public and private wireless operators.<sup>68</sup> Applications for allocations of radio frequency spectrum will be made to FAB through PTA. The FAB will be less autonomous than the PTA, since its board will consist of the federal secretary, Ministry of Communications, as chairman, an executive director, the chairman of PTA, and a nominee each from the ministries of Defense, Interior, and Information and Broadcasting. Like PTA, the FAB has yet to start functioning. The other agency established under the 1994 ordinance, NTC, will provide telecommunications services to the armed forces, defense projects, federal and provincial governments, and local authorities as well as to any other agencies the government determines.<sup>69</sup> This will presumably provide telecommunications services to the public sector parallel to an eventually privatized PTC.

Within a few days of the issuance of the Telecommunications Ordinance in July 1994, the government announced the first steps toward PTC's privatization. Through the Privatization Commission, the government decided to offer for sale 1 million PTC vouchers to domestic and international investors in denominations of Rs3,000 per voucher (\$1 = approximately Rs31).<sup>70</sup> Each voucher would be exchangeable for 100 shares of PTC in two years' time. The total share capital of PTC was decided at 5.1 billion shares of Rs10 per share. In August 1994 the government floated 1.8% of the total shares, or 100 million shares. These were offered at a premium of Rs20 per share and in the form of 1 million vouchers, making the offer price Rs30 per share, or Rs3,000 per voucher. The vouchers included a "put option," giving buyers the right to sell back the vouchers in two years time at Rs3,840, which translated into an annual interest or mark-up rate of 14%. It was decided to reserve almost 10% of the offer for PTC employees.

This first share offer received a very buoyant response from the market. The subscription was open for three days, 15–17 August 1994. The asking amount of Rs3 billion was oversubscribed 6.4 times, at Rs19.158 billion. Significantly, 85.91% of the subscription came from the category "foreign investors," and the number of these applications was only 54. These were presumably financial institutions or high net worth individual investors. In the final allotment they received 10.04% of the shares. The offering had been basically aimed at domestic investors under the category "general public." Their subscribed share was only 13.07%, which they received in full, and this came to 83.47% of allotted shares. The two other categories, "PTC employees" and "Overseas Pakistanis," also received their full subscription, their allotment coming to 4.21% and 2.28%, respectively.<sup>71</sup> A speculative trend soon emerged: within a couple of weeks PTC shares were trading at a curb price of over Rs70 per share.

Encouraged by the favorable response from the foreign market, the government decided on an almost immediate further international placement of PTC vouchers. In late August 1994 the Privatization Commission announced a second tranche of 5 million vouchers, equivalent to 500 million shares, to be sold to foreign investors. A syndicate was appointed, led by Jardine Fleming and a recently privatized local bank, Muslim Commercial Bank. A minimum tender price of Rs4,500 per voucher was set, but under the open book-building system the strike price was raised to Rs5,500. Total bids reached \$2 billion, a 2.1 times oversubscription at the strike price. These bids were received from 602 institutions in 21 countries. A total of \$898 million was raised by the sale in mid-September 1994, and the government netted \$872 million after commissions. The geographical distribution of the allocation by regions was United States (22.9%), Australia (2.2%), United Kingdom (24.1%), Europe (11.3%), Middle East (4.3%), Far East (29.2%), and the rest of the world (6.0%).<sup>72</sup>

Despite this success, underlying weaknesses began to emerge that cast a shadow over the process of PTC privatization. For one, critics questioned the government's haste in launching the two branches so close together: It had earlier promised a six-month gap. Fears were also raised of inflationary pressures and capital market weaknesses. Local investors faced liquidity problems in meeting clearance dates on the PTC scrip. Either they had to liquidate other portfolios to

generate cash for taking delivery of PTC shares or they had to book a loss and sell PTC at lower rates to avoid delivery. This twofold pressure generated a wave of selling, bringing the PTC share price down to Rs44 by mid-October. Further reductions have led to a price range of Rs30–35 by April 1995. This accompanied a general share price decline in Pakistan, stemming from mounting political violence in the country. The Karachi Stock Exchange index declined from 2,660 in March 1994 to 1,600 in April 1995.<sup>73</sup>

