4

China

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Confucius noted, "The propagation of morals is a faster means of ruling than to have the post to send commands." Still, as befits a cradle of civilization, communication systems developed very early in China. During the Shang Dynasty (sixteenth to eleventh century B.C.) there were codes of drum beats to give alarms. In the Zhou (eleventh century to 771 B.C.) beacon fires and smoke signaling were used. As the state grew in size and complexity, organized communication systems developed to fulfill the requirements of the ruling class, as was the case in other ancient empires such as Persia and Rome.

Development of courier post systems depend on the relative power of the state and the prosperity of society. By Confucius' time in the sixth century B.C. a courier post was well known, quite speedy, and was used by the state to transmit commands and pass on orders. During the Han Dynasty (206 B.C. to 446 A.D.), courier service reached distant countries, including Persia. Indeed, the first Han emperor had once been a courier station chief.

The Tang Dynasty (618–907) was a period of power, culture, and prosperity when the courier service reached a high state of development. There was a well-organized system of 1,639 stations along land and water routes. Stations specifically built for the service handled official documents and farmlands were allocated for their upkeep. Couriers were exclusively engaged as carriers under a system requiring certification or credentials to transfer documents.

The Song (960–1279) further developed procedures for document transmittal by finding ways to eliminate delays at stations where couriers and horses were changed. Messengers would travel day and night, covering as much as 250 km in a day.

By the Ming (1368–1644) as a result of the development of commerce, civilian letter carriers emerged serving private citizens. The first such carriers appeared in the important seaport of Ningbo in Zhejiang province. Half the fee for carrying a letter was collected from the sender and the other half from the receiver. By 1840, several thousand unofficial postal bureaus had been set up to handle letters, parcels, and remittances to and from overseas Chinese. After 1840, a number of foreign countries operated postal services in China. These

were initially mostly British. However, by the early twentieth century the Japanese and Russians had the most offices. Their offices were primarily in Manchuria, and to a lesser extent in other parts of northern China.

Telegraph and telephone were successively introduced to China after the 1870s, with facilities largely provided by foreign countries for their own use. The first submarine cable was laid in 1871 by the Danish Great Northern Co. connecting Hong Kong to Shanghai. The first city telephone system was opened in Shanghai by the British in 1881. The system expanded for the next half century. By 1936 there were over 18,500 post and telecommunication (PT) offices (including branches), 193,000 urban telephone lines, and 180,000 km of long-distance telegraph and telephone lines.

4.1 Structure

Public telecommunications in China are a government monopoly, primarily under the Ministry of Posts and Telecommunications (MPT), which was established November 1, 1949. The minister is responsible to the premier of the State Council. Other ministries—including the railways, the petroleum industry, water resources and electric power, and public security—construct and operate telecommunications systems dedicated to their own use.

As an executive agency of the government, MPT directly controls the operations of all PT enterprises, exercising both administrative and managerial functions, including supervision of their production. It is responsible for development plans, technical standards, service policies and regulations, and tariffs. In addition, it researches international and domestic PT markets. In addition to administrative departments and special operations that are directly under MPT, the sector has a extremely complex hierarchial structure. MPT forms the first level.

The second level, directly controlled by the MPT, consists of thirty Post and Telecommunications Administrations (PTAs). These geographically coincide with the highest level of local government. PTAs function as the medium managerial level and play an important role overseeing operations in the twenty-one provinces, five autonomous regions, and four special municipalities (the metropolitan areas of Beijing, Shanghai, Guangzhou, and Tianjin are not in provinces).

At the third level, operations are separated into activities that are performed by about 2,500 enterprises. These enterprises include equipment production and research facilities. Also at the third level is the network of main offices where the public can conduct post and telecommunications business—buy stamps, place telephone calls, and so on. (Beijing is an exception to this, its Postal Bureau is directly under the MPT, skipping the PTA level, although there is still a PTA for Beijing to oversee the enterprises). These offices are generally in each prefectural capital—seats of the second level of local government administration. The branches and subbranches of prefectural offices could be considered fourth and fifth levels.

