China

"Beijing-Shenyang-Harbin Telecom Systems Project (1) (2)"

Project Summary

Borrower:	Foreign Trade and Economic Cooperation Department, People's Republic of China	
Executing Agency:	Ministry of Information Technology and Telecom Industries, People's Republic of China (Posts and Telecommunications Department at the time of L/A signing)	
Exchange of Notes:	(1) October 1992,	(2) August 1993
Date of Loan Agreement:	(1) October 1992,	(2) August 1993
Final Disbursement Date:	(1) November 1997,	(2) September 1998
Loan Amount:	(1) ¥3,145 million,	(2) ¥4,055 million
Loan Amount Disbursed:	(1) ¥2,778 million,	(2) ¥3,258 million
Procurement Conditions:	General Untied	
Loan Conditions:	Interest rate: 2.6%, Repayment period: 30 years (10 years for grace period)	

《Reference》

(1) Currency: Yuan

(2) Exchange Rate: IFS average market rate

Year		1990	1991	1992	1993	1994	1995	1996	1997	1998
Rate	Local currency/US$	5.2	5.4	5.8	5.8	8.4	8.3	8.3	8.3	8.3
	¥/US$	144.8	134.7	126.7	111.2	102.2	94.1	108.8	121.0	130.9
	¥/Local currency	27.85	24.94	21.84	19.17	12.17	11.34	13.11	14.58	15.77
CPI(1990=100)		100.0	103.5	110.0	126.1	156.6	183.1	198.3	203.8	202.2

(3) Rate at the time of appraisal: 1 Yuan = ¥20.9

(4) Fiscal Year: January ~ December

(5) Units:

① Mbit/s (Mb/s): A unit of transmission speed for a digital signal (megabits per second).
② Ggbit/s (Gb/s): A unit of transmission speed for a digital signal (gigabits per second).

(6) Terminology:

① Optical fiber cable: Communications cables made of glass fiber or plastic of high purity. Signal deterioration is low, even over long distances, the frequency band is broad and the signals are less susceptible to noise from external sources.

② Telephone density: Number of subscriber lines per 100 inhabitants.

③ Subscriber lines: The lines that link subscribers' homes to exchanges.

④ Unmet demand: Number of applicants waiting for telephone installation (waiting applicants).

⑤ Ratio of unmet demand: Unmet demand/subscriber lines

⑥ Switching capacity: Number of subscriber lines able to be connected to switching system

⑦ Call completion rate: The probability of completing a call successfully.

⑧ Overflow rate: Number of times a call could not be placed/ Number of attempts to place a call.

⑨ SDH: Synchronous Digital Hierarchy. Compared to the older PDH (Peripheral Digital Hierarchy) system, SDH can deal flexibly with signals at conventional speeds and the various types of high-speed service signals. It is an international standard for transmission facilities.

1. Project Summary and Comparison of Original Plan and Actual Result

1.1 Project Location

1.2 Project Summary and ODA Loan Portion

The communications field in China has been growing extremely rapidly since the 1970s, but the country's large land area and the pressure of its 1.1 billion population make it difficult to keep pace with demand. The diffusion of telephones nationwide was around one per 100 people in 1989 (a diffusion rate of 0.98%), but even the target of 2.8 telephones per hundred people set for 2000 is far short of the worldwide average of 9.9/100 reached in 1977.

The Northeast of China, which was targeted by this project, has recently been achieving rapid economic growth, which is boosting the demand for communications. The growth rate in long-distance calls in 1989~1991 was 30% per year in Beijing and Tianjin and 20% in Shenyang, Changchun and Harbin, raising concern over shortages of long-distance switching system capacity and transmission equipment.

This project is designed to increase long-distance switching system capacity and improve the long-distance transmission network with an aim of addressing the growing demand for long-distance communications in northeastern China.

The JBIC loan covers the entire foreign currency portion of optical fiber transmission facilities, long-distance switching system and technical training.

1.3 Background

1.3.1 National Policy for Economic Development

Since the openness policy was adopted at the Third Plenary Session of the 11th Chinese Communist Central Committee in December 1978, a succession of special economic zones, open economic zones and free coastal zones have been designated along China's Eastern Seaboard, and they have been expanding rapidly as centers for international trade.

In the name of balanced economic growth under such circumstances, the Seventh Five-Year Plan (1986~1990) proposed a regional economic development policy which emphasized close linkage between the progress of the Eastern Seaboard and the development of inland regions.

The Eighth Five Year-Plan (1991~1995) followed on from the Seventh Five-Year Plan in advocating harmony between coastal and inland development. It listed the improvement of the communications network alongside agriculture, energy and transport as priority sectors for development.

1.3.2 Telecommunications Sector Under the Eighth Five-Year Plan

The Eighth Five-Year Plan set a target of 17% annual growth in domestic telecommunications over the five years from 1991 to 1995. The Plan called for the addition of 15 million connections to long-distance switching system capacity (10 million local switching system, 4 million PBX, 1 million rural telephones) and a total of 23.8 million telephones to raise the 1995

telephone diffusion rates to a national average of 1.8~2.0% (double the 1991 level), with at least 10% in provincial capitals and 15% in the four big cities of Beijing, Tianjin, Shanghai and Guangzhou.

For long-distance telephone services, the Plan called for a net increase of 400,000 connections in long-distance switching system, the addition of 150,000 long-distance lines and the construction of a high-capacity digital data communications network, mainly using optical fiber cables.

This extensive network was to center on Beijing and link it with over 20 provinces and coastal zones in the six major regions of Dongbei, Huabei, Huadong, Huanan, Xibei and Xinan, with a total length of 25,000km. The main planned optical fiber connections were as follows:

(1) Nanjing ~ Shanghai ~ Fujian ~ Guangdong.....2,800km
(2) Beijing ~ Tianjin ~ Nanjing.....1,300km
(3) Beijing ~ Wuhan ~ Guangzhou.....2,900km
(4) Beijing ~ Shenyang ~ Harbin .....4,700km (this Project)
(5) Zhengzhou ~ Xian ~ Chengdu.....1,500km
(6) Beijing ~ Taiyuan ~ Huhehaote.....1,700km

In addition, twelve earth stations using mainly Intelsat transponders were to be built for satellite communications, to expand on the 20 existing large and medium earth stations, to build an automatic nationwide long-distance telephone network linking all cities and metropolitan areas in the Eastern and Central areas of China, and some prefectural and rural areas on the coast.

