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**DIRECTORATE FOR SCIENCE, TECHNOLOGY AND INDUSTRY
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**REVIEW OF THE DEVELOPMENT AND REFORM OF THE TELECOMMUNICATIONS SECTOR
IN CHINA**

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FOREWORD

The purpose of this report is to provide an overview of telecommunications development in China and to examine telecommunication policy developments and reform. The initial draft was examined by the Committee for Information, Computer and Communications Policy in March 2002. The report benefited from discussions with officials of the Chinese Ministry of Information Industry and several telecommunication service providers. The report was prepared by the Korea Information Society Development Institute (KISDI) under the direction of Dr. Inuk Chung. Mr. Dimitri Ypsilanti from the OECD Secretariat participated in the project. The report benefited from funding provided mainly by the Swedish government. KISDI also helped in the financing of the report.

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TABLE OF CONTENTS

CHAPTER 1: THE CHINESE TELECOMMUNICATIONS SECTOR.....	6
1.1. Achievements and goals	6
1.2. General features of the telecommunication markets.....	7
1.3. The regulatory regime.....	8
CHAPTER 2: THE INFORMATION AND TELECOMMUNICATIONS REGULATORY REGIME.....	11
2.1. Regulatory institutions and regime	11
2.1.1. Overview.....	11
2.1.2. Ministry of Information Industry	12
2.1.3. The State Council.....	13
2.1.4. The State Development Planning Commission	13
2.2. Telecommunications regulations	13
2.2.1. Background to the Telecommunications Decree	14
2.2.2. Four basic principles of the Telecommunications Decree	14
2.2.3. The Telecommunications Decree	15
CHAPTER 3: THE CHINESE TELECOMMUNICATIONS MARKET.....	19
3.1. Structure of the telecommunications market	19
3.1.1. Overview.....	19
3.1.2. The break-up of the old China Telecom	21
3.2. Fixed-line telephony	22
3.2.1. The local call market.....	22
3.2.2. Long-distance market	22
3.2.3. Regional disparities in fixed-line service.....	23
3.3. Wireless paging service	26
3.4. IP telephony	27
3.4.1. Overview.....	27
3.4.2. IP telephony service market.....	27
3.4.3. Future prospects and tasks	29
3.5. Mobile telephony	30
3.5.1. Overview of the mobile telephony market in China	30
3.5.2. Geographical distribution of mobile telephone subscribers.....	32
3.5.3. Mobile telephony service providers.....	33
3.5.4. Demographic characteristics of Chinese mobile subscribers.....	37
3.6. Internet and data transmission	40
3.6.1. The structure and performance of the market	40
3.6.2. Infrastructure development	45
3.7. Prospects for convergence in the IT sector	47

CHAPTER 4: THE INFORMATION TECHNOLOGY EQUIPMENT INDUSTRY IN CHINA 49

4.1. Overview.....	49
4.2. The network equipment manufacturing market.....	52
4.2.1. Overview.....	52
4.2.2. Future prospects.....	53
4.3. The mobile equipment market.....	54
4.3.1. Market shares of mobile handset manufacturers.....	54
4.3.2. Market share of the mobile network equipment.....	54
4.4. The IP telephony equipment market.....	55
4.5. Government policies in support of technological advancement.....	56
4.5.1. Localisation policy on IT equipment in China.....	56

CHAPTER 5: GOVERNMENT POLICIES FOR THE CHINESE TELECOMMUNICATIONS SECTOR 58

5.1. Overview.....	58
5.2. Major targets of China's Tenth Five-year Plan for the IT sector.....	58
5.2.1. Telecommunications industry as a driving force for economic growth.....	58
5.2.2. Building the telecommunications infrastructure.....	58
5.2.3. Establishment of research centres.....	59
5.2.4. The IT infrastructure.....	59
5.2.5. The State management system of providers.....	59
5.2.6. Enterprise restructuring.....	59
5.2.7. Enhancing network security.....	60
5.2.8. Maintaining relationships among operators and manufacturers.....	60
5.3. Regulatory policies.....	60
5.3.1. Rules affecting market entry.....	60
5.3.2. Interconnection.....	61
5.3.3. Tariffs.....	64
5.4. Higher local fixed-line tariffs.....	65
5.5. Lower long-distance and leased-line charges.....	65
5.6. Universal service.....	66
5.7. Spectrum allocation.....	66
5.8. Investment in the Chinese IT industry.....	67
5.8.1. Investment in the Chinese IT industry: A history.....	68
5.8.2. Factors relevant to investment and finance in China's telecommunication industry.....	69
5.8.3. Problems with investment mechanisms for the Chinese information industry.....	71

CHAPTER 6: THE IMPACT OF CHINA'S WTO MEMBERSHIP ON THE TELECOMMUNICATIONS SECTOR 73

6.1. Progress of the negotiations in view of WTO membership.....	73
6.2. Analysis of China's concession schedule in the telecommunications sector.....	74
6.2.1. China's commitments.....	74
6.3. The impact of WTO membership on the Chinese IT market.....	75

CHAPTER 7: CONCLUSIONS AND RECOMMENDATIONS.....	78
7.1. General assessment of current trends, strengths and weakness	78
7.1.1. Trends	78
7.1.2. Strengths	79
7.1.3. Weaknesses.....	81
7.2. Policy recommendation for further reform	83
7.2.1. Expansion of the information infrastructure	83
7.2.2. Comprehensive legal framework for the effective implementation of IT policies	84
7.2.3. Strengthening the independence of the responsible organisation	84
7.2.4. Transparent and impartial regulatory mechanism.....	84
7.2.5. Reforming regulations to stimulate competition.....	85
7.2.6. Re-examination of the scope, effectiveness, and compulsory measures of competition policies	85
NOTES.....	86

CHAPTER 1: THE CHINESE TELECOMMUNICATIONS SECTOR¹

1.1. Achievements and goals

The Chinese telecommunications market has experienced double-digit growth in recent years and continues to expand rapidly as demand surges. As of 2000, China was ranked second in the world, after the United States, in terms of its absolute market size in the telecommunication service sector, with 145 million fixed lines and 85 million mobile subscribers, respectively. However, as of September 2002, China became the world's largest telecommunication service market with 397 million combined subscribers in fixed line and mobile telephony, that is, 207 million and 190 million, respectively. In that time span, the number of mobile telecommunication service subscribers increased 123.5% and fixed line telephony subscribers also increased by 43.7%. With 22 million wireless pager services subscribers in September 2002, though a big drop from 49 million at its peak in 2000, China still has the largest wireless pager market in the world and its IP telephony service market is growing at a particularly rapid pace. More importantly, although still in its infancy stage, limited competition was introduced in the telecommunications service sectors, including fixed-line service.

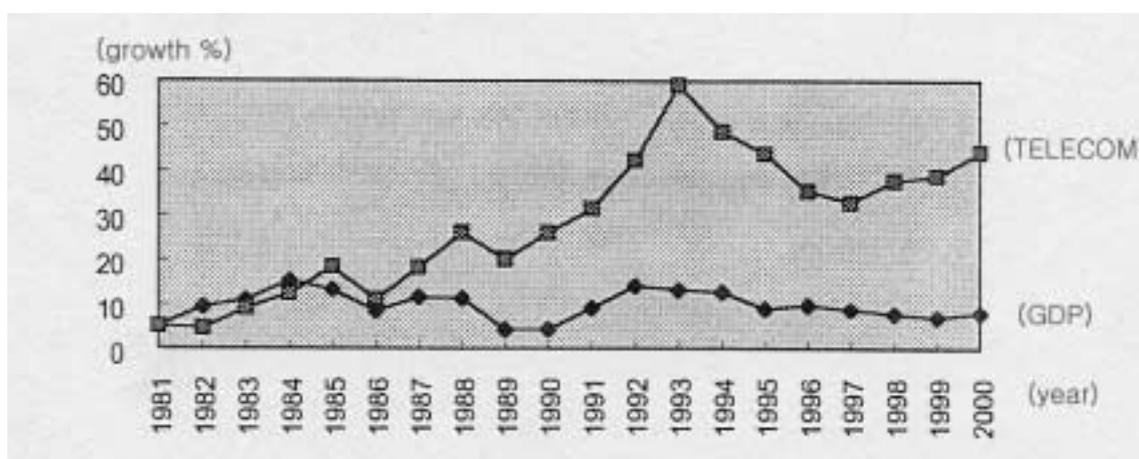
However, the overall level of infrastructure development remains low. As of September 2002, the penetration rate, *i.e.* subscribers per 100 population, in the wired and mobile market was 16.25% (with 23.95% in urban areas) and 14.95% for mobile services, and still up to 50% of the country did not have access to basic telecommunication services. The Chinese government's policy towards competition in the telecommunications market is still in a transitional phase and the history of a nation-wide telecommunications market is relatively short, beginning with the inception of China Unicom in 1994.