Local governments also have some say in PT activities within their borders.

Thus provincial administration (PPT) falls under the jurisdiction of the MPT and the provincial government. PT enterprises are also responsible to the city or county governments where they are located. Within this three-way control, the MPT can override the province, which can override the city or county. Under a 1990 reform local control was expanded by the state council to make county-level PT departments responsible for township and village telephones, with administration vested in the county government.

Education and training are important tasks of the MPT. In 1955, the first specialized institute, the Beijing University of Posts and Telecommunications, opened. Four such specialized institutes had been established by 1980. Course offerings are in telecommunications technology and PT economics and management. Most of the 40,000 graduates have been assigned to positions in the various PT departments. In addition to these highly specialized institutes, provincial MPT administrations also run vocational and technical schools.

4.2 Development Since 1949

By 1949 the telecommunications network had been ravaged by years of war. During 1950–1952 urgent attention was devoted to rehabilitation and resumption of services—annual investment for telecommunications was 3.5, 1.7, and 0.6 percent, respectively, of total state investment. The effort both restarted facilities and insured unimpeded communication between Beijing and all provincial capitals and important cities as well as afforded some additions and improvements to the network.

4.2.1 First Five-Year Plan (1953–1957)

China's first five-year plan was one of steady economic growth, and telecommunications expanded rapidly. Investment in telecommunications averaged 0.55 percent of total state investment annually. This was relatively less than it was during the rehabilitation years, but the actual amounts were much larger because total investments were greater.

During the plan, a national trunk network was completed with Beijing as the center. All the important industrial cities were linked by direct circuits to Beijing for telegraphic and telephone communication. Wire photo service was also provided between a number of big cities in 1955. The networks primarily were wireline; remote areas such as Xizang (Tibet) and Xinjiang were linked by radio. Long-distance telegraph and telephone facilities increased only a little because a great deal of refurbishing was carried out; much of the "make-do" equipment from the rehabilitation period was replaced by better quality facilities. Table 4.1 summarizes the period's main additions to facilities and equipment.

National telephone density was only 0.05 in 1949, and there were no rural telephones. In 1952, only 84 cooperative farms had telephones, but the number

Table 4.1. Telecommunication Capacity Growth During the First Five-Year Plan (1953–1957)

Capacity in 1957	Growth during Plan (%)	Facility
4,946	11	Telegraph circuits
4,684	24	Long-distance telephone circuits
647,000	64	Urban telephone exchange capacity (lines)
326,000	327	Rural telephone exchange capacity (lines)

Source: MPT *Statistical Yearbook*

Growth is over the entire five-year period of the plan.

increased to 16,412 cooperatives by 1956. As population increased from 540 million in 1949 to 650 million in 1957, telephone density rose to 0.13.

4.2.2 Comparative Sectoral Growth, 1953–1980

During the first five-year plan the development of telecommunications generally matched the growth of the national economy and the demand for service. Taking 1949 as a base, the growth rate of the PT industry approximated that of manufacturing and agriculture taken together, but lagged behind the rate for growth of manufacturing alone.

Between 1957 and 1970 telecommunications did not grow steadily because of various political and economic reasons, and the gap between service availability and demand grew larger. However, improvement of the telecommunications system was an important aspect of the fourth five-year plan (1971–1975). Expanding and upgrading the system was given high priority in the allocation of scarce resources. Wideband trunk lines—both cable and microwave—were added. International connection was made by coaxial cable to Hong Kong and satellite ground stations. The ground stations were originally set up in 1972 so that the visits of Richard Nixon and Kakuei Tanaka could be covered live.

Still, taking the city of Beijing as an example, in the thirty years 1949–1979, the capacity of the city's telephone exchanges grew only 3.6 times—while manufacturing production increased by a factor of 104, water supply by 46, and electric power by 32.