1.3.3. Positioning of the Northeastern Region

The region targeted by this project includes the cities of Beijing and Tianjin and the provinces of Hebei, Liaoning, Jilin and Heilongjiang. It contains 17.8% of the national population on 22.7% of the land area, and has been developing rapidly in recent years. The main target area consists of the three provinces of the Northeast (Liaoning, Jilin and Heilongjiang), which contains four cities arranged on a straight North-South line at intervals of around 400km. The southernmost is Dalian, followed by Shenyang, Changchun and Harbin, each with a population of around 2 million. The economic relationships between these major cities and provincial capitals are strengthening every year. Dalian is home to around 250 foreign companies, Shenyang is a zone of heavy mechanical industries, Heilongjiang is a ricebowl and oil field, and Jilin province contains Duman Gang, which is another ricebowl and is eyed as a future gateway to the Sea of Japan. If the distinct characteristics of these cities can be used well and the linkages between them can be built up, the Northeastern region has great potential for further progress.

To strengthen these linkages within the region, a better communications network is urgently needed in addition to improved road and air links.

1.3.4 History

1989	February	Preparation of F/S for this project of Overseas Communications/ Broadcasting Consulting Cooperation (JTEC)
End of 1989		Approval of F/S by Posts and Telecommunications Department, People's Republic of China
1991		National Planning Committee approved F/S prepared by Posts and Telecommunications Department
1992	January	Official request of FY1992 ODA loan made by Chinese side
	March	Deliberation on a government basis
	Apr. ~ May	JBIC appraisal mission
	June	FY1992 Prior Notification
	October	E/N conclusion for FY1992 ODA loan L/A signing for 1992 ODA loan
	November	Official request of FY1993 ODA loan made by Chinese side
1993	February	Deliberation on a government basis
	Mar. ~ Apr.	JBIC appraisal mission
	June	FY1993 Prior Notification
	August	E/N conclusion for FY1993 ODA loan L/A signing for FY1993 ODA loan
1995	December	Completion of the project

1.4 Comparison of Original Plan and Actual

1.4.1 Project Scope

(1) Construction of optical fiber transmission facilities

Facilities	Section	Plan	Actual	Difference
Main lines	Beijing～Tianjin～Qinhuang Dao～Shenyang～Changchun～Harbin	1,654km	Same as planned	No difference
	Beijing～Chengde～Fuxin～Baichang～Qiqihar	1,622km	Same as planned	No difference
	Shenyang～Dalian	479km	Same as planned	No difference

Feeder lines	Shenyang～Fuxin	212km	Same as planned	No difference
	Harbin～Qiqihar	362km	Same as planned	No difference
	Changchun～Baichang	380km	Same as planned	No difference
Optical fiber trans-mission equipment	Beijing～Tianjin	(7＋1)×140Mb/s	(9＋1)×140Mb/s 4×2.5Gb/s	2×140Mb/s 4×2.5Gb/s
	Tianjin～Shenyang	(5＋1)×140Mb/s	7×140Mb/s 3×2.5Gb/s	1×140Mb/s 3×2.5Gb/s
	Shenyang～Changchun	(4＋1)×140Mb/s	(6＋1)×140Mb/s 2×2.5Gb/s	2×140Mb/s 2×2.5Gb/s
	Changchun～Harbin	(3＋1)×140Mb/s	(4＋1)×140Mb/s 2×2.5Gb/s	1×140Mb/s 2×2.5Gb/s
	Beijing～Chengde	(3＋1)×140Mb/s	(5＋1)×140Mb/s 1×2.5Gb/s	2×140Mb/s 1×2.5Gb/s
	Chengde～Fuxin	(3＋1)×140Mb/s	5×140Mb/s 1×2.5Gb/s	1×140Mb/s 1×2.5Gb/s
	Fuxin～Qiqihar	(2＋0)×140Mb/s	(2＋1)×140Mb/s 1×2.5Gb/s	1×140Mb/s 1×2.5Gb/s
	Shenyang～Dalian	(2＋1)×140Mb/s	(3＋1)×140Mb/s 2×2.5Gb/s	1×140Mb/s 2×2.5Gb/s
	Yinkou～Dashiqiao	(2＋0)×140Mb/s	(2＋1)×140Mb/s	1×140Mb/s
	Shenyang～Fuxin	(3＋1)×140Mb/s	(5＋1)×140Mb/s 1×2.5Gb/s	2×140Mb/s 1×2.5Gb/s
	Changchun～Baichang	(2＋0)×140Mb/s	(2＋1)×140Mb/s 1×2.5Gb/s	1×140Mb/s 1×2.5Gb/s
	Harbin～Qiqihar	(2＋0)×140Mb/s	(2＋1)×140Mb/s 1×2.5Gb/s	1×140Mb/s 1×2.5Gb/s

* The figures in the parentheses show “Current system number” + “Reserved system number”.

(2) Installation of long-distance switching system

Facilities	Section	Plan	Actual	Difference
	Tangshan	1,500 lines	1,500 lines	No difference (*)
	Dalian	2,900 lines	2,900 lines	No difference
	Siping	500 lines	500 lines	No difference
	Baichang	300 lines	300 lines	No difference
	Tongliao	300 lines	300 lines	No difference
	Qiqihar	500 lines	500 lines	No difference (*)

* The Tangshan and Qiqihar portions of the project were carried out by the Chinese side using its own funds.

(3) Technical training

Plan: Study groups were to be dispatched three times, as described below.

(a) Technology for laying optical fibers in frigid regions

Destination: Canada
Group size: 8
Period: Two weeks (fourth quarter of 1992)
Objective: To gain skills and expertise in the laying of optical fiber cables in a region as cold as Northeastern China.