However, the general decline in share prices in Pakistan has also been attributed to downward pressures exerted by the PTC scrip itself. One reason is the size of the PTC offering, said to be the fourth largest ever in Asia. This seems to have drained liquidity from the relatively limited resources of the Pakistani capital market. Both in volume and value terms, the PTC shares on several days reached, and at times even exceeded, half the total traded shares.<sup>74</sup> Trends in PTC share values had an obvious impact on the general share index. Downward pressures on PTC shares were also exerted from investors' concern that the government was using sale proceeds to meet its fiscal deficit rather than for reinvestment in telecommunications infrastructure and services. The auditing process that PTC used also remained problematical. The replacement of A. F. Fergusons, one of the country's leading auditing firms after two years in 1994 sent negative signals regarding PTC's accounting practices and financial management.

During 1995, these issues created problems for the government in implementing the next planned stage of PTC privatization. This period was marked by the search for a "strategic investor" to buy 26% of PTC shares. By April 1995 the decision on such an investor, presumably one or a combination of international telecommunications operators, was still awaited. In January 1996 PTC was incorporated, and Deutsche Morgan Grenfell invited bids for prequalification. After this stage, the government has planned to offer the remaining shares successively on the market. Currently, the impact of such large offerings is difficult to estimate, given the experiences with the limited proportions that have actually been sold.

#### 4.12 Other Telecommunications Networks

There are certain exceptions to the PTC monopoly. The Pakistan Railways, Water and Power Development Authority (WAPDA), and Sui Northern Gas Pipelines Limited (SNGPL) have their own telecommunications networks. The military, apart from using the PTC system, also has its own facilities, as do the country's police forces. Owing to heavy usage and the vital role of communications for their operations, these organizations could not depend on the low penetration and poor quality of the public network.

In the case of Pakistan Railways, financial constraints prevented early improvements on the rudimentary system inherited from colonial rule. Stop-gap arrangements included extending track control circuits, opening subcontrol offices, and installing teleprinters and HF and VHF radio circuits. The railways leased overhead wire circuits from T&T, but they were prone to breakage, and the wires, which had deteriorated with age, were unreliable. In 1979 work began on a more

modern communication system along the main Karachi-Peshawar line and important branch lines. A new 960-channel microwave system stretched for close to 2,700 km between 44 stations. In addition, a 36-channel UHF system replaced the open wire lines, linking 266 stations by 1995, while VHF radio connected 64 base stations with locomotives and yards. Seventeen automatic telephone exchanges were also installed in the major stations.<sup>75</sup>

Sui Northern Gas Pipelines Limited is a public sector company with gas fields in southern Pakistan and its market up-country. To facilitate its work of purifying, transmitting, and distributing a potentially explosive substance it developed an in-house telecommunications network extending throughout the system—something the government required under its Mineral and Gas Safety Rules because of the hazards associated with this industry. Leased circuits might have sufficed if the T&T had been more reliable; instead, the utility had to develop a dedicated system, diverting resources from energy development. Sui Northern, which also undertakes pipeline construction projects, surveyed, fabricated, and erected the system itself around 1984 through its telecommunications wing. In the mid-1980s a microwave link replaced a UHF radio link established in the 1960s, and telemetering equipment was installed to permit monitoring of changes in power generation variables. Sui Northern had 51% government equity, which by 1995 stood at 36% after partial privatization in 1992.<sup>76</sup>

The Water and Power Development Authority, which generates and distributes the country's electrical power, is the other agency with its own telecommunications network. This network extends throughout the country, to help track the real time status of power supplied by the agency's thermal, hydel, and steam systems. Collectively known as supervising control and data acquisition (SCADA), it is equipped for speech relay, teleprotection, telemetering, and teleoperation. The system was begun in 1958, with a project that established power line communications (PLC) between the main grid stations, located far from the urban areas where the T&T system was concentrated. Today, WAPDA's national control center, located in Islamabad, also communicates with the main grid stations via PLC as well as via UHF. A nation-wide microwave link, using Ericsson's load dispatch system, has been operating since 1982; plans to upgrade it from 60 to 120 channels have been pending for some years. A pilot project for a fiber-optic link of 250 km was completed in 1994, although the cost makes its replication on a larger scale unlikely.<sup>77</sup>