4.2.3 Achievements, 1980–1985

China recognizes telecommunications as an advance agent that must take precedence in economic development. Accordingly, during the 1980s it became a priority in China's construction efforts. To raise the capital needed for this, emphasis has been given to the principle that funds ought to be raised in a variety of ways and from a number of sources, including state authorities, individuals, and investment by collective or private institutions. Installation fees

for urban phones are allowed with the agreement of local government. Together with operating profits, these may be used for infrastructure investments.

State and local authorities furnish the necessary foreign exchange to support the importation of equipment and technology. Although basic tariffs are uniform nationally, local governments may permit PT enterprises to collect surcharges from users. For example, in addition to the unified rate users pay, there is a surcharge of 0.1 yuan per minute on trunk calls.

4.2.4 Enhancements During the 1980s

With ongoing adoption of advanced technologies, the capabilities of the national public telecommunication networks were significantly enhanced during the 1980s. Stored program controlled (SPC) exchanges were introduced in 1984 and by 1988 represented 25 percent of switch capacity. Fiberoptic cables, 960- and 600-channel microwave relay systems, and balanced and coaxial cables also became widely used. A domestic satellite network, first operational in 1986, links Beijing, Lhasa, Urumqi (in Xinjiang), Hohhot (Inner Mongolia), Guangzhou, and other cities. The number of long-distance telephone circuits doubled from 1980 to 1986 (to 44,000), and it exceeded 66,000 in 1988. Telegraph circuits have also increased. Table 4.2 provides additional data.

Since the sixth five-year (1980–1985) plan, a number of major construction projects have been completed to extend communication capacities and enhance the level of operation. These include the Beijing–Wuhan–Guangzhou 1,800-channel medium coaxial cable; a number of SPC exchanges in Beijing, provincial capitals, and coastal open cities; international gateway exchanges in Beijing and Shanghai; and the domestic satellite network.

A variety of means were used to raise funds for telecommunications development during the sixth five-year plan, as shown in Table 4.3. Enterprises have become less dependent on the state than was formerly the case. State funding accounted for only 31 percent, while capital raised by individual enterprises made up more than 50 percent of investment. This trend resulted from reforms

Table 4.2. Telephone Exchange Capacity and Telephone Density, 1980–1987*

		Urban Exchanges			Rural Exchanges
Year	Density	Lines	Automatic (%)	SPC (%)	Lines
1980	0.43	2.00	66	0	2.43
1983	0.49	2.62	75	0	2.54
1986	0.67	3.80	84	7	2.92
1987	0.75	4.64	87	19	3.09

Source: MPT *Statistical Yearbook*

*Million lines and percentages

During the 1980s about 95 percent of townships (*xiang*, the third level of local rural government) had telephone service.

Table 4.3. Investment Sources During the Sixth Five-Year Plan, 1981–1985*

31.05		Central government
4.52		Local governments
=	35.57	State investments
3.01		Localities
51.13		Enterprises
=	56.14	Individually raised
	2.87	Users
	3.69	Domestic loans
	0.29	Foreign capital
	1.44	Other

Source: MPT *Statistical Yearbook*
Shown in percentages.

to heighten the ability of enterprises to develop autonomously. Domestic loans and funds raised from users began to provide a small part of the total investment, also a new precedent. Foreign capital has remained negligible.

In 1985 investment equalled a whopping 56 percent of gross revenue generated by telecom services. In 1988 MPT said funds retained from operations allowed construction of only about 200,000 local lines a year. Private parties have received approval to set up switchboards with their own funds in order to improve rural communications. Some of these involve large numbers of people each contributing small amounts.

4.3 Networks

In many areas, particularly rural ones, the local network is not connected to the long-distance network. Instead, there are one or more phones at the town or county post office that are connected. The wait to use one is often hours. In 1988 MPT estimated about half of long-distance calls did not get through.