(b) Cross connection equipment

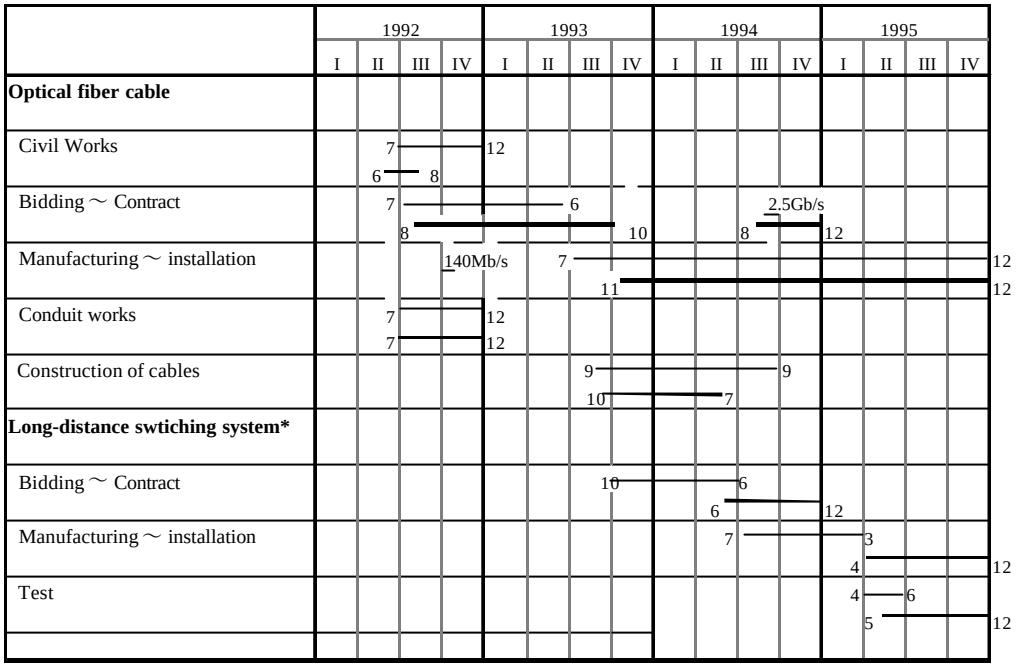
Destination: Japan
Group size: 8
Period: Two weeks (second quarter of 1993)
Objective: To study the concepts behind the design and operation of cross connection equipment.

(c) Telecommunication Management Network (TMN)

Destination: USA
Group size: 8
Period: Two weeks (third quarter of 1993)
Objective: To study TMN and network monitoring tasks.

Results: The training in Canada (a) was conducted by the executing agency using other funds. (b) and (c) were abandoned.

1.4.2 Implementation Schedule



original
actual

* Excluding Tangshan and Qiqihar.

1.4.3 Project Cost

	Plan (at the time of appraisal)			Actual			Difference		
Item	Foreign currency (¥1 million)	Local currency (Million Yuan)	Total (¥1 million)	Foreign currency (¥1 million)	Local currency (Million Yuan)	Total (¥1 million)	Foreign currency (¥1 million)	Local currency (Million Yuan)	Total (¥1 million)
Optical cable	3,065	285.89	9,040	2,637	285.12	7,236	-428	-0.77	-1,804
Optical transmission equipment	3,278	67.24	4,683	3,082	64.74	4,126	-196	-2.50	-557
Long-distance switching system	480	48.23	1,488	313	27.15	750	-167	-21.08	-738
Technical training cost	30	0.24	35	0	0	0	-30	-0.24	-35
Land acquisition cost	-	18.23	381	-	18.12	292	0	-0.11	-89
Price escalation	-	15.53	325	-	-	0	0	-15.53	-325
Total	6,853	435.36	15,952	6,032	395.13	12,404	-821	-40.23	-3,548
Material contingency	347	36.53	1,110	0	0	0	-347	-36.53	-1,110
Grand total	7,200	471.89	17,062	6,032	395.13	12,404	-1,168	-76.76	-4,658

[Exchange Rate] Plan (at the time of appraisal): 1 Yuan = ¥20.9
Actual (Average for 1992-1995): 1 Yuan = ¥16.1

2. Analysis and Evaluation

2.1 Evaluation on Project Implementation

2.1.1 Project Scope

(1) Optical fiber transmission facilities

① Main lines
Executed as originally planned.

② Feeder lines
Executed as originally planned.

③ Transmission equipment
Sixteen PDH systems with 140Mb/s capacity were added. Furthermore, 19 SDH systems with 2.5Gb/s and 8 metering equipment sets for 2.5Gb/s systems were added (JBIC approved). These additions were made to meet unexpectedly rapid growth in demand for communications transmission and they brought a remarkable improvement in the communications situation in the Northeast, reducing the overflow rate from 60% in 1993 to 10% in 1994.

(2) Long-distance switching system

The long-distance switching systems were built as planned in Dalian, Siping, Baichang and Tongliao, using the loaned funds. The Tangshan and Qiqihar switching systems were built by the Chinese side using its own funds due to the extreme urgency of the situation, but the overall content of the project was still as planned. In the four years between the preparation of the feasibility study (F/S) in 1989 and the project request made in 1992, economic growth was very rapid and the urgency of switching system for long-distance calls increased. However, even when the second appraisal for this project was made in March and April 1993 the Chinese side made no statements on the earlier implementation of the construction in Tangshan and Qiqihar.

(3) Technical training

The plan called for study teams to be dispatched three times using the loaned funds. In fact, the first round of training was carried out by the executing agency using other funds, but the second and third rounds were not. This change was made because the engineering staff on the Chinese side had built up their experience on other projects, and because when the communications equipment is installed, the manufacturers always provide technical instruction and training. As a result, the training was not required.

2.1.2 Implementation Schedule

(1) Optical fiber transmission facilities

As noted above, the project was completed within the planned implementation schedule despite the expanded scope. This was achieved through the proper management of the construction process by the executing agency.

(2) Long-distance switching system

Although there was some delay, the installation was completed largely as planned. However, as noted earlier, the Tangshan and Qiqihar switching systems were built earlier using funds provided by the Chinese side, and they were completed earlier than the switching systems in the other four cities.

2.1.3 Project Cost

(1) Total project cost

The actual project cost was ¥12,404 million, a cost underrun of approximately 22% relative to the initially planned ¥15,952 million (excluding contingency). The underrun was 12% in the foreign currency portion and 9% in the local currency (excluding contingency in each case).

(2) Foreign currency portion (the subject of the JBIC loan)

The actual foreign currency portion was ¥6,032 million, a cost underrun of approximately 12% compared to the initially planned ¥6,853 million (excluding contingency). This occurred because technological advances sharply reduced the cost of equipment and materials in the communications field, which meant that the optical fiber transmission equipment could be bought much more cheaply. There was no great reduction in the purchase price of each long-distance switching system, but those for Tangshan and Qiqihar were built by the Chinese instead, with alternative funds. The cost of those two exchanges is not included in the foreign currency portion of the project cost.