#### 4.13 Expanding Rural Telecommunications

The telecommunications system in Pakistan not only has a very low density relative to population but also remains highly concentrated in the urban areas. At least 70% of Pakistan's population is still rural, however, and recent high rates of rural-urban migration suggest that a significant portion of city dwellers retains close links with the rural hinterland, creating a pressing developmental need to expand telecommunications. The potential benefits are well understood, not only on human grounds but also on the basis of encouraging cost effective infrastructural development and commercial activity. With the present rural population at over 90

million and the existing rural network numbering approximately 40,000 manual exchange lines, the rural manual service stands at under 0.05 per 100 population, while rural automatic service is nonexistent. The more rapid growth in telephone services in the past five years has also remained concentrated in the urban areas. Pakistan has around 44,000 villages with populations under 5,000, but telecommunications services exist in only 4,200, or under 10%, of them. Public call offices (PCOs) are the main form of service to these areas. Of about 6,300 long-distance PCOs in service, 50% operate via VHF links and 50% via line and wire links; there is only one long-distance PCO for every 14,000 persons. In 1990 the figure for pending demand for rural connections was given at 750,000. However, with facilities so scarce, the unstated demand was far higher than the 1990 figure. Currently, it is estimated that rural demand by the year 2003, with population and income growth, will be 1.91 lines per 100 population. This would require approximately 2 million new lines, at an estimated capital cost of \$4 billion. It is highly unlikely that these targets will be met.<sup>78</sup>

Similarly, projections in previous years have also failed to meet targeted growth in rural telecommunications. In 1991 a consultant's report, financed through Asian Development Bank technical assistance, recommended a strategy for expanding rural telecommunications.<sup>79</sup> It proposed that large villages (18,000+) have automatic exchanges and meet the full demand for services, medium-sized villages (5,000+) have PCOs and meet a limited demand for essential government services and service to key businesses, and small villages (1,000+) get PCO service only. The capital cost was to be around \$595 million for 150,000 new lines, supported by around 190 new rural exchanges with associated microwave spurs as well as 200 new time division multiple access (TDMA) radio systems.

It is unclear whether the recent moves toward privatizing PTC will delay plans for expanding rural connections and also whether it would be cost effective for a privatized system to develop rural networks. That such expansion did not occur when the system was a publicly owned utility and generating a revenue surplus must be seen as a major lost opportunity. The recent spread of cellular networks has, however, created much interest in rural areas, where units are used as PCOs. Billing recoveries have been a problem with such clients, but once tight credit controls are introduced, rural-based mobile PCOs have proved to be high revenue earners for cellular phone companies.

In conclusion, telecommunications development in Pakistan has been the result of several factors: steady network growth, the willingness to adopt new technology, and the resource and capability constraints endemic to lesser developed economies. The low penetration rate has persisted over time, and improving it will require effective planning strategies and major financial outlays. Quality of service has remained one of the system's critical shortcomings, with service disruptions at 27 per 100 subscribers per month and completion ratios of 46% for local, 35% for long distance, and 32% for international calls. Some might argue that rapid network expansion cannot be justified when system quality is so poor and that service improvements should come first.

Nevertheless, the sector has begun to change rapidly. Accelerated expansion, new services and the adoption of new technologies, changes in industry structure,

foreign investment, and state liberalization all promise to have a profound effect on telecommunications in Pakistan. If this sector maintains the nature and pace of change that it has experienced in the past five years, there is little doubt that in the next 10 years telecommunications in Pakistan will be transformed.

### Notes

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1. The role of telecommunications in economic development is analyzed in M. Jusawalla and D. M. Lamberton, eds., *Communication Economics and Development* (New York: Pergamon, 1982) and R. J. Saunders et al., *Telecommunications and Economic Development* (Baltimore: Johns Hopkins University Press, 1983).

2. The major form of economic change in the Pakistan region under colonial rule was agrarian growth. The tributaries of the Indus River were diverted into perennial canals, making possible major agricultural projects. For an assessment of this period, see Imran Ali, *The Punjab under Imperialism, 1885–1947* (Princeton: Princeton University Press, 1988) and Imran Ali, "Malign Growth? Agricultural Colonization and the Roots of Backwardness in the Punjab," *Past and Present* 114 (1987):110–132.