When China began its reform process in 1978, the telecommunications sector was identified as one of the four major obstacles to modernisation. At that time, China had a telephony switching capacity of only 1.75 million sets, the telephone penetration rate was a mere 0.18%, and all long-distance and most inner city calls had to be manually connected.² Furthermore, prior to 1978, the Chinese telecommunications industry was a government-controlled monopoly, with the construction of the basic telecommunication network, the production of telecommunications equipment and the provision of telecommunication services being centralised within the (then) Ministry of Posts and Telecommunications.

However, since the beginning of the 1980s, the Chinese government has boosted the development of the telecommunications sectors through the use of an aggressive development policy. The industry has been able to expand at a staggering average annual growth rate of 44%, far above the GDP growth rate for the same period (Figure 1.1).³ One prominent government official once proudly announced that China now numbers among "the world's few telecommunication giants and ranks second world-wide in terms of telecommunication network size and number of subscribers".⁴ A recent report on the Chinese IT sector points to China as the next technology super-power.⁵

Figure 1.1. Growth rates in the telecommunications sector compared to GDP

1981-2000



Source: Reprinted from Dr. Wang Wei's paper "China's Integration with the World Economy: Repercussion of China's Accession to the WTO", International Workshop Proceedings, August 2001.

Despite the recent rapid development of the Chinese telecommunication market, the future appears rosy given the tremendous level of demand and the government's strong commitment to support this market. Policymakers have designated telecommunications as a strategic national business and have implemented the Tenth Five-year Plan (known as the "10-5 Plan") to promote development beginning in 2001. By 2005, it is planned to double GDP growth compared to its 2000 level. Efforts are being made to expand the provision of the infrastructure required for the third-generation telecommunications and IP networks and to strengthen the information technology sector by setting up IT research groups.

1.2. General features of the telecommunication markets

The Chinese telecommunications industry has experienced three major changes. First, the State Council's 1994 decision to establish China Unicom as a competitor to China Telecom, brought about a major change in telecommunications structure. Second, the spin off of China Mobile from China Telecom in April 2000 introduced a more competitive market structure. Furthermore, in May 2002, China Telecom was broken up into two sections. The southern section of China Telecom remained as the new China Telecom. China Netcom (CNC) was set up as a new company through the merger of China Netcom and Jitong Communications, as well as a northern section of China Telecom (See details in Section 3.1.2). These three events are significant as they reflected the government's objective to separate the state from the market (*i.e.* separation of regulation and operation of telecommunication services) in order to invigorate market growth through independent management and wider market competition.

However, despite the changes in the regulatory framework, market competition is weak, with the two new companies, China Telecom and the new China Netcom, retaining dominant positions in local telephony and China Mobile dominating the mobile communications market. In the meantime, mobile phones have closed the gap with fixed phones as the primary business of China's telecommunications sector, while digital services are emerging as a new and only source in this sector's growth.⁶ More recently, IP telephony has taken over a substantial amount – 19.2% at present – of the long-distance telephone service market and pre-paid mobile users account for 24% of total mobile users.⁷ Despite a large number of service providers participating in the wireless paging market, the number of subscribers has declined in 2001, which indicates an ongoing change to a new competition model.

Before May 2002, the five major telecommunication service providers, China Telecom, China Unicom, China Mobile, China Jitong, and China Netcom provided almost all telecommunication services in the national market.⁸ The market shares of these basic telecommunications service providers at the end of 2001 were as follows: China Telecom, 50.4% of total telecommunications service revenue; China Mobile, 37.5%; China Unicom, 10.6%. In the IP telephony, market, the share in terms of call-hours was 75.6% for China Telecom, 18.4% for China Unicom; 3.6% for China Jitong; and 1.5% for China Netcom (China Netcom has carved a niche market for itself in network leased-line service).

China Telecom,⁹ China Unicom and the new China Netcom compete in the local, long-distance and international fixed market. The local call market comprised 207 million subscribers in September 2002, a 43.7% increase in the 20 month span. The new China Telecom still has the largest number of subscribers, 130 million, two-thirds of the fixed line subscribers, and the new China Netcom has the rest, with 77 million. However, China Unicom was able to capture 13% of market share in the long-distance market (domestic and international long-distance services) by the end of 2000.

Wireless services are provided by China Mobile, which spun off China Telecom in April 2000, and by China Unicom. The wireless market is growing at a tremendous rate. At the end of September 2002, 144.8 million subscribers were registered, a 124% increase over a 20 month period, becoming the world's largest mobile company in absolute terms. Macroeconomic growth and the increasing market share of the latecomer, China Unicom, may indicate a positive market development. China Unicom's market share grew from 5.8% in 1998 to 15% by the end of 2000, to 28.3% by the end of 2001. However, China Mobile still dominates the market.

In April 1999, IP telephony service was introduced to provide universal access at low rates in a country where few people have direct access to fixed phones. China Telecom, China Unicom, along with China Netcom and other smaller businesses, offer this service.

The most intense competition takes place in the wireless paging service market. Wireless paging service began in 1984 and there are currently 1 700 providers serving some 21.65 million subscribers. The main service providers include Guoxin, Zhongbei, Lunxun, Wancheng, Wanlitong, Zhongtie, Minhang and Luihua. Guoxin leads the market, with about 60% of market share. However, growth in wireless paging services has declined since the end of 2000, due to the rapid increase in wireless telephone services.

1.3. The regulatory regime

As mentioned above, the evolution of the telecommunications regulatory framework is reflected in the introduction of China Unicom to market competition and the adoption of the Telecommunications Decree in 2000.¹⁰ A system of telecommunications laws forming the basic foundation of policies and regulations for the telecommunication market was not established until 2000, when the Telecommunications Decree was announced as a national policy framework of basic telecommunication regulations relating to market entry, interconnection, tariffs and resource allocation, along with preparation for WTO membership. Even though it was a significant step in the right direction, however, the Decree is still rather limited from a regulatory standpoint.¹¹ China would like to encourage its telecommunication market to grow through market competition. In particular, competition will be enhanced by easing entry into basic telecommunications markets for new players, even from foreign countries with entry to the WTO.¹² The government has the discretionary power to approve and set the maximum limit of 49% for foreign investments in basic telecommunications as equity joint venture (EJV) upon the concession schedule of telecommunications sector to the WTO in the very near future. To facilitate this development, the Chinese government announced a *Regulation of Foreign-Invested Telecommunications Enterprises* ("FITE Provisions") at the end of 2001.

Table 1.1 highlights important developments in the Chinese telecommunications industry in terms of market participants, regulatory policies and legal framework.

Table 1.1. Important events in the Chinese telecommunications industry

1994	First half	Ministry of Post and Telecommunications (MPT) established Data Transmission Office; Mobile Telecommunications Office; and restructured the Telecommunications Office.
	July	Establishment of China Unicom: introduction of competition in the basic telecommunications sector.
	September	Ministry of Post and Telecommunications (MPT) announces development plan for GSM mobile telecommunications; GSM service tested in designated cities.
1997	July	China Telecom, with 10 million mobile telephony subscribers, ranks third in the world.
	October	China Telecom (Hong Kong) listed on the New York and Hong Kong stock markets.
1998	March	Creation of MII through the merger of MPT and the Ministry of Electronics Industries (MEI).
	April	Decision to separate the postal sector from MII.
	August	China exceeds 100 million fixed telephony subscribers and 20 million mobile telephony subscribers.
	September	A paging company: creation of Guoxin
	December	Fibre-optic cable spans all regions of China.
1999	January	Independent business operation of post and telecommunications.
	February	China Telecom announces its break up into four separate entities: China Telecom, China Mobile, China Satellite Company, and China Paging Co. China Unicom absorbs a paging company (Guoxin) and railway telecommunications company and expanded services area.
	August	Formation of China Wangtong to construct and operate the fibre-optic network
	October	Internet and IP Telephony licence granted to China Telecom, China Unicom, Jitong, China Netcom and China Mobile

Table 1.1. Important events in the Chinese telecommunications industry (cont'd)

	April	Reassessment of China Telecom. The company is split into two groups: China Telecom and China Mobile
	May	China Telecom and China Mobile start individual business operations.
	June	China Unicom exceeds 10 million subscribers, while China Mobile exceeds 43 million subscribers.
2000	June	China Unicom listed on the New York and Hong Kong stock markets.
	July	State Council grants licence to establish the China Satellite Telecommunications (ChinaSat) Group; MII establishes "Telecommunication Service Standards" to improve quality of services
	September	The State Council adopts and announces the Telecommunications Decree.
	January	China Unicom acquires the China Great Wall Network (CGWN) Company, along with CDMA services
	February	China Unicom surpasses 20 million subscribers
2001	November	China admitted to the WTO: submits the concession schedule in telecom sector.
	December	Official member of the WTO; Announced the Regulation of Foreign-Invested Telecommunications Enterprises ("FITE Provisions").
2002	May	China Telecom split in two: China Telecom and China Netcom

Source: OECD.