(3) Local currency portion (paid by China)

The actual local currency portion was 395.13 million Yuan, compared to a planned 435.36 million Yuan. The costs of the Tangshan and Qiqihar switching systems, which were built with funding from the Chinese side, was thereby transferred to the local currency portion, but there was still a cost underrun of around 9%. The cost fell because the installation of the long-distance switching system was much cheaper than initially anticipated.

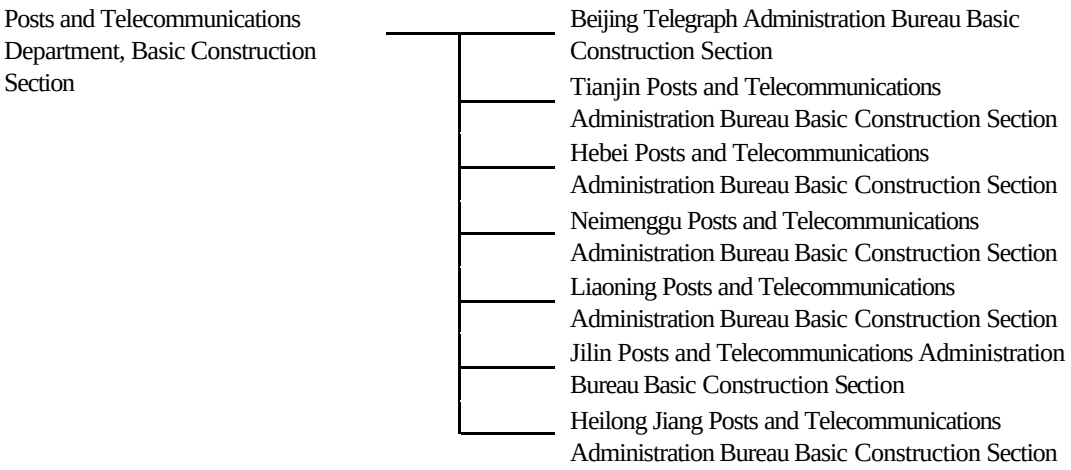
2.1.4 Implementation Scheme

(1) Executing agency

The executing agency for this project was the Posts and Telecommunications Department*. As Figure 1 shows, the project implementation scheme was managed by the Department's Basic Construction Section and constructed by the basic construction office of each regional authority.

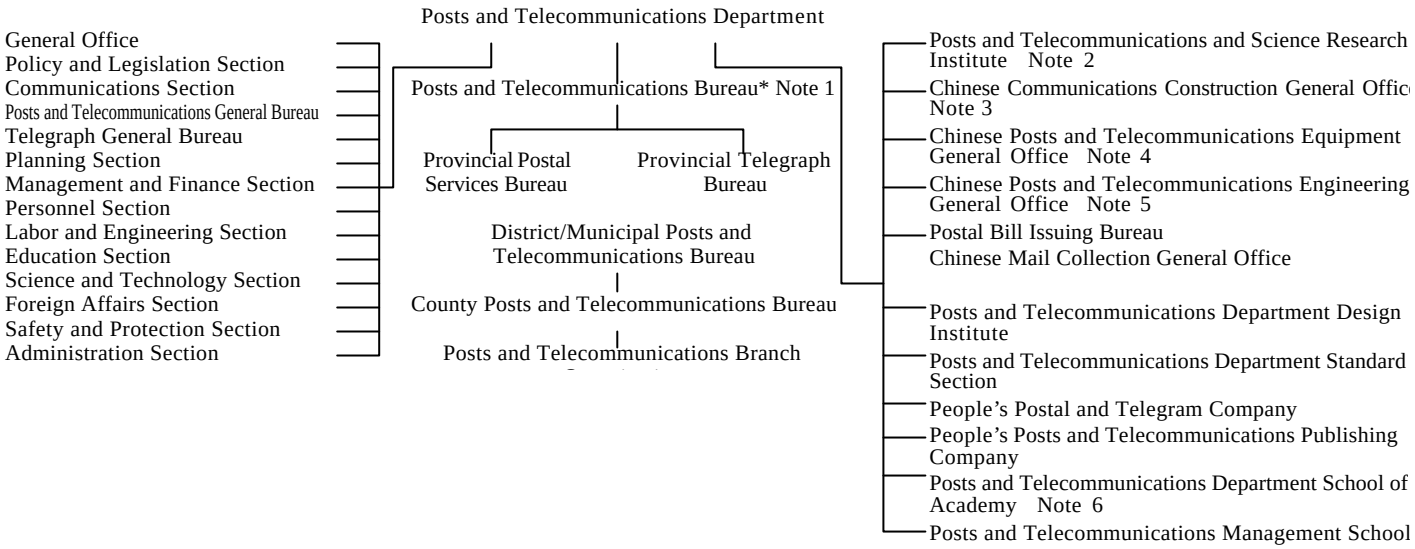
The Posts and Telecommunications Department executed this project, including its additions, without delays. Therefore, their implementation capability was deemed to the favorable. However, there were some procedural problems as they cancelled the dispatch of study teams and switched the Tangshan and Qiqihar switching systems to their own funding without notifying JBIC.

Figure 1 Implementation Scheme



* As an element in structural government reforms, Posts and Telecommunications Department, Electronic Industry Department, Radio, Film and Tele vision Department, Wireless Management Committee, Department of Information Promotion, Military Engineering and other official bodies associated with data communications were merged to form Ministry of Information Technology and Telecom Industries. Figure 2 shows the organization of the Posts and Telecommunications Department at the time of L/A signing, while Figure 3 shows the current organization of Ministry of Information Technology and Telecom Industries. The work of the Basic Construction Section of Posts and Telecommunications Department has been taken over by General Planning Section of Ministry of Information Technology and Telecom Industries.

Figure 2 Organization Chart of Posts and Telecommunications Department, China



Note 1 : Telegraph Administration Bureau and Postal Administration Bureau are divided in Beijing only.