The long-distance telephone network is hierarchically structured, with up to four levels of manual and automatic transit centers depending on administrative districts and traffic conditions. Together with terminal exchanges connecting to subscribers these make up a five-level system. At present, the manual and automatic long-distance networks are used in combination, and the structures of these networks are identical. The four levels of transit centers for the network are described in detail later.

The highest level is interprovincial centers, the basic skeleton of the national network. These are the points where traffic between several provinces of a major region interconnect. There are six such centers—Beijing, Shanghai, Wuhan, Shenyang, Xi'an, and Chengdu. As the national capital, Beijing also has direct circuits to all the provincial capitals. Auxiliary centers are located in Tianjin, Nanjing, Lanzhou, and Chongqing. The network among them forms a mesh,

while lower level networks form star configurations. Direct circuits are also provided in accordance with the demand for service, traffic volume and economic reasons to form an integrated and unified network.

The second level, usually located in provincial capitals, handles transit connections for intraprovince communication. At the third level, intercounty centers connect circuits between the counties; they are generally in cities that are seats of a subprovincial region or prefecture. County *(xian)* centers are the fourth level; they connect circuits within a district and are generally located in the seats of county government. A call from one county center to a distant one may have to go through seven circuits.

4.3.1 Private Networks

Because of the special requirements of various departments and limited public network capacity, there are a number of private networks, including ones for railways, electric power transmission, oil production, military departments, and broadcasting and television.

Local private networks handle calls within a long-distance numbering area of the public network. These networks are usually simply structured, using analog exchange equipment and urban telephone cables for transmission, and usually follow star configurations, though some have more complicated configurations.

Long-distance private networks traverse a number of areas of the public network. There are currently scores of departments using or planning to establish such networks. These may be categorized according to their usage or requirements. Two- and three-tier star-shaped networks connect a ministry or national commission with large-scale industrial or mining enterprises. Networks of mixed configuration incorporate a mesh type network between centers of higher order and a star from centers to lower-order stations. There are also international private networks which connect to international public networks via marine communications or satellite systems.

Many private networks have adopted digital technology. Digital microwave, fiber optic cables, satellite circuits, and SPC exchanges are increasingly used for transmission and switching. As these networks are usually smaller than the public networks and their members are in a position to make substantial investments, digitalization will probably occur faster than it does in the public networks.

An example is China National Petroleum & Chemical Co. GTE Spacenet built a satellite-based, interactive voice, data, and fax network for it under a $10 million contract (announced in 1992, after the project was operating). By 1997 the network was expected to cover 2,000 sites.

4.4 Technological Developments

China is implementing most of the technological advances that have been made in telecommunications, albeit on a limited scale.

Most digital SPC switches are imported, and the variety of systems occasions frequent difficulties in maintenance (see Chapter 5 for more on foreign suppliers). During the sixth five-year plan the MPT's First Research Institute in Shanghai developed a prototype of a switching system, dubbed the DS 2000 SPC. The Shanghai Bell Telephone Company produces S-1240 SPC switches with imported technology, and JD 1024 long-distance SPC switches have been developed domestically.

Domestic satellite communications were introduced in 1977 using Intelsat and ground stations in Beijing and Shanghai. A domestically produced experimental satellite was launched in April 1984, and a fully operational telecommunications satellite followed in February 1986. These are part of a public network linking Lhasa, Urumqi, Hohhot, Shanghai, and Guangzhou, with Beijing as the center. The 1984 satellite also has extensive television and radio broadcasting capability. In 1990 installation plans were announced to increase the number of earth stations to fourteen, including one more each in Beijing and Shanghai to link with Intelsat. The petroleum sector has its own network and other government departments are planning them.