CHAPTER 2: THE INFORMATION AND TELECOMMUNICATIONS REGULATORY REGIME

2.1. Regulatory institutions and regime

2.1.1. Overview

Prior to 1993, the then Ministry of Post and Telecommunications (MPT) was the sole provider of public telecommunications services in China. These services were provided through provincial and municipal Posts and Telecommunications Administrations (PTAs) and appeared in 1993, when the State Council issued regulations allowing other domestic companies to provide certain non-basic telecommunications services such as paging and domestic VSAT (very small aperture terminal) services.

In July 1994, China Unicom was formed with the State Council's blessing, in the wake of the reorganisation of the MPT in December 1993, which separated the Directorate General of Telecommunications (DGT) – also referred to as China Telecom – from the MPT. On 1 April 1998, the State Council integrated the former MPT, the Ministry of Electronics Industry (MEI) and parts of the Ministry of Radio, Film and Television into the new Ministry of Information Industry (MII), with the goal of ensuring that the rapidly growing information and communication industry developed in a systematic and coherent way.

The Ministry of Information Industry (MII), together with a number of other authorities, has very wide discretionary powers to formulate and implement regulations in respect to the telecommunications industry in China. However, important strategies and policy decisions by the MII must first be approved by the State Council. In addition, the State Development Planning Commission (SDPC) and the State Economic and Trade Commission (SETC) also play a role in the decision process and implementation of telecommunications regulations and policies¹³.

In the absence of an approved law on telecommunications, the regulatory environment will continue to lack transparency. It has become a standard practice for the MII to suggest that the promulgation of a new law on telecommunications is imminent. However, the MII's interests have been served by delaying the enactment of the law, since such regulations would likely entail the licensing of alternative carriers, increased competition, a dissolution of power and removal of the ministry's power to make arbitrary decisions. A draft law was dismissed twice in 1997 as other ministries and operators objected to a bias in favour of the MII and China Telecom.

However, with the enactment of the Telecommunications Decree in September 2000, the basic legal framework, albeit not complete, was finally established in the Chinese telecommunications market and a somewhat full-fledged telecommunication law has reportedly been drafted now.

2.1.2. Ministry of Information Industry

The departments/offices and main duties of MII are summarised in Table 2.1.¹⁴ Departments related to telecommunications service include the Department of Policy and Regulations, the Department of Planning, the Department of Enterprise Restructuring and Operation, and the Telecommunications Administration Bureau. The Department of Policy and Regulation studies reform measures, establishes telecommunications laws, and formulates market-opening policies. The Department of Planning focuses on medium and long-term strategies, allocation of spectrum, joint ventures with foreign capital, telecommunications standardisation, prevention of over-lapping investments, and the provision of statistical data. The Department of Enterprise Restructuring and Operation is responsible for advising telecommunications operators on organisational restructuring and policies and strategies, analysing and preparing economic statistical data, providing recommendations for annual development strategies, and managing imports of telecommunications equipment and technologies. The Telecommunications Administration Bureau is responsible for promoting fair competition, providing universal services, regulating telecommunications service fees, interconnection, allocation of numbers, and providing telecommunications security measures.

Table 2.1. The organisation of the Ministry of Information Industry

Department	Main functions
General Office	Regulate relations between offices, announce and publicise regulations and laws; release publications, administration management.
Department of Policy and Regulations	Examines and formulates general policies and major reform plans. Drafts laws, administrative rules, and regulation and develop policy strategies, plan market-open policies; policies on Hong Kong and Chinese Taipei telecommunications industries.
Department of Planning	Develop mid- to long-term policies; allocate spectrum resource, prevent over-lapping investments; joint ventures with foreign capital; promote standardisation in telecommunications; release statistical data.
Department of Science Technology	Analyse international telecommunications technology; set technology regulations; establish public telecommunications technology system standardisation; oversee quality of service.
Department of Enterprise Restructuring and Operation	Direct and provide advice on restructuring policies of telecommunications operators; provide business policies and strategies; analyse and release economic statistics; provide annual development plans; manage imports of technologies and contents.
Telecommunications Administration Bureau	Promote fair competition; implement policies on universal services, service tariffs, interconnection; allocate and manage numbering resource; provide measure for telecommunications security.
Department of Financial Regulations and Clearing	Establish and develop postal policies; supervise financial affairs of state-owned operators; set budget regulations between operators.
Department of the Electronic and IT products	Provide mid- to long-term policies, regulations, and studies on the development of the telecommunications industry; promote domestic telecommunications products.
Bureau of Special Electronic Installations	Oversee administrative management of special/military electronic technology
The State Informatization Office (Department of Information Promotion)	Carry out research on regulations and strategies to develop national economy and information system; supervise local government authorities; develop information security technology; promote information education.
Bureau of Radio Regulation (The State Radio Regulatory Office)	Conduct research on efficient use and management of spectrum resources; allocate spectrum; oversee and manage wireless stations; prevent spectrum disruption; participate in international conferences related to radio spectrum.
Department of International Affairs	Attend international conferences; negotiate and exchange telecommunications co-operation with foreign governments; analyse international regulation models
Department of Personnel	Manage staff, labour issues and wages; co-ordinate organisations under the Ministry
Ministry-Party Co-ordination Office	Ensure co-ordination between government parties and ministries

Source: OECD.

2.1.3. *The State Council*

The State Council is the highest level of administration in the setting of national policy. The department comprises the Prime Minister, four Deputy Prime Ministers, and eight counsellors selected from among the different ministries and commissions. Under the State Council are five commissions, 22 ministries and the provincial administrations. The Ministry of Information Industry responsible for telecommunications regulation enforcement, is included in this latter category.

The State Council has the power to outline legislation and policy guidelines and review the major projects submitted by the ministries and provincial governments.

2.1.4. *The State Development Planning Commission*

The State Development Planning Commission is the largest comprehensive body under the State Council. It is the largest organisation playing a major role in the development of economic, scientific/technological and social development strategies, as well as key economic technology policies. In addition, the Commission establishes national economic plans and provides financial support for large infrastructure projects, including those relating to telecommunications. In general, projects exceeding CNY 30 million must first be approved by the State Development Planning Commission.

In some cases, operators break projects into smaller elements as a way of side-stepping the approval procedure, although reporting to the provincial Development Planning Commissions cannot be avoided. Therefore, with the exception of projects that are strongly support by the provincial government, all joint investment of foreign capital must obtain prior approval.

2.2. *Telecommunications regulations*¹⁵

Until recently, telecommunications sector officials were hard-pressed to tackle problems in the absence of a telecommunications law or regulations to provide guidance. The telecommunications industry is governed both by regulations issued by the State Council and by regulations set by the Ministry of Information Industry, the State Development Planning Commission, the State Economic and Trade Commission, the Ministry of Foreign Trade and Economic Co-operation, all of which are fundamentally based on the State Council's regulation.

The first telecommunications regulation since the establishment of the People's Republic of China (PRC) was formulated in 1955 and completed in 1958 as the Post and Telecommunications Law; however, it was never enacted. The draft telecommunications law was prepared in 1980 and submitted to the State Council in 1982, but failed to be approved. In early 1986, a second draft of the telecommunications law was submitted, but was once again rejected.