Note 2 : Posts and Telecommunications Scientific Institute

Beijing Posts and Telecommunications Scientific Institute

1) No.1 Research Laboratory (Shanghai) : Satellite communications, switching system, telephone equipment etc.
2) No.3 Research Laboratory (Shanghai) : Postal automatic distributing equipment etc.
3) No.4 Research Laboratory (Xian): Microwave, satellite communications
4) No.5 Research Laboratory (Chengdu): Cables, optical fiber, carrier data communications
5) No.7 Research Laboratory (Houma) : Facsimile, telegram
6) No.10 Research Laboratory (Xian): Long-distance switching system, telegram relay
7) Telegraph Transmission Research Laboratory (Beijing): Structure and standards of communications network
8) Data Communications Research Laboratory (Beijing): Data communications
9) Paragon Research Laboratory (Beijing): Communications measuring equipment, net automatic monitoring
10) Postal and Scientific Research Laboratory (Beijing): Automation of handling postal matter
11) Semiconductor Research Laboratory(Beijing): Semiconductor for communications use
12) Science and Technology Information Research Laboratory(Beijing): Communications , science and technology information
13) Communications Measurement Center (Beijing): Measuring standards of gauges
14) Economics and Technology Development Center (Beijing): Technology, economy and management in the posts and telecommunications

Wuhan Posts and Telecommunications Scientific Research Institute

1) Laser Communications Research Laboratory (Wuhan): Laser communications facilities primarily with optical communication
2) Solid Parts Research Laboratory (Wuhan): Laser communication parts primarily with luminous tube

Note 3: Chinese Communications Construction General Office

A communications construction company directly attached to Posts and Telecommunications Department. It works in the communications construction business overseas as well as in China.

The main company has Design Office, Construction Technology Research Center, Foreign Department, Construction Department, Technical Development Department, Economic Development Department and Training Department, as well as six directly-managed construction companies.

1) No.1 Processing Office (Baoding)
2) No.2 Processing Office (Xian)
3) No.3 Processing Office (Wuhan)
4) No.4 Processing Office (Zhengzhou)
5) Beijing Electronic Processing Office (Beijing)
6) Guanlu Construction Processing Office (Beijing)

Note 4 China Telegraph and Telecommunications Equipment Corporation

This corporation acts as a purchasing agent for the Projects Division, handling tenders and other matters related to the purchase of equipment and materials for the use of Posts and Telecommunications Department. This corporation covers a wide range of items including switching, transmitting, wireless, digital communications and facilities for mail deliveries.

In addition to the overall corporation, there are branch corporations in ten cities, Beijing, Huabei, Huadong, Zhongnan, Xinan, Xibei, Dongbei, Harbin, Chongqing and Shenzhen.

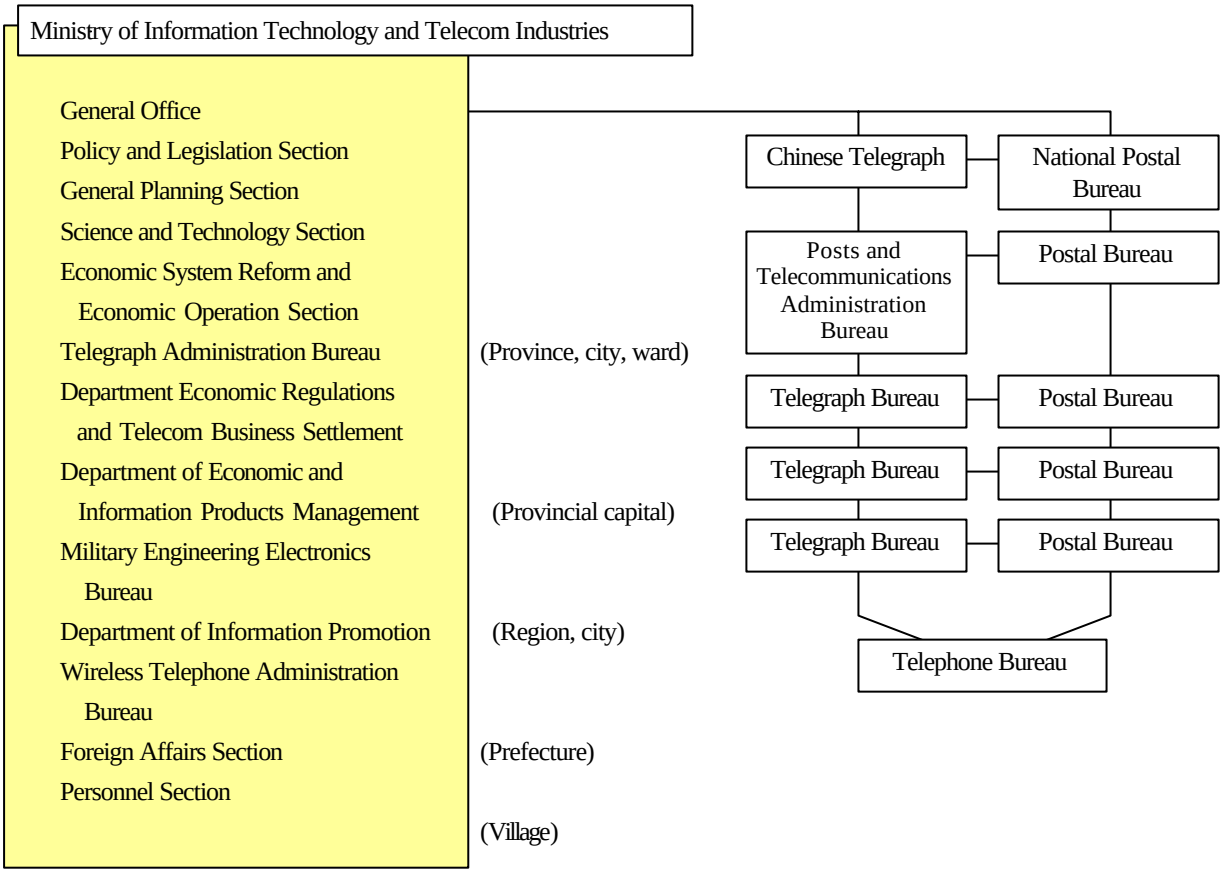
Note 5 China Posts and Telecommunications Engineering Corporation

This corporation is the largest industrial group in China supplying a variety of communications equipment. It has 27 directly-managed factories. Its main product types are cables, crossbar switching system, telephones, fax machines, conveyor equipment, satellite communications equipment, optical cables, optical devices, metering devices, and all other types of equipment needed for communications. It also produces a wide range of vehicles and scooters for mail deliveries and machinery for sorting and handling mail.