3. T&T's performance prior to corporatization is shown below:

Year ending 30 June	1987	1988	1989
Operating Profit (R million)	3190.1	3579.1	5092.4
Operating Ratio %	43	45	39
Rate of Return (revalued %)	28	27	34

(U.S.\$1 = R17–21 in these years.)

See Asian Development Bank, "Appraisal of Third Telecommunications Project in Pakistan," Report No. LAP:PAK 22273 (Manila, 1990), p. 14. The report adds: "In recent years, T&T has consistently achieved strong financial performance. Rates of return on revalued assets have exceeded 25 percent, and annual revenue collections have significantly exceeded the aggregate of annual working expenses and capital expenditure. The resultant cash surpluses automatically flow to the national exchequer and, in turn, the Government services the debts of the telecommunications sector. T&T's strong financial performance is attributable to a combination of effective budgetary control, selective annual tariff increases and steady growth in telecommunications services."

4. Information for the period up to 1960 is from *Second Five Year Plan* (Karachi: GOP, 1960), pp. 309–314.

5. For a useful survey of this period, see Nachrichtentechnisches Beratungsburo GmbH, *Long Term Telecommunications Survey of Pakistan* (Karachi: GOP, 1966).

6. *Third Five Year Plan* (Islamabad: GOP, 1965), pp. 403–406.

7. See "The History of Microwave Communication in Pakistan," *The Pakistan Times* (Lahore), 17 May 1990. The Pakistan Television Corporation also leased microwave channels from T&T for its national programs.

8. There are two earth stations in Pakistan linked with a 60E satellite over the Indian Ocean and a 359E satellite over the Atlantic Ocean. Current capacity is 1,595 channels. There are also three earth stations for domestic satellite communications, with a capacity of 120 channels. See *PTC Annual Report* (Islamabad: PTC, 1991), pp. 6, 9.

9. *Fourth Five Year Plan* (Islamabad: GOP, 1970), p. 461.

10. *Fifth Five Year Plan* (Islamabad: GOP, 1978), pp. 247–248.

11. Ibid., pp. 153–154.
12. A contemporary statistical survey of the telecommunications network is *Epic Review for 1980* (Islamabad: T&T, 1980).
13. *Sixth Five Year Plan* (Islamabad: GOP, 1983), pp. 272–273 and annexure II.
14. *Seventh Five Year Plan* (Islamabad: GOP, 1988), p. 530.
15. The following is one assessment of such inefficiencies: “Even a cursory analysis of the results will indicate substantial weaknesses in the overall management and procedures in the sector. The delay in the selection of the switching system perhaps as a case study if undertaken would reveal how hamstrung such decisions which are vital for a commercial entity can be due to the bureaucratic procedures and various levels which they are subjected to. The cost overruns indicate lack of plans and estimating capability or execution delays or a combination of both. The delays in civil works points to the need for a radical change in method of execution. All these are problems within the organization. The absence of response for investment from the private sector indicates either lack of interest or inadequate presentation or preparation for execution of this innovative step.” See S. A. Sathar, *Pakistan. Strategic Issues for the Eighth Plan Telecommunications* (Islamabad: GOP, 1991), annex. I, p. 1.
16. *Seventh Five Year Plan* (Islamabad: GOP, 1988), pp. 530–534 and annex. V and VI, pp. 545–548. For more detailed projections, see *Seventh Five Year Plan (1988–93) and Prospective Plan (1988–2003). Report of the Sub-working Group on Telecommunication* (Islamabad: GOP, 1987).
17. See S. Ansari, “Pakistan” (UNIDO, Meeting on Technological Cooperation for the Development of the Telecommunications Industry in the Asia-Pacific Region, Bangalore, 1991), annex I. (henceforth Ansari).
18. *PTC Annual Report*, 1991, p. 3.
19. The World Bank has helped to fund five telecommunications projects in Pakistan and has no further projects planned. The Asian Development Bank has completed three such projects. The appraisal reports for these projects provide useful reviews of telecommunications development in the country.
20. Ansari, annex. II.
21. World Bank, “Staff Appraisal Report. Pakistan T&T Department. Fifth Telecommunications Project,” Report No. 5483-PAK (Washington, D.C., 1986), p. 21.
22. Asian Development Bank, “Third Telecommunications Project,” p. 14 and app. 9.
23. *Dawn* (Karachi), 5 October 1991.
24. Interview with Kamal Abbasi, General Manager, Telecommunications Division, Siemens Pakistan Ltd., Islamabad, January 1992.
25. Ansari, pp. 5.5–5.6.
26. Asian Development Bank, “Third Telecommunications Project,” p. 5.
27. Ansari, pp. 5.1–5.4.
28. Interviews with Zia Mohiuddin and Moaz Mohiuddin of Panasian Marketing Services (Pakistan representatives of Ericsson), Islamabad and Lahore, September 1991.
29. See W. W. Ambrose et al., *Privatizing Telecommunications Systems* (Washington, D.C.: International Finance Corporation, 1990), p. 35.
30. Interview with Brigadier Rathore, ex-Chairman, National Radio and Telecommunication Corporation, Lahore, September 1991.
31. Ansari, chap IV and annex. III.
32. “Systems Limited (A),” Lahore Business School Case No. 08-168-87-1 (Lahore, 1987), pp. 1–2.
33. As an example see “Fazalsons,” Lahore Business School Case No. 14-077-87-1 (Lahore, 1987).
34. Interview with Asif Mallam of Digital Communications, Lahore, August 1991; Ansari, p. 5.9.