China's preparations for membership in the World Trade Organization (WTO) have highlighted the necessity of a law on telecommunications. Accordingly, on 25 September 2000, the People's Republic of China Telecommunications Decree, hereinafter referred to as the Telecommunications Decree, was promulgated and enforced under State Council Directive 291. The following describes the Telecommunications Decree, the first comprehensive telecommunications law in China.

2.2.1. Background to the Telecommunications Decree

Prior to the adoption of the Telecommunications Decree, the telecommunications market in China faced a number of regulatory challenges. The incumbent operator was using its dominant market power to exercise anti-competitive behaviour through such practices as refusing interconnection rights to other operators, or providing services with outdated technology and equipment.¹⁶ Moreover, telecommunications networks were deployed by operators or individuals without proper licence from the government. In order to solve such problems and to optimise development over the long term, a regulatory policy framework was called for. In addition, the Chinese government recognised the urgent need to launch the Telecommunications Decree in preparation for the market opening that would follow its membership of the WTO.

2.2.2. Four basic principles of the Telecommunications Decree

Principle of equality, fairness and separation of government and business

The Telecommunications Decree mandates the separation of the role of government and that of the telecommunications operators in order to increase public interest. China Telecom was detached from the Ministry in 1995 and regrouped into four new companies in 2001 to provide basic telephone services. The government is responsible for ensuring that policies and regulations are in accordance with the goals of transparency, equality, and fairness, although it is finding it difficult to balance its dual role as owner of telephony companies and regulator of competition policies. The government also has responsibility for ensuring fair market competition by individual competitors and telecommunications service operators.

Ensuring competition and promoting development

The Telecommunications Decree creates a policy environment that is conducive to the entry of new players in the market. On the other hand, it imposes heavier obligations on the incumbents in terms of interconnection, equal access and unbundling, and regulates anti-competitive practices.

Progress in telecommunications technology

The Telecommunications Decree adopts the definition of “telecommunications” put forward by the International Telecommunications Union (ITU). Based on internationally accepted universal concepts, telecommunications includes broadcasting networks, Internet networks, and other services within the scope of telecommunications management in order to provide a legitimate basis to efficiently address the convergence of telephone, computer and television.

Future prospects and globalisation

The Telecommunications Decree seeks to internationalise the telecommunications industry and determine its future direction through an analysis of the experiences of other advanced nations in such areas as telecommunications regulations, the role of regulatory bodies, basic telecommunications operation licences, resource distribution and access.

2.2.3. *The Telecommunications Decree*¹⁷

The Telecommunications Decree comprises seven parts and 81 sections. The following summarises the main contents of the decree.

Service operating licence

The Telecommunications Decree states that any operator who intends to provide service must obtain a telecommunications operating license granted by Ministry of Information Industry or the local telecommunications authority. Telecommunications services are divided into basic telephony services and value-added services. The standards, procedures, and licensing authority body are determined by each service category.

Basic telecommunications service is defined as services that provide public switched telephone network (PSTN), public data transmission and basic voice transmission service. Related services are fixed-line telephony service, mobile service, satellite communications service and resale of these basic telecommunications services. The Ministry of Information Industry has the authority to grant licences to basic telecommunications operators. Foreigners are banned from offering basic telecommunications services under a regulation stating that a Chinese national must own more than a 51% share of a basic telecommunications company.

Value-added service is defined as information and telecommunications service offered through public telecommunications network facilities. These services include e-mail, online information service, Internet access service, and Internet information service. Local telecommunications authorities issue licences for value-added operators. However, in the case where the operator provides services to more than two regions, approval must be sought from the Ministry of Information Industry.

Interconnection

Ensuring interconnection between networks is precondition for a competitive telecommunications market. The Telecommunications Decree states that an incumbent cannot refuse an interconnection requirement of any service operators or leased-line operators. A dominant incumbent with a major share of the market may be able to significantly affect the entry of new service providers in the market. The dominant incumbents are regulated by the Ministry of Information Industry, reporting to the State Council.

In line with the Telecommunications Decree, agreement on interconnection arrangements initially involves commercial negotiations between the two parties. If the two parties are unable to reach an agreement within a period of 60 days from the initial request for interconnection, one of the parties can apply to the telecommunications supervisory body for arbitration. If the regulatory body fails to reach agreement with the parties within 45 days, the regulatory body enforces an interconnection arrangement among the incumbents, based on the recommendations of experts in the field.

Table 2.2. Telecommunications service licences

	Basic service	Value-added service
Definition	Install PSTN, provide public data transmission service and basic voice telecommunications service	Provide telecommunications and information service using public telecommunications network facilities
Services	<ul style="list-style-type: none"> • Domestic, long-distance and local telephony service • Mobile telephony service and data service • Satellite telecommunications and satellite mobile telephony service • Internet network and other public data transmission service • Lease broadband, microwave, fibre-optic cable, trunk, and other telecommunications network contents, resale service • Basic international telecommunications facilities, international telecommunications service • Paging services • Resale of basic telecommunications services 	<ul style="list-style-type: none"> • E-mail • Voice mail • Search and collect online information • Data exchange • Manage online data and connection • Value-added fax • Internet access service • Internet information service • Video conferencing service
Required conditions	<ul style="list-style-type: none"> • Manager must represent the established basic telecommunications service company in accordance with the law. More than 51% of the enterprise share must be owned by Chinese nationals • Report on appropriateness of business, planning documents on network construction • Maintain business capital and specialised workforce • Maintain business activities and proper resources • Ability to provide long-term services to end-users • Other factors in accordance with national regulations 	<ul style="list-style-type: none"> • Manager must represent the established company in accordance with the law • Maintaining business capital and specialised workforce • Ability to provide long-term services to end-users • Other factors in accordance with national regulations
Application and licensing procedure	<ul style="list-style-type: none"> • Submit application with documents prescribed in Section 10 of the Telecommunications Decree. • The MII must determine and notify granting of licence within 180 days of application submission. • Once the licence is granted, a Basic Telecommunications Operating License is issued. • If the operation is not approved, reasons for rejection must be notified to the applicant in writing. 	<ul style="list-style-type: none"> • Submit application to MII or the telecommunications regulatory body of province or city in accordance with Section 9, Provision 2 of the Telecommunications Decree. • The MII or telecommunications regulatory body of the province or city must determine and notify granting of licence within 60 days of application submission. • Once the licence is granted, a Value-added Telecommunications Operating License is issued. • In the case the business is not approved, the reasons for rejection must be notified to the applicant in writing.
Licence authority	<ul style="list-style-type: none"> • Ministry of Information Industry 	<ul style="list-style-type: none"> • Local telecommunications authority. • Approval of Ministry of Information Industry when servicing more than two regions.

Source: Summarised from The Telecommunications Decree, Ministry of Information Industry, China.

Management of service tariffs

The Telecommunications Decree sets out three tariff-setting schemes: a set of tariffs determined by the operators; one advised by the government; and one set by the government. Whereas an operator in a competitive market environment is allowed to determine its own service tariffs, a monopoly operator comes under the responsibility of the government which takes the national economy, social development, telecommunications development and the income level of consumers into consideration before setting the tariffs. The remaining service tariffs refer to the government's advisory rate. In addition, before enforcing the government advisory tariff or the government set tariff, opinions from all social sectors must be taken into account.

Distribution of telecommunications resources

The term "telecommunications resources" refers to the finite resources used to supply telecommunications services such as wireless spectrum, satellite orbit stations, and network numbers. The Telecommunications Decree stipulates the use of telecommunications resources with payments/charges based on the principles of unified telecommunications resource planning, consistent management and efficient distribution. Pursuant to the Decree, the charges are determined by the related ministries and have to be ratified by the State of Council prior to enforcement.

Quality of service

The government manages and controls telecommunications service quality in the public interest. The Decree stipulates that each telecommunication company should set out detailed regulations on the type and range of telecommunication services offered, tariff standards, and service schedule such as service opening, maintenance and service change. These regulations are then submitted to a concerned local telecommunication regulatory body.

Management of infrastructure/network construction

The public telecommunications network provides the physical basis for the computerisation of the national economy and public services. To ensure efficient allocation and use of national resource and to prevent duplication of investments, the Telecommunications Decree states that construction of public networks, leased line networks, and TV broadcasting transmission networks must be managed and administrated by the Ministry of Information Industry. Therefore, nation-wide infrastructure construction, or public networks, leased line networks, and TV broadcasting transmission networks that exceed the scale set by the government must be approved by the Ministry of Information Industry.