Note 6 Posts and Telecommunications Department School of Academy

This university, which trains the engineers and managers needed by Posts and Telecommunications Department, has six campuses nationwide. Posts and Telecommunications Administration Bureau in Beijing, Nanjing, Changchun, Chongqing, Xian, Shijiazhuang and other regions of the country each have intermediate technical colleges. Posts and Telecommunications Department also has hospitals and other clinics in other locations, but their doctors, nurses and pharmacists are trained at Beijing Telecommunications School of Medicine and Hygiene.

Figure 3 Organization Chart of Current Ministry of Information Technology and Telecom Industries



(2) Consultants

No consultants were used in this project (there was never any plan to employ any). The project was executed without delays under the monitoring of the executing agency, and no significant problems occurred.

(3) Contractors

The optical fiber transmission equipment was procured by international competitive bidding. The order for the 140Mb/s systems went to a Japanese company and that for a 2.5Gb/s system went to a German company.

The long-distance switching systems were procured by the established supplier contracted directly. As noted above, the long-distance switching systems for Tangshan and Qiqihar were built with the executing agency's own funds.

- Tangshan: A Japanese company.
- Dalian: A Swedish company.

- Siping, Baichang, Liaoning, Qiqihar: A Hong Kong company

The equipment was delivered and installed with no delays, and technical guidance and training were provided when the equipment was delivered. The performance of the contractors was high.

2.2 Evaluation on Operations and Maintenance

2.2.1 Operations and Maintenance Scheme

(1) Organizational structure

The operations and maintenance of this project was initially supposed to be handled by Telecommunications Regulatory Bureau Telegraph Section of each regional and local authority under the General Telecommunications Office of Posts and Telecommunications Department (Figure 4). In 1994 the General Telecommunications Office was spun off from Posts and Telecommunications Department as an independent profit-based company called China Telecommunications. Therefore the operations and maintenance of this project are handled by Telecommunications Regulatory Bureau of each province, directly-governed city or zone, and each city (see Figure 3 above).

The organization of China Telecommunications is as shown in Figure 5.

Figure 4 Operation and Maintenance Scheme (Plan)

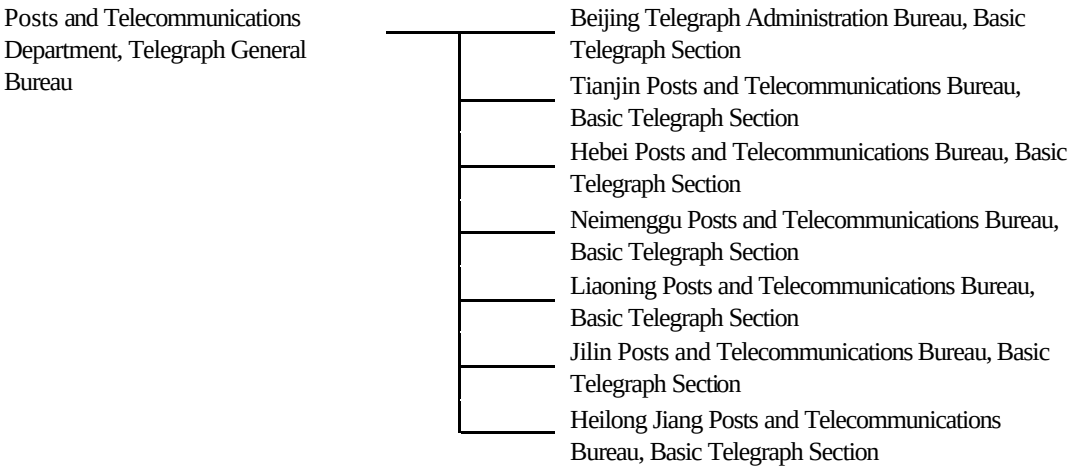
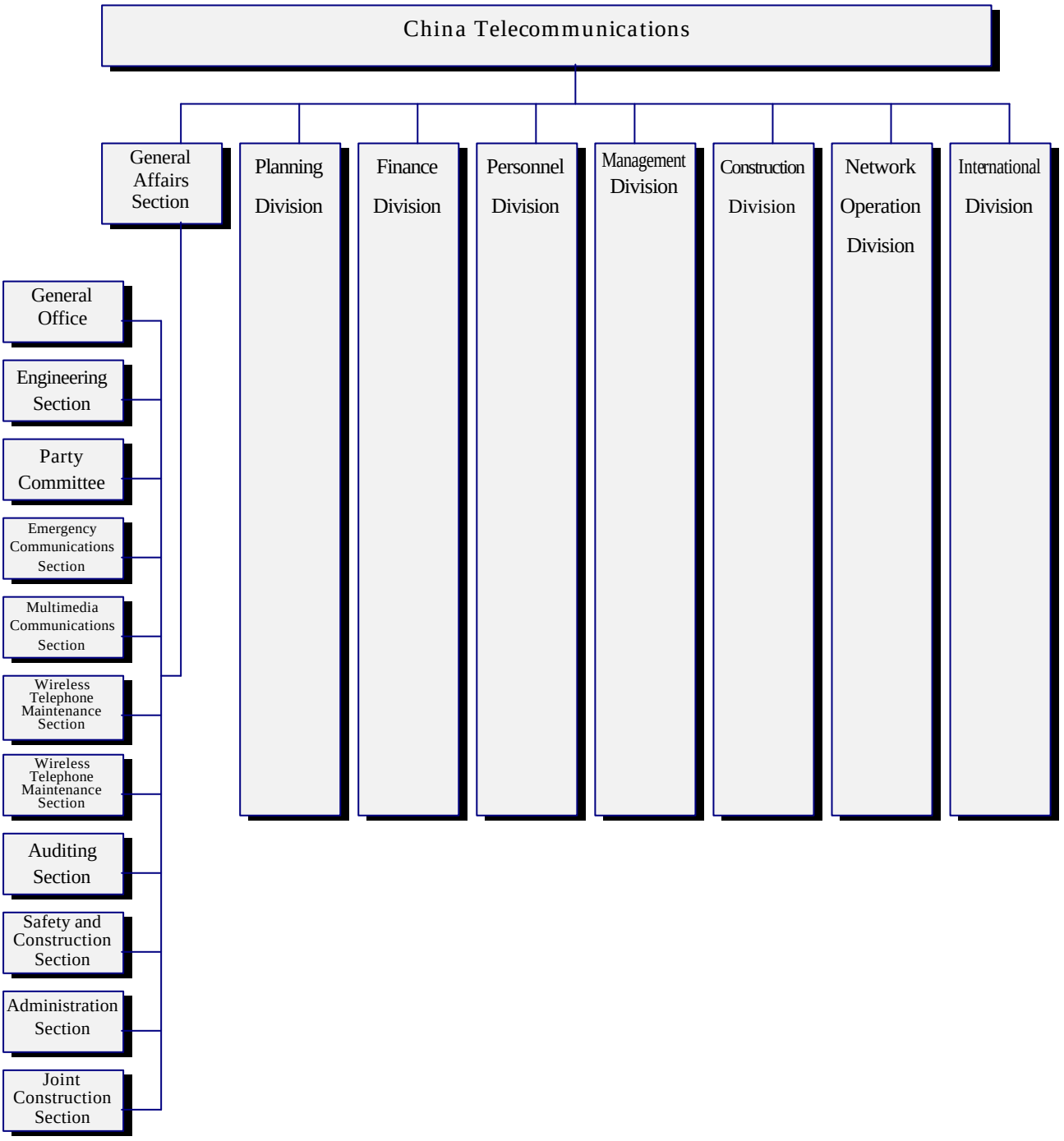