MPT's First Research Institute has done much work on satellite communications. In 1980 it formulated the overall plan and technical specifications for earth stations for a domestic system to use Intelsat transponders. In 1982 it conducted tests and trials for leasing Intelsat facilities over the Indian Ocean and completed the installation and implementation of earth stations in Xinjing Nei in Mongolia, Xizhang, and Guangdong in 1985 and 1986. The Institute and Xi'an Communication Equipment Factory are positioned to provide and implement a complete system of earth stations.

China paid early attention to optical communications. A number of institutes conduct research in fiberoptics, including the Wuhan Post and Telecommunications Research Institute, Beijing University of Posts and Telecommunications, Jiaotong University in Shanghai, 46th Institute of the Ministry of Electronics Industry, and the University of Science and Technology in Shanghai. Fiberoptic transmission was in use by late 1986. It is used mainly for junction cables for urban telephone service in major cities such as Beijing, Wuhan, and Shanghai, although long-haul fiberoptic cables, such as one between Nanjing, Wuhan, and Chongqing, are under construction.

4.4.1 Public Data Telecommunications

China provides public data services through telex and low-speed data networks, open data services carried by the telephone networks, and the public packet switched data communication network.

4.4.1.1 Telex and Low Speed Data

More than sixty cities are equipped with telex switches, and over twenty have concentrators. A three-level telex network system has been established using Beijing and Shanghai as international traffic gateways and the provincial capital cities as subcenters. Beijing, Shanghai, and Guangzhou have direct connections

with more than forty countries and regions. Provincial capitals are the centers of the domestic network.

Because mechanical electrical switching systems comprise a large part of the network, with resultant inherent poor transmission quality and low connection rates, some parts of China cannot even operate at 300 baud, although most of the system is capable of at least that and some routes have allowed 600 baud since the early 1980s.

A 300-baud network is being developed that will provide an effective means of communication for subscribers with light traffic and wide area communication needs. To develop domestic and international low-speed data and Chinese character telex services, advanced time division multiplexing (TDM) telegraphic equipment and the corresponding switching modules required for 300-baud service are being adopted to update the existing transmission network.

4.4.1.2 Open Data Service by Telephone Network

To meet subscriber demand for data transmission over the telephone network, MPT has worked out a "technical system of opening data services on the telephone network" that has been in use since January 1988. Since the late 1980s provincial capitals and medium coastal open cities have installed imported SPC switches. SPC systems for both international and domestic trunk services have been installed in Beijing, Shanghai, Guangzhou, and Tianjin; SPC for local telephone services account for almost half of the total access lines. These systems provide 2,400-baud data transmissions—and 9,600 for G3 facsimile services.

4.4.1.3 Public Packet Switching Data Communication Network

The packet switched network (CNPAC) consists of primary node switches in Beijing, Shanghai, and Guangzhou, and eight concentrators. The dual-system network management center is located in Beijing. Outgoing and incoming gateways are also located in Beijing, interconnecting with public packet switched networks around the world.

The system was put into operation in 1988 as a trial functioning network. Both the primary node equipment and concentrators are SESA DPS25s and use such CCITT (In English): (The International Telegraph and Telephone Consultive Committee) protocols as X.25, X.75, X.3, X.28, and X.29. The system also executes IBM's SNA/SDLC protocol and connects with an IBM mainframe. There are almost 500 ports, linked to the mainframe either via private line or through the public and telex networks. The system provides switched and permanent virtual circuits with some added services such as closed user group, reverse charge, and call transfer, as well as videotex. The public packet switched network can provide ports for various data bank connections, enabling information suppliers to serve their designated or public subscribers.

4.4.2 Mobile Communications

MPT has issued technical specifications for land-based mobile telephone networks and for public paging services. Depending on the particular area and

network interface, a mobile telephone network must adopt TACS using 900 MHz (mainly in metropolitan areas such as Beijing, Tianjin, Shanghai, and Guangzhou) or NMT-450 using 450 MHz (used mainly for remote interior regions). Paging systems must conform to CCITT No. 1 code (POCSAG Code) and special service station modes with a frequency of 150 MHz.