Licensing of telecommunications facilities

To protect the public interest and to regulate interconnection between networks and use of spectrum, the Telecommunications Decree sets out a telecommunications facility licensing policy covering vertical network facilities, wireless service facilities and interconnection facilities. These facilities must comply with the technical standards regulated by the state and a facility licence application cannot be filed with the Ministry of Information Industry until it has been tested and approved by the Industry Quality Supervisory authorities.

Telecommunications security

Security in telecommunications networks and information has become an economic and social issue. The Telecommunications Decree sets out 17 articles of prohibited acts regarding network crime and illegal acts. Moreover, the Decree has provisions requiring international telecommunications service providers to deploy and operate international gateways under the MII permit in order to establish China as an internationally competitive nation in telecommunications.

Evaluation and future prospects of the Telecommunications Decree

Prior to the Telecommunications Decree, the Chinese telecommunications market was planned and managed by the state government. The enforcement of the Decree implemented basic controls and regulations with a view to promoting a market economy. Although coming somewhat late, the Decree is expected to contribute significantly to the restructuring and development of the telecommunications industry in China. In particular, changes to licensing policies, strengthening of interconnection regulations and the introduction of a system of service quality will represent key improvements.

Despite WTO membership, some limitations remain in Chinese telecommunications markets.¹⁸ The Telecommunications Decree sets out transitional administrative regulations prior to the establishment of a full-scale telecommunications law. The Decree must be subsumed by the new comprehensive Telecommunications Law which may expect to be adopted in the near future.¹⁹ In order to maximise the public benefit of full market competition, the Decree must first regulate the market power of China Telecom by enhancing interconnection policy. Although the Decree emphasises the importance of interconnection, it does so at the basic level with no reference to unbundling. To stimulate competition in the market, regulations concerning equal access, carrier selection, and a more specific methodology to decide interconnection charges should be either established. Furthermore, with a fixed-line telephony penetration rate of only 12%, the universal service obligation is of key importance and needs to be introduced in the future telecommunications law.

With respect to spectrum allocation, the Telecommunications Decree considers the licensing of spectrum and regulates the principle levels of the spectrum. In view of the trend towards a market economy, it is anticipated that approval for mergers and acquisitions between operators and the lifting of limits on foreign investments will be promoted in stages.

CHAPTER 3: THE CHINESE TELECOMMUNICATIONS MARKET²⁰

3.1. Structure of the telecommunications market

3.1.1. Overview

Prior to the establishment of the present competitive market system, the Chinese telecommunications sector went through three major reforms: *i*) the formation of China Unicom in 1994 by decision of the State Council; *ii*) the establishment of China Mobile in April 2000; *iii*) the break-up of the old China Telecom in May 2002.

The restructuring of the telecommunications sector separated the state and enterprise in 1995, as well as breaking out the operations of post and telecommunications. Another new competition structure has been underway with the recent entrance of Jitong and China Netcom in the market and eventual merge of these two companies into a new China Netcom.

The Chinese telecommunications market comprises six main operators: China Telecom, China Unicom, China Mobile, new China Network Telecom (“China Netcom”), with old China Jitong Telecom (“Jitong”), China Satellite, and China Railcom. Fixed-line local, long-distance and international telephony services are provided by China Telecom, China Netcom and China Unicom, China Railcom, mobile services by China Mobile and China Unicom, and IP telephony service by China Telecom, China Unicom, China Netcom including old Jitong, China Mobile, China Railway Telecom (“China Railcom”). ChinaSat provides the satellite service, including VAST. At first sight, many operators appear to be participating in the service market; however, in reality, only China Unicom provides comprehensive services that include fixed, wireless, mobile, data, IP telephony, internet, and paging services.

Railway and broadcasting networks (especially TV networks) have the capacity to adapt to the telecommunications sector in various ways. However, despite the benefit of cross-participation of the broadcasting network and telecommunications sectors, this practice is not permitted at present.

Table 3.1 Market players in the Chinese telecommunications market

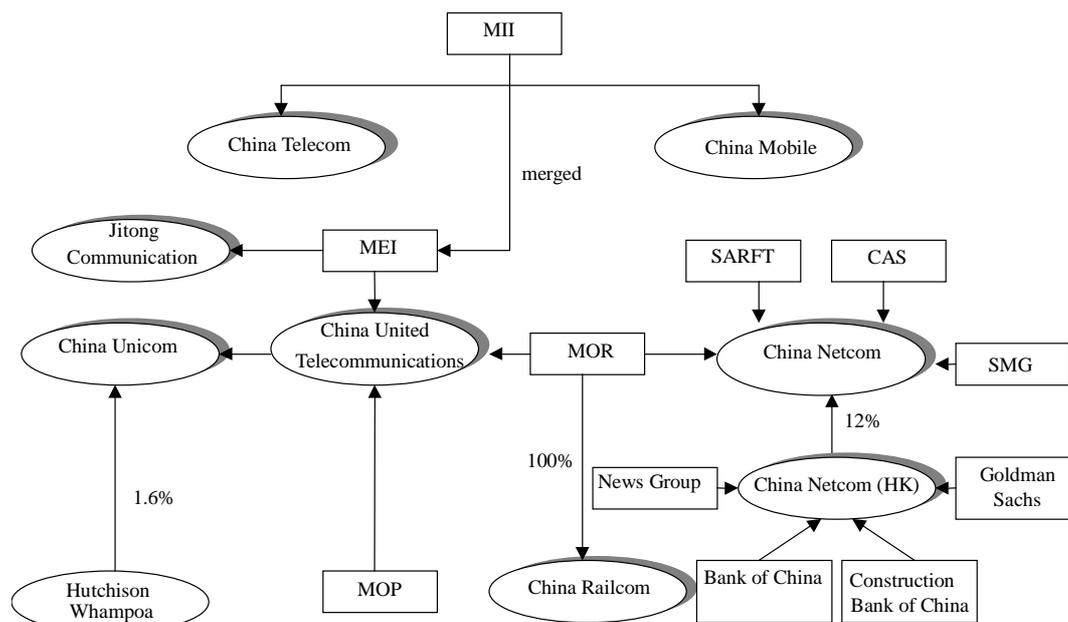
Category	Telecommunications providers
Fixed line telephony	China Telecom, China Unicom, (China Netcom)
Mobile telephony	China Mobile, China Unicom
Paging	Guoxin, Zhongbei, Lunxun, Wancheng, Wanlitong, etc.
IP telephony	China Telecom, China Unicom, China Netcom, China Mobile, China Railcom, (Jitong),
Satellite service	China Sat

Source: OECD.

Since the creation of the Chinese telecommunications market, China Telecom and China Mobile have shown a strong capacity to develop. China Unicom, China Netcom/Jitong and China Telecom have grown rapidly, although they still lag behind the market leaders.

The ownership chain of the main telecommunication operators presents a number of interesting features.²¹ Most of the Chinese telecommunication companies are owned by Chinese governmental bodies, such as MII, the Ministry of Railway, or the State Administration for Film, Radio and Television (SARFT).

Figure 3.1. Ownership chain of major telecommunication operators in China (as of 2001)



Key:

MII: Ministry of Information Industry; MEI: Ministry of Electronics Industry; MOR: Ministry of Railways;
MOP: Ministry of Powers; SARFT: State Administration for Film, Radio and Television;

CAS: Chinese Academy of Science; SMG: Shanghai municipal government

MII is a majority shareholder in two major public telecommunications companies: China Telecom and China Mobile. Prior to the establishment of MII, the Ministry of the Electronics Industry, a fierce rival of the then Ministry of Post and Telecommunication, was a majority shareholder in China Unicom and Jitong. However, with the integration of the Ministry of Electronics Industry within MII, MII has become a majority shareholder in both companies²².

Meanwhile, SARFT and the Ministry of Railways, MII's other rivals in the sector, are majority shareholders of China Netcom. In particular, the Ministry of Railways holds a significant amount of China Unicom shares and established China Railcom in December 2000.

The old China Netcom was founded in August of 1999 by the Chinese Academy of Science, the Ministry of Railways, SARFT, and the Shanghai Municipal Government. In February 2001, old China Netcom closed its first round of private equity offering, raising USD 325 million, about 12% of its shares, from investors such as News Corp, Goldman Sachs, Bank of China and the Construction Bank of China. However, the China Netcom was re-established on May 2002, as one of three big integrated service providers, along with the new China Telecom and China Unicom, providing local and long distance service, as well as data and IP telephony services.