Figure 5 Organization Chart of China Telecommunications (January 1999)



(2) Charge systems

The charges for the use of the communications systems installed by this project are incorporated into the unified nationwide charge system. Therefore we will describe the unified nationwide charge system here.

① Charge systems

China's telephone charge systems are as shown in Tables 1 and 2.

Table 1 Telephone Charges (Fixed Telephones)

(Unit: Yuan)

		1993	1996	1999
A. Local call (3 minutes)		0.1	0.12 (+/-20%)	0.19 (0.16,0.18,0.20,0.22) Each Telecommunications Regulatory Bureau makes decisions.
B. Long-distance call (3 minutes)	Below 25km	0.1	Same as left	Same as left
	25-50km	0.2		
	50-100km	0.3		
	100-150km	0.4		
	150-200km	0.5		
	200-400km	0.6		
	400-600km	0.7		
	600-800km	0.8		
	800-1000km	0.9		
	1000-1500km	1.0		
	1500-2000km	1.1		
	2000km or more	1.2		
(Between provinces)	Below 800km		0.8	Same as left
	800km or more		1.0	
(Within provinces)	Below 800km		0.5	Same as left
	800km or more		0.6	
C. Basic charge (1 month)		21.6	Same as left	Same as left
D. Overseas call (3 minutes)	Europe	29.55	20.7	15.0
	USA	26.25	18.4	15.0
	Japan	18.15	12.7	12.0
E. Installation cost (differs from provinces)		3,000-5,000	Below 4,500	500-1,000 (Beijing: 1000, Other than Beijing: 500)

Table 2 Telephone Charges (Cellular Telephones)

(Unit: Yuan)

	1993	1999
A. Rental charge (1 month)	150	50.0
B. Connection fee	3,000-5,000	500-1,500
C. Local call (1 minute)	0.6	0.4
D. Long-distance call (1 minute)	0.6 + B of Table 1	0.4 + B of Table 1

② Charge determination method

First, based on the Price Law, Ministry of Information Technology and Telecom Industries hears the opinions of the users of telephone services (companies and other large users) and prepares a revision proposal. Next, after coordination with China Telecommunications and other related agencies, the Department exchanges views with Finance Department, National Planning Committee and Price Bureau. After gaining the agreement of these agencies, the revision is submitted to the State Council for final approval before implementation.

③ Charge collection methods and the state of collection

The collection of telephone charges is handled by the China Telecommunications' internal billing center. Charges are recorded by automatic billing machines and bills are mailed to users every month. Normally, large users pay by bank transfer and small (individual) users pay by cash.

The overall collection rate for both fixed and cellular phones together is around 90%. The collection rate is lower for cellular telephones than for fixed lines.

(3) Y2K preparations

Many computer systems use only the last two digits to recognize years, which leads to the risk of date misrecognition and system irregularities when the year changes to 2000, and beyond. This is the Year 2000 computer problem (Y2K), which is exerting a strong influence on the activities of computer-using organizations around the world. Companies involved with data communications are highly dependent on computers and therefore must prepare themselves with particular care.

China Telecommunications have established a working group, as directed by State Council, which is working on Y2K preparations. By now, 90% of systems are Y2K compliant and the remaining systems are scheduled to be compliant before the arrival of 2000.

Two types of measures are used in preparation. One deals with equipment already in use and the other deals with procurement of equipment for projects currently under way. According to the

Liaoning Provincial Telecommunications Regulatory Bureau which conducted the field survey for this evaluation, all equipment currently in use is to be made Y2K compliant by the end of June 1999, while only Y2K-compliant equipment is being bought for projects now under way.

(4) Maintenance

As Table 3 shows, the reliability figures for the systems provided by this project are excellent.

Table 3 System Reliability

	1997	1998
Mean time between failures (minutes)	8,760	105,120
Average repair time (minutes)	312	540
Work rate (%)	96.56	99.49

The proportion of breakdowns repaired within the next business day in China as a whole and in the cities of the Northeast served by this project was 100% in Beijing, Shenyang, Harbin and the whole of the Northeast, and 98% in China overall.

According to the Liaoning Provincial Telecommunications Regulatory Bureau, breakdowns within the scope of their management due to external factors include cable damage during road repairs on 3 occasions. There is no problem with projects to build new roads because the position of cables is checked before work begins, but sometimes cable positions are not considered during repair works. Cable breakdowns are repaired within 72 hours and all other breakdowns are to be repaired within 24 hours. The 3 incidents mentioned above were all repaired within that time frame.

2.2.2 The business position of China Telecommunications

China Telecommunications is an independent profit-based enterprise, but its independent accounts are not published. As far as can be seen from the account settlements of Ministry of Information Technology and Telecom Industries, it is using the profit from the communications division to offset the losses of the posts division (Table 4). There are regional differences in profitability, with profits from the coastal regions used to cover losses from inland.