35. Interviews with Sohail Ahmed, ex-Managing Director, Microelectronics International, Lahore, August 1991 and January 1995.
36. Ansari, p. 5.10.
37. Asian Development Bank, "Appraisal of the Second Telecommunications Project in Pakistan," Report No. PAK: Ap-60 (Manila, 1985), p. 2.
38. Hafiz Investor Services, Report No. M8 (Karachi, 1990), and company annual reports, 1992–1994.
39. Interview with P. Challeyer, Project Director, Telecom Australia (International), Islamabad, January 1992.
40. See Telecom Australia publications (n.d.). *Telecom Australia (International) Ltd., and 1990–1991: The Investments, the Returns.*
41. PTC's training facilities consist of a staff college, five regional training schools, and five district training centers. The staff college specializes in more advanced courses for engineers and supervisors, while regional schools serve technicians and telephone and telegraph operators, and the district training centers conduct basic courses for linesmen and wiremen. The annual training capacity is only about 4% of the labor force; only half of this is utilized. See World Bank, "Fifth Telecommunications Project," p. 18.
42. See Telstra documents (n.p., n.d.), "Data Network Solutions" and "International Business, Corporate Profile."
43. Ansari, p. 2.3.
44. Interview with C. Edwards, CEO, Paktel, Islamabad, September 1991; and R. Khan, General Manager Marketing, Paktel (paper presented at Conference on Telecommunications, Center for Management and Economic Research, CMER, Lahore, November 1994).
45. See *Cable and Wireless Annual Report, 1990*, p. 26.
46. See Pakcom document (n.d.), "Millicom International Cellular: The Success Story behind Instaphone."
47. Interviews with Javed Feroze, Director, Arfeen International, and Irfan Qureshi, Branch Manager, Pakcom, Islamabad, January 1992. See "Arfeen at a Glance," Arfeen International (Pvt.) Ltd. document (Karachi, n.d.). See also "Instaphone' Special Report," *The News* (Lahore), 1 January 1992.
48. S. Ansari (paper on mobile communications presented at Conference on Telecommunications, CMER, Lahore, November 1994).
49. See letter by Pakistan Mobile Communications Ltd., *The News*, 26 September 1991.
50. Interviews with Usman Babar, Marketing Manager, Paktel, Lahore, August 1991, and Irfan Qureshi, Marketing Manager, Pakcom, Islamabad, January 1992.
51. S. Ansari (paper presented at Conference on Telecommunications, CMER, Lahore, November 1994).
52. Interview with M. Akram, Chief Engineer (Planning), Pakistan Telecommunications Corporation, Islamabad, January 1992.
53. Interviews with Ashfaq Chaudhry, General Manager, and Ghazanfar Ali, Divisional Engineer, Central Telephone Research Laboratory, Islamabad, September 1991.
54. For texts of these two acts, see the legal series *Pakistan Code*, (Islamabad: GOP, 1933, 1985).
55. *Business Recorder* (Karachi), 8 November 1991. For text of bill, see *Gazette of Pakistan*, 27 November 1991, pp. 479–491.
56. See text of ordinance in *Privatization* (Islamabad: Pakistan Telecommunications Corporation, 1991), pp. 31–40.
57. PTC Ordinance in *Privatization*, p. 37.
58. First Capital HG Asia, "Pakistan Telecommunication Corporation" (Hong Kong, January 1995), p. 9.
59. The urgent need for major restructuring has been emphasized by donor agencies