Mobile communication services became available in Guangzhou, Shanghai, and Qinhuangdao in the late 1980s, and in 1990 in Beijing. Systems are under construction in Chongqing, Shenzhen, and Zhuhai. Other cities, including Tianjin and Dalian, are also making preparations. Furthermore, there are some private systems, such as the network set up by Liaohe Oil Field and the Beijing Tourism Administration, but they are prohibited from offering their services to the public. Some estimates put cellular subscribers in 1991 at 39,100.

There are still many private networks using other systems, including a dozen in Beijing, ranging from simple walkie-talkie and single-frequency radio-band telephone dispatching systems to automatic frequency selection systems with several high-frequency channels. Paging was introduced in 1984, and was available in forty-one cities at the end of 1987; there were 30,897 subscribers. The service operates twenty-four hours a day.

4.5 Equipment Manufacturing

Manufacturing telecom equipment falls mainly under MPT and the Ministry for Machine Building and Electronics Industry (MMBEI). The capacity of the plants under MMBEI is greater than that of plants under MPT. In 1980 there were twenty-nine such industrial enterprises directly under the ministry. The factories are capable of producing a wide range of items, including cable, microwave systems, telephone exchanges, and satellite communication equipment. In 1988 the factories employed about 40,000 and production amounted to 340 million yuan (about U.S.$91 million). Among the main types of equipment produced that year were:

47	Telephone systems (12-channel)
430	Telephone systems (60-channel)
3,512	Teletype machines
170	Facsimile machines
561	Shortwave radios
511	Microwave radios
244,900	lines of urban telephone exchanges
147,400	Telephone sets
11,343	km of communication cable

In addition to industrial plants directly under MPT, provincial administrations also run equipment factories. There were 120 such factories in 1980 with annual production valued at about 200 million yuan. They have been an important factor in the development of PT services and provide the basic facilities needed.

To increase development of equipment manufacturing, a number of production systems have been imported from abroad for MPT factories. These include production lines from Italy for making PCM (pulse code modulation) equipment at Factory 515 in Chongqing, from the United States for making plastic sheathed telephone cables at Factory 514 in Chendu, from Japan for making multifunction telephone sets at Factory 512 in Tianjin, from France for making telex equipment at Factory 524 in Guangzhou, from NV Philips for making PCM equipment by Factory 519 in Shanghai, and from Japan for making 140 Mbps digital microwave systems at Factory 506 in Beijing, as well as equipment for making SPC exchanges (Shanghai Bell and a joint-venture company with Belgium).

4.6 Urban Services

There are two categories of urban telephone service subscriber: those with telephones installed in their private residences and all others, such as business subscribers. There are three methods of billing: a flat monthly rental, a simple message rate, and a complex message rate system.

Under the first system, subscribers are charged a fixed monthly fee according to their service-fee class and subscriber category. For example, a category *A* subscriber in an area served by exchanges with more than 10,000 lines is charged 12 yuan; a category B subscriber in the same area pays 20.

According to the simple message rate system, subscribers are charged a fixed monthly rental according to their service-fee class and subscriber category in the same manner as the monthly rental system, with allowances for a certain number of free calls. If the number of calls made does not exceed the free allowance, only the monthly rental is charged. For example, the monthly rental for a *B* category subscriber in an area served by exchanges with over 10,000 lines is 16 yuan, with an allowance of 100 free calls. Each additional call is 0.04 yuan.

Under the complex message rate system, charges are based on the duration and distance of calls. The time unit for calls made to subscribers in the immediate urban area is three minutes. Calls made to subscribers outside the area are charged in the same way as long-distance calls. No free calls are allowed but the monthly rental fee is lower.

Letter service using fax machines at post offices is available between Beijing, Shanghai, Guangzhou, Shenzhen, and Zhuhai, and with Hong Kong, Macao, Japan, the United States, Canada, Germany, and Singapore. The service is expected to be expanded to more cities.