Table 4 Business Position of China Telecommunications

(Unit: 100 million Yuan)

	1991	1992	1993	1994	1995	1996	1997
Business income							
Telecommunications	n.a.	n.a.	358	562	855	1,099	1,555
Postal	n.a.	n.a.	35	49	126	180	274
Total	176	252	392	611	981	1,278	1,828
Profit before tax							
Telecommunications	66	83	111	114	134	177	193
Postal	n.a.	-9	-31	-31	-45	-62	-49
Total	n.a.	74	80	83	89	115	144
Total assets	489	721	1,450	2,277	3,119	4,287	6,080

Source: Naoko Yamanishi "Policy in the Infrasector and the Separation of Enterprises - The Case of the Communications Industry", February 1992.

2.2.3 Environmental Impact

Optical fiber cables have no environmental impact, as they produce no noise or electromagnetic pollution.

No residents had to be relocated to enable the installation of optical fiber cables and exchanges. In rural areas, cables were laid in the agricultural off-season, when the works had no impact on crops.

2.3 Project Effects and Impacts

2.3.1 Quantitative Effects

(1) Improvement in the overflow rate

The installation of optical fiber transmission facilities and the expansion of long-distance switching systems implemented under this project brought a great improvement in the communications situation in the target area. As Table 5 shows, the overflow rate, which indicates how difficult it is to place a telephone call, improved dramatically in 1994, when part of this project went into operation, and improved further in 1996, when the 2.5Gbit/s SDH system was added. Further improvements in 1997 and 1998 were due to the beginning of operation of a 10Gbit/s system which was added separately.

Table 5 Transition of Overflow Rate

	1991	1992	1993	1994	1995	1996	1997	1998
All China	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	8.32	1.16
Northeast region	75	77	60	10	5	3	6	0.3
Beijing	40	40	35	30	25	10	2	1.0
Shenyang	70	83	60	5	13	4	*10	0.3
Harbinj	79	65	65	10	5	2	5	0.2

* The temporary increased overflow rate in Shenyang in 1997 was due to flooding.

Furthermore, the telephone diffusion rate in China in recent years has been growing at a remarkable pace, as Table 6 shows. The improvement in the communications situation brought by this project has helped to accommodate this demand, and it has also encouraged new demand.

Table 6 Telephone Diffusion

		1992	1993	1994	1995	1996	1997
No. of subscribers	1,000 person	11,469	17,332	27,295	40,706	54,947	70,318
Increase rate	%		51.1	57.5	49.1	35.0	28.0
Telephone diffusion rate	lines/100 person	1.6	2.2	3.2	4.7	6.3	8.1

(2) Financial Internal Rate of Return (FIRR)

A FIRR of 12.11% was anticipated at the appraisal before this project was implemented. The actual FIRR, as calculated from records of call charges and the volume of calls made, was 52.14% (the introduction of discount rates for calls at night and on holidays, the reduction of international call rates and the increased use of telephone lines for Internet access at cheaper rates are expected to reduce profits, and the FIRR calculated to take these changes into account was around 30%). The actual FIRR exceeded the initial calculation because the cheap procurement prices for equipment and materials (optical fiber cables and transmission equipment), and the substantial increase in call capacity yielded by the introduction of SDH, increased profitability.

2.3.2 Qualitative Effects

The initially anticipated qualitative effects of this project were: ① improved means of communication between and within provinces, and ② stimulation of economic growth in the Northeastern region.

In fact, the following impacts have been observed.

① Improved means of communication between and within provinces

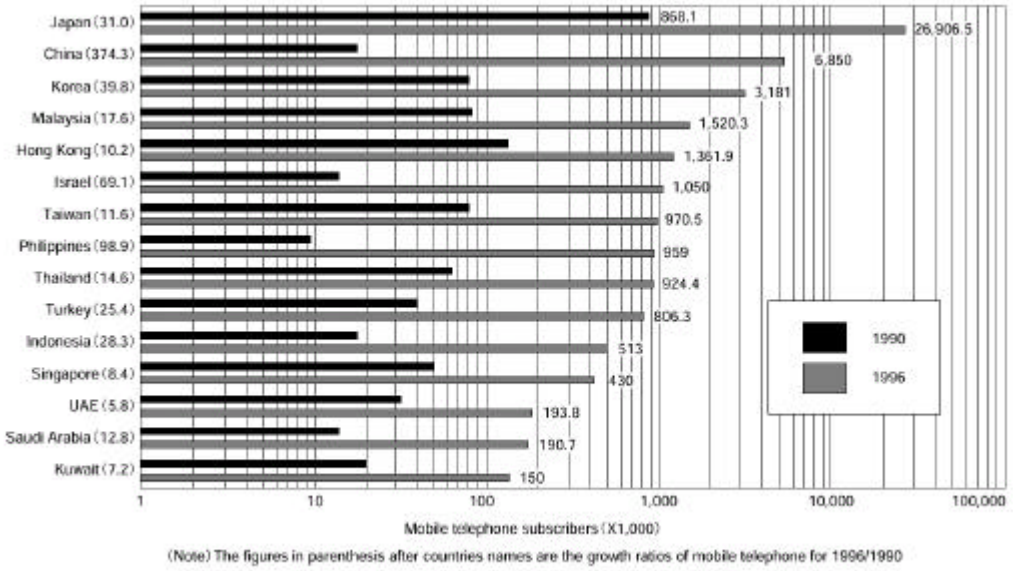
- Smoother liaison between provincial governments.
- Improved communications services to the public.

② Stimulation of economic growth in the Northeastern region.
- The improved communications situations at the ports of Tianjin, Dalian and Qinhuang Dao has made import-export operations more efficient.
- The improved communications situation in tourist areas has had a positive effect on tourism.
- Smoother liaison with the distributors has contributed to the growth of agriculture.

2.4 Future Demand

Demand for mobile telephones is growing rapidly, as shown in Figure 7, and further growth can be expected. To meet this demand the infrastructure for mobile telephones will have to be put in place and more fixed lines will be urgently required to link them.

Figure 7 Rapid Growth of Mobile Telephones in Asian Countries (1996)



(Source: World Telecom Visual Data 1999 Edition.)