Two main conclusions can be drawn based on the shareholding structure of the Chinese telecommunications companies. First, there is competition in the Chinese telecommunications market among various governmental bodies such as MII, the Ministry of Railways, the Ministry of Powers, SARFT, and the Shanghai Municipal Government. This situation is very different from that in the telecommunications market in developed countries where private telecommunication companies vie for power.

Second, MII is able to influence the entire Chinese telecommunication market through its control of leading Chinese telecommunication companies such as China Telecom, China Mobile and China Unicom. In effect, competition in the Chinese telecommunications market is managed by MII.²³ To facilitate genuine competition among service providers, the independence of the telecommunication companies from government influence would need to be ensured. The independence of telecommunication companies would be best ensured through privatisation, but it is expected that the privatisation process for these enterprises will take a considerable amount of time. As an interim measure, and to ensure independence between operational and policy functions, the shares of these major telecommunication carriers should be held by other ministries (such as the Ministry of Finance).²⁴

3.1.2 *The Break-up of the old China Telecom*²⁵

At the end of 2001, the State Council began to consider the division of the old China Telecom, the country's near monopoly fixed line phone operator, to promote competition in the market and provide better services to customers. Thus, on 16 May, 2002, the old China Telecom was split into two new regional companies – one serving the north of China and the other serving the south and west of the country. Under the approval of the State Council, the company was divided into two regional companies, China Telecom (CT) and China Netcom (CNC).

The new China Netcom has assets of the old China Telecom's 10 northern and coastal provinces and cities and merged with the old China NetCom, the long distance backbone carrier and only Chinese telecommunications firm with direct foreign investment. The old China Telecom's assets in the 21 remaining provinces and cities in the south and northwest operate under the name of China Telecom.

Table 3.2. The break-up of old China Telecom

China Netcom	China Telecom
10 northern Provinces/Municipalities: Heilongjiang, Liaoning, Jilin, Hebei, Henan, Inner Mongolia, Shandong, Shanxi, Beijing and Tianjin.	21 southern Provinces/Municipalities: Anhui, Chongqing, Gansu, Guangxi, Hainan, Hunan, Jiangsu, Ningxia, Sichuan, Xinjiang, Zhejiang, Fujian, Guangdong, Guizhou, Hebei, Jiangxi, Qinghai, Shaanxi, Shanghai, Tibet and Yunnan
Approx. population covered: 430.5 million	Approx. population covered: 828.6 million
Backbone 17 major cities and provincial capitals; small VoIP long-distance business	
Fixed line, IP backbone	Fixed line

Source: OECD.

The rationale behind that decision was to stimulate competition in the fixed line market and facilitate the planned USD 4-6 billion overseas IPO for China Telecom.²⁶ The creation of two new smaller companies offers the chance to serve up more "bite size" investment opportunities to the world's capital market. However, this regional break-up would do little to encourage competition unless each regional company

would be allowed to compete in the other company's geographic territory.²⁷ In particular, it does not bring any new competition to the key area of local loop access.

3.2. Fixed-line telephony

3.2.1. *The local call market*

In September 2002, there were 207 million local telephone subscribers, from 144 million at the end of 2000, a significant increase of 44% over 20 months. Actually, in 2001, China became the country with the largest number of fixed-line subscribers, reaching 180 million. While China's favourable economic outlook will stimulate the growth of fixed-line take-up, the increase in local fixed-line tariffs as of the beginning of 2001 may dampen this trend.

There are currently four local fixed-line operators in China, China Telecom, China Netcom, China Railcom and China Unicom (the parent of the listed Unicom). Before the break-up, the old China Telecom, the former monopoly, was by far the dominant player, with a market share more than 99%, reporting a 34 million increase in fixed-line subscribers to about 179 million by the end of 2001. By contrast, China Unicom, which only rolled out its local fixed-line services in 1999, had about 168,000 customers (less than 1% of market share) at the end of 2001. The China Unicom group provides local fixed-line services in Tingjin, Chengdu and Chongqing areas. Since the China Unicom Group has no universal service obligation (USO), it operates only in areas which provide synergy with its mobile, and data and Internet businesses. At the end of 2001, China Railcom had 1.4 million users, 96.5% of them were urban subscribers.

MII announced a long-expected fixed-line tariff rebalancing scheme in late 2000, which took effect officially from 1 January 2001. Local usage tariffs appear to have been raised broadly in line with China Telecom's original proposal of CNY 0.1 per minute (*i.e.* about a 67% increase). For the residential monthly fee, MII has changed the payment schedule from number-or-switchers-based to location-based.

Under the new monthly fee system, it is estimated that residential users in cities now pay 54% more (from CNY 14.6 on average to CNY 22.5 on average) while users in rural areas pay 14% less (from CNY 14.6 on average to CNY 12.5 on average).²⁸ Business users will have to pay 33% more (from CNY 22.5 on average to CNY 30 on average). China Telecom was known to have proposed a 25% decrease, and this may suggest that the government favoured China Telecom in this area by allowing it to increase both local usage charges and average monthly fees. Furthermore, China Unicom has the right to charge 10% below the State guidance rate.

3.2.2. *Long-distance market*

The long-distance market remained dominated by the old China Telecom. In April, 2000, China Unicom launched its long-distance services in 25 cities, extending the services to 220 cities by the end of 2000. China Unicom also reported total long-distance traffic of 1 billion minutes for 2000. Since China Unicom is allowed by the authorities to set its rates 10% below the State guidance rate for long-distance services,²⁹ the company is expected to gradually increase its market share in this area. Furthermore, the break-up of the old China Telecom will result in new competition in the long distance market.

According to the above-mentioned tariff rebalancing plan, the state guidance rates for IDD/IDD PSTN have been revised as follows. For DLD services, China Telecom had proposed a reduction in circuit-switched DLD tariffs to CNY 0.6 per minute; it appears that the tariffs have been reduced by less than the original proposal. Meanwhile, VoIP DLD services are currently billed at CNY 0.3 per minute. According

to the MII announcement, operators will be allowed to set their own VoIP tariffs and the authorities have not specified that prior approval will be required.

For IDD services, China Telecom had proposed a reduction in circuit switched IDD tariffs (for Hong Kong, Macao and Chinese Taipei) to CNY 3.0 per minute; the reduction is therefore higher than that originally put forward. For other areas, China Telecom is believed to have proposed a reduction in circuit-switched IDD tariffs to CNY 5.0 per minute, *i.e.* the reduction is lower than the original proposal. VoIP IDD services were originally billed at CNY 2.5 per minute to Hong Kong, Macao and Chinese Taipei and at CNY 4.8 per minute to other destinations. According to the MII announcement, operators would be allowed to set their own VoIP tariff (with the exception of settlement rates for international calls, which must follow the guidance rate set by MII). China Unicom recently announced its new DLD/IDD tariff plan, effective as of 21 February 2001. The revised PSTN tariffs represent a 10% discount compared to the new State guidance rate.

In response to these changes in tariffs, China Netcom cut its prices for VoIP IDD calls to the United States and Canada by 50% to CNY 2.4 per minute, and dropped the price of calls to other international destinations by 33% to CNY 3.2 per minute, and of calls to Hong Kong, Macao and Chinese Taipei by 40% to CNY 1.5 per minute, with effect from 1 January 2001. Unicom also revised downwards their VoIP IDD tariff by 25-46% and its new IDD VoIP charges are 25-46% lower than those of China Telecom. Over the medium-to-long term, although the reduction in IP tariffs may stimulate more traffic, the freeing up of IP charges may trigger greater price competition between the operators.

DLD/IDD operators would be allowed to adjust their rates for holidays and non-peak hours in line with market forces. Recently, China Unicom has offered an additional discount of 17-50% for its off-peak hour PSTN services; its rates are thus 21-25% lower than those recently announced in China Telecom's new promotion package. In addition, each year DLD/IDD and IPLC service providers, excluding China Telecom, would be permitted to recommend tariff revisions to the MII (on an above-cost basis). These measures may allow China Unicom to win market share from China Telecom. However, given the freeing-up of IP telephony charges and its increasing popularity, it is expected that the impact of this new policy may be lessened.