4.6.1 Services Rates

There are four categories for domestic rate setting—long-distance telephone, telegrams, leased circuits, and rental or maintenance fees for leased equipment—and an international category. The rates given in this section were in

effect in 1988 unless noted otherwise; the official exchange rate for 1 yuan was U.S.$0.27.

Domestic long-distance charges vary with distance and time of day. There are twelve levels of per minute charge, the highest being 1.2 yuan for calls over 2,000 km. A call between Shanghai and Guangzhou is 1 yuan; it is 1.1 yuan between Guangzhou and Beijing. The minimum billing time for operator-connected or semiautomatic calls is three minutes, with additional time charged at the regular per minute rate. Automatic calls are charged in minute increments. Peak-rate hours are 7 A.M. to 9 P.M. except holidays and Sundays. The off-peak rate is half the peak rate.

Domestic telegrams are charged by the word and purpose. Regular rates range from 0.02 to 0.07 yuan per word; express or urgent telegrams are charged double.

The network access fee for 50-baud telex is 60 yuan per month; it is 100 yuan for 300-baud data. The call charge for 50-baud telex between domestic cities is 1 yuan per minute; it is 1.5 yuan for 300-baud data.

Telex rates in Beijing have come down significantly since early 1989, as has the time it takes for a connection. The wait was two years and installation was 30,000 yuan (including the machine) in early 1989. By the fall of 1990 the wait was two months and installation was under 6,000 yuan. However, per minute transmission rates to Hong Kong and New York increased—from 8 to 10 yuan and from 14.4 to 18, respectively. On the other hand, Tokyo rates dropped from 14.4 to 10.1. (At the 4.72 yuan/U.S.$ rate in 1990, these rates are high—$2.12 to Hong Kong, $3.05 to Tokyo, and $3.81 to New York.)

4.7 International Cooperation

China's international relations have progressed rapidly since implementation of its open door policy. In 1972 the Universal Postal Union and the International Telecommunications Union (ITU) accepted China. The ITU elected China a member of its Administrative Council. China joined Intelsat in August 1977. The country has participated in the activities of PT organizations in the Asian-Pacific Region.

International communication has increased phenomenally since implementation of reforms and the open door policy. In February 1985 Fuzhou started international direct dialing (IDD) service with Japan and the United States. In 1986, SPC exchange facilities for IDD were put into service in Beijing and Shanghai. In 1990 a third international gateway was opened in Guandong province feeding into facilities in Hong Kong. By the end of 1987, there were about 50,000 subscribers for IDD service in more than twenty cities, with access to fifty-one countries and regions. Foreign countries may direct dial subscribers in 310 cities. A 7,560-circuit cable linking Shanghai to Japan, to be built by KDD and AT&T, was announced in mid-1990. Completion is scheduled for 1993.

With regard to data retrieval, China is able to access information sources in

the United States, Germany, the United Kingdom, France, and Luxembourg via Rome, and to Switzerland via Vienna. The service is available in Beijing, Shanghai, and Guangzhou. China is indeed working to be in touch with the rest of the world.

4.8 Conclusion

The growth rate of telephone density since 1980 has generally been slower, indeed, increasingly so, than the growth rate of GNP per capita. The number of telephone sets per million yuan of GNP has decreased, too. Still, telecommunications in China has developed since 1980 both in overall capacity and in operational efficiency. Both developments were required to meet the rising demand for services brought by China's opening and reforms. Of course, compared to most countries the level of development of telecommunications and density are still very low. China is the most populous country in the world; raising density one percentage point means the addition of 10 million phone lines, and total population continues to grow.

Two vignettes show how telecommunications is affecting China. As result of the spread of telephone access, telephone numbers now appear on product packaging. Before the mid-1980s even if the manufacturer had a telephone, it would have been at best difficult to call. In the late 1980s, in a mixture of an old custom with modern technology, a telephone had become the bride price in some areas of Fujian.

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