such as the World Bank and the Asian Development Bank. See S. A. Sathar, *Pakistan: Strategic Issues for the Eighth Plan Telecommunications* (Islamabad: GOP, 1991).

60. See *Privatization*, p. 2. Among the companies attending were AT&T (U.S.), C&W (U.K.), Ericsson (Sweden), Italtel (Italy), Telecom Australia, Wandel and Golderman (Germany), and Sumitomo, Marubeni, and C. Itoh (Japan).

61. For arguments in favor of privatization see W. W. Ambrose, *Privatizing Telecommunications Systems* (Washington, D.C.: World Bank, 1990), and G. Roth, *The Private Provisions of Public Services in Developing Countries* (New York: Oxford University Press, 1987), especially chap 5.

62. PTC documents, "Staff Strength Relative to Telephones" (n.d.) and "Principal Telecommunications Statistics" (1991).

63. For reports on this court action, see *The News*, April 1995.

64. Letter of M. H. Wiehen, Director, Country Department I, Europe Middle East and North Africa Region, to Secretary, Ministry of Communications, 17 July 1991.

65. For a further projection of the World Bank's approach to privatization, see S. A. Sathar, *Pakistan: Strategic Issues for the Eighth Plan Telecommunications* (Islamabad: GOP, 1991), pp. 8–10.

66. See *PTC Annual Report, 1991*. T&T's accounts were first audited by the auditor-general of Pakistan, whose audit focused on cash and compliance with government rules and regulations. The director of commercial audits, under the auditor-general, then audited T&T's commercial accounts.

67. For information on PTA, see Shahid Mahmud (paper presented at Conference on Telecommunications, CMER, November 1994), and "Pakistan Telecommunication Corporation" (London: Baring Securities), March 1995, pp. 22–25.

68. For information on FAB, see Mahmud, "Pakistan Telecommunication Corporation."

69. For information on NTC, see *ibid.*

70. See Nooruddin Baqai (paper presented on PTC privatization at Conference on Telecommunications, CMER, November 1994).

71. See "Pakistan Telecommunication Corporation," report by First Capital HG Asia (Hong Kong, January 1995).

72. *Ibid.*

73. See share market information in *The News*, March 1994–April 1995.

74. *The News*, September 1994–April 1995.

75. Pakistan Railways, "Railway Telecommunications Systems" (Lahore, n.d.). Also interviews with Farooq Aslam, Pakistan Railways Telecommunications Division, Lahore, August 1991, and M. Ataullah, Executive Engineer, Telecom 1, Pakistan Railways, Lahore, April 1995.

76. Interview with Ahmed Ibrahim, ex-General Manager, Telecommunications, Sui Northern Gas Pipelines Limited (SNGPL), Lahore, October 1991. See also SNGPL's *Annual Report* (Lahore 1994).

77. Interviews with Zafar Mahmud, Chief Engineer, M. Ayub, Assistant Director, and M. Nasir, Executive Engineer, Telecommunications Wing, Water and Power Development Authority, Lahore, October 1991 and April 1995.

78. Ansari, chap 8. See also S. Ansari, "Rural Communications" (paper presented at the Conference on Telecommunications, CMER, November 1994).

79. Intelcon Research and Consultancy Ltd., "Pakistan Telecommunications Corporation Rural Telecommunications Strategy Study" (Vancouver, Canada, 1991), 3 vols.