Internet protocol (IP) telephony services were introduced in China in mid-1999. Currently, six companies are licensed by the Chinese government to offer nation-wide IP-based commercial voice and data communications services: China Telecom, China Unicom, China Mobile, China Netcom/Jitong and China Railway Telecom. It is estimated that DLD/IDD VoIP traffic accounted for only 2.2% of the total DLD/IDD traffic in China in 2000. According to MII, IDD VoIP traffic accounted for 88.4% of the total VoIP traffic in 2000, largely attributable to the bigger price differential between IDD PSTN and IDD VoIP services. In view of the freeing-up of IP telephony charges since 1 January 2001, and the increasing quality of IP telephony, the market share of VoIP is expected to increase to 20% in 2005.

3.2.3. Regional disparities in fixed-line service

Fixed-line telephony subscribers and growth trends in China

The number of fixed telephony subscribers in China is increasing at a rate of much more than 20% per year. By the end of 2001, the total number of subscribers for fixed-line telephony services was recorded at 179 million, a 23.4% jump from the previous year.

Table 3.3. Fixed telephony subscribers and growth trends in China

Unit: in terms of thousands

	1997	1998	1999	2000	2001	2002.9
Total subscribers	7 027 (27.8%)	8 735 (24.3%)	10 881 (24.6%)	14 512 (33.4%)	17903 (23.4%)	20700 (15.6%)
Penetration rate	5.68	7.00	8.64	11.4	13.9	16.25

Source: Ministry of Information Industry.

Note: Growth rate is shown in parentheses (15.6%: 2001.12-2002.9).

However, in terms of the penetration rate of fixed telephony, at the end of 2001 this stood at 13.9, a relatively low level compared to other advanced countries.

The number of subscribers for fixed telephony has almost tripled in the past four and half years, indicating rapid growth in the fixed telephony market. The Chinese government estimates the number of total subscribers for fixed telephony services to be in the range of 220 million to 260 million in 2005 by the end of the Tenth Five-year Plan.

Regional divergences

China is divided into 31 regions. One of the key problems facing the country's development is the large variations in standards of living from one region to another. In regards to the national infrastructure, differences in the level of telecommunication services among regions are evident.

Based on the penetration rate of fixed telephony at the end of 1999, the latest available data, the top five regions are located in the north-eastern part of the country which includes Shanghai, Beijing, Tianjin, Guangdong and Zhejiang. In these regions, the number of subscribers for fixed telephony totals 26.68 million, at a penetration rate of 22.5% which is comparatively higher than other regions.

Table 3.4. Penetration rate of fixed telephony in the top five regions

Ranking	Area	Fixed-line subscriber		Penetration rate	
1	Shanghai	1998	4.66 million	1998	31.6
		1999	4.84 million	1999	32.4
2	Beijing	1998	3.44 million	1998	27.4
		1999	3.76 million	1999	29.6
3	Tianjin	1998	1.78 million	1998	18.4
		1999	2.04 million	1999	20.9
4	Guangdong	1998	10.48 million	1998	14.7
		1999	11.37 million	1999	15.7
5	Zhejiang	1998	5.51 million	1998	12.3
		1999	6.67 million	1999	14.7
Sub-total/Average penetration		1998	25.87 million	1998	20.88
		1999	28.68 million	1999	22.66

Source: Ministry of Information Industry.

In contrast, in Guizhou, Tibet, Sichuan, Guangxi, Gansu, five regions located in the mid-western part of China, the total number of fixed telephony subscribers amounted to 8.59 million, with a penetration rate of a mere 3.9%.

It should be noted, however, that the mid-western regions have shown a comparatively higher rate of growth in fixed telephone subscribers, with a 15.6% rate of growth in the five most backward regions compared to 3.9% in the top five regions in 1998.

However, the percentage of subscribers in these regions among total fixed telephony subscribers has declined overall. The weight of the five eastern regions among total subscribers has fallen slightly from 29.6% in 1988 to 26.4% in 1999, while for the five areas in the mid-western region, shares have declined from 0.085% in 1998 to 0.078% in 1999. This indicates that, despite the strong support by the Chinese government for telecommunications development in the mid-western region, little improvement has been achieved.

Table 3.5. Penetration rate of fixed telephony in the five most backward regions

Ranking	Area	Fixed-line subscribers		Penetration rate	
		Year	Number	Year	Rate (%)
31	Guizhou	1998	0.84 million	1998	2.3
		1999	1.09 million	1999	3.0
30	Tibet	1998	0.07 million	1998	2.6
		1999	0.08 million	1999	3.1
29	Sichuan	1998	3.82 million	1998	3.6
		1999	4.14 million	1999	4.4
28	Guangxi	1998	1.72 million	1998	3.7
		1999	2.10 million	1999	4.4
27	Gansu	1998	0.98 million	1998	3.9
		1999	1.18 million	1999	4.6
Subtotal/Average penetration		1998	7.43 million	1998	3.22
		1999	8.59 million	1999	3.9

Source: Ministry of Information Industry.

The urban/rural divide

As of 1998, with nearly 70% of the total population in China residing in rural and farming areas, rural areas contribute significantly to the Chinese economy. In this connection, the first objective of the Tenth Five-year Plan targets the strengthening of the rural economy, it being recognised that. The basis for the continued growth of the Chinese economy lies in the development of the rural areas.

However, this type of support by the government strongly suggests the existence of a substantial income gap between urban and rural regions. The divide in the area of telecommunications poses a difficult challenge that the Chinese government must resolve. Installing telecommunications networks in rural areas entails not only high construction costs but also a vicious circle whereby the low number of subscribers leads to low productivity levels in telecommunications companies who have difficulties in attaining economies of scale. Low income levels in the agricultural regions restrict spending, thus hindering the development of the telecommunications network in these areas.

As noted above, the urban/rural divide appears to be relatively large in the case of telecommunications. However, as shown in the following table which sets out the Chinese government's plans for development policies and continued investments in rural areas, the information gap between rural and urban regions is expected to narrow. In 1997, the shares of subscribers in urban and rural regions were substantially different, at 75.9% and 24.1%; however, in 2000, the gap was reduced to 64.2% for urban regions and 35.8% for rural regions. With its Tenth Five-year Plan, the Chinese government plans to increase the number of fixed telephone subscribers in rural areas to over 100 million through continued investments in these regions.

Table 3.6. Growth trends in fixed telephony subscribers in rural and urban areas

	1997	1998	1999	2000
Urban areas	5 332.6 (75.9%)	6 257 (71.6%)	7 463 (68.6%)	9 297 (64.2%)
Rural areas	1 694.4 (24.1%)	2 478 (28.4%)	3 418 (31.4%)	5 183 (35.8%)
Total subscribers	7 027	8 735	10 880.7	14 512.2

Source: MII Statistics Report.

Evaluation and future work

The digital divide in China can be roughly categorised into a regional and an urban-rural divide. Despite the continuing efforts of the Chinese government, there has been little success in resolving the digital divide among regions; however, there is some hope of narrowing the digital divide between rural and urban areas.

Efforts to resolve the gap in telecommunications are high on the agenda of recent government policies. Implementing these policies and providing universal services for the Chinese people will be the responsibility of China's leading fixed telephony provider, China Telecom. However, in the absence of a framework for the expansion of universal service and, without reasonable compensation, China Telecom will inevitably delay the construction of the information network in remote regions in order to deal with factors that will negatively affect profitability.

A universal service framework, outlining the areas of service, responsibilities and funding, urgently needs to be established in order to stimulate the development of the information network in remote regions, protect new entrants and ensure the sound development of China Telecom.

3.3. Wireless paging service

Wireless paging service was first introduced in China in 1984. By September 2002, the total number of paging service subscribers was 21.7 million, with over 1 700 companies providing service. Considering the geographical characteristics of China and its large population, it was thought that paging services would maintain its market status especially since demand for paging service had been increasing steadily in the mid-western provinces and in rural areas where telephone penetration rates and income levels are very low. As of November 2000, with 49 million paging subscribers, the Chinese market was the largest in the world. However, the introduction of mobile phones has had a significant impact on paging services. Since its peak in 2000, the number of subscribers in the wireless paging market has continuously declined, down to more than half of its peak (21.7 million).

The main paging companies in China are Guoxin (a former subsidiary of old China Telecom), Jungbai, Lunshuin, Wansung, Wanlitong, Jungtae, Minhang and Luiwha. In February 1999 with the State Council's decision to restructure the telecommunications market, Guoxin was transferred to China Unicom. At the end of 2000, Guoxin held 60% of the market share.

3.4. IP telephony

3.4.1. Overview

China's IP telephony service began in April 1999 when the Ministry of Information Industry (MII) introduced a licensing system for IP telephony operators. Restricted IP telephony service licences were initially issued as a pilot service to the state-owned companies China Telecom, China Unicom and old Jitong, with the goal of launching pilot services in 26 cities for a period of six months. After October 1999, China Netcom was included in the market to deliver services, and on 30 March 2000, MII granted full legal operating licences to the four operators.

IP telephony has considerable price advantages over the existing fixed-line telephone. In particular, its service charge for domestic long-distance and international calls is only half of that of the fixed-line telephone. Because of this price competitiveness, the IP telephony market has experienced remarkable growth since the launching of the pilot service. The MII forecasts that the market volume of the IP telephony service will reach CNY 100 billion by 2002.

3.4.2. IP telephony service market

In China, IP telephony service (phone-to-phone service), is categorised as basic communications and comes under the supervision of MII. In March 2000, MII granted permission to provide commercial services to five service providers: China Telecom, China Unicom, Jitong, China Netcom, and China Mobile.

Since the start of the pilot service, IP telephony has become hugely popular with the general public as the fixed-line service charge for toll and international calls was extremely expensive. The IP telephony traffic, a mere 103.6 million minutes in 1999, rocketed by 2 772% to reach 2.975 billion minutes in 2000.

Table 3.7. Growth of China's IP telephony traffic

Unit: 100 million minutes, percentage

	1999	2000	Growth rate(%)
Toll calls	0.74 (71.4)	27.83 (93.5)	3 661
International calls	0.22 (21.2)	1.37 (4.6)	624
International calls to Hong Kong, Macao, Chinese Taipei	0.076 (7.4)	0.55 (1.9)	523
Total	1.036 (100)	29.75 (100)	2 772

Source: MII Statistics Report.

Note: Share among all IP telephony traffic is shown in parentheses.

In terms of Internet service, the use of domestic long-distance telephone calls soared by 3 661%, while international calls and calls to Hong Kong, Macao and Chinese Taipei increased by 624% and 523%, respectively.

In terms of shares of total IP telephony service, in 1999, toll calls, international calls, and calls to Hong Kong, Macao and Chinese Taipei accounted for 71.4%, 21.2% and 7.4%, respectively. In 2000, the number of toll calls increased rapidly and, as a result, the shares changed to 93.5%, 4.6% and 1.9%.

Meanwhile, in terms of the share of IP telephony service in total traffic in the respective markets, international calls, international calls to Hong Kong, Macao and Chinese Taipei, and toll calls accounted for 20%, 5.4% and 4.3%, respectively.

Table 3.8. Traffic between fixed line and IP telephony by service category

Unit: 10 000 minutes, percentage

Category		Traffic	%
Toll calls	Fixed-line telephone	6 132 998	95.7
	IP telephony	278 293	4.3
	Total	6 411 291	100
International calls	Fixed-line telephone	55 084	80
	IP telephony	13 729	20
	Total	68 813	100
International calls to Hong Kong, Macao, Chinese Taipei	Fixed-line telephone	98 517	94.6
	IP telephony	5 569	5.4
	Total	104 086	100

Source: The Analysis of Domestic IP Telephony Equipment Market, Telecommunications World, 2001. 5. 28.

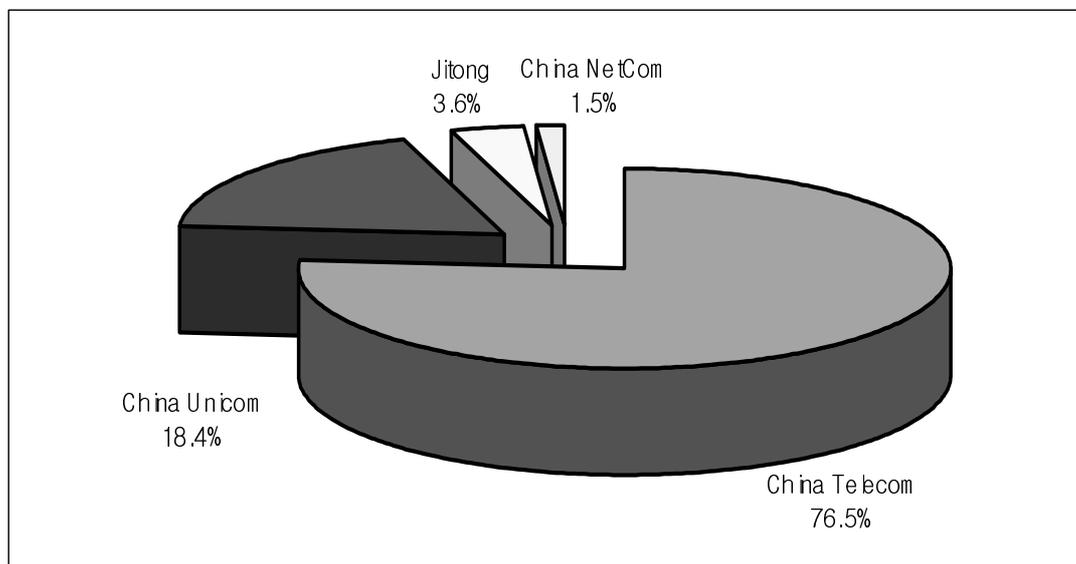
In China's telecommunications industry, depending on the business, service charges are set by applying one of the following three mechanisms. The first pricing mechanism is to allow service providers themselves to set the service charge. The second is to decide on a price, based on the government's advice. The third is to let the government set the service charge. In IP telephony, the first mechanism is applied. In 2001, with latecomers China Netcom and Jitong drastically cutting service charges, the IP telephony service market has become highly competitive.

China Netcom's steep price cut (33-50%) triggered a "full-scale war" to cut service charges. On 18 February 2001, in response to China Netcom's lead, Jitong reduced its service fee and adopted a policy of charging clients on a six-second basis rather than on the former one-minute basis. It also set a "discount time zone" according to which users can enjoy a discounted service rate at designated times. China Unicom and China Telecom joined the movement on 21 February and 1 June 2001, respectively.

In terms of China's IP telephony service market shares, China Telecom, China Unicom, Jitong, China Netcom had 76.5%, 18.4% 3.6%, and 1.5% of market share, respectively, as of June 2001. China Telecom strengthened its IP telephony operation and its share continues to grow. In particular, China Telecom's market share in toll calls, which account for the largest portion of the IP telephony service, is extremely

large. Meanwhile, China Unicom, Jitong, and China Netcom are focusing their resources on international calls.

Figure 3.1. Market share in the IP telephony service market



Due to these price wars among service providers, charges for IP telephony are about 25%, up to 50% cheaper than those for fixed-line telephony.

3.4.3. Future prospects and tasks

Since its introduction in April 1999, IP telephony service has enjoyed explosive growth every year. The IP telephony traffic, (as of April 2001) recorded 4.6 billion minutes, 53% more than the entire traffic for 2000. This figure strongly suggests that growth will continue into the second half of the year, partly because the penetration rate for fixed-line telephony remains very low (at around 12%). Also, in view of the expensive service charge for long-distance calls, demand for IP telephony service will remain strong for at least the next two or three years.

It should be noted that, in the process, the Chinese communications network will be rapidly transformed from the existing voice communications network to a packet exchange-based IP network. In other words, in setting up a key communications network, China's telecommunication service providers are adopting the IP network rather than expanding the existing voice communications network. This is because the IP network enables a number of services and allows service providers to economise on costs. Indeed, major telecommunications service providers are investing huge amounts of money and efforts in establishing the IP network.

Table 3.9. Comparison of service charges between fixed telephony and IP telephony among service providers, July 2001

CNY per minute

		China Telecom		China Unicom		JiTong		China Netcom
		Peak rate	Off-peak rate	Peak rate	Off-peak rate	Peak rate	Off-peak rate	
Fixed-line telephone	Toll calls	0.7	0.4	0.6	0.3	-	-	-
	Hong Kong, Macao, Chinese Taipei	2	n.a.	1.8	1.5	-	-	-
	Other countries	8	4.8	7.2	3.8	-	-	-
IP telephony	Toll calls	0.3		0.3		0.3	-	0.3
	Hong Kong, Macao, Chinese Taipei	1.5		1.5		1.2	1.0	1.5
	United States, Canada	2.4		2.6		2.4	2.0	2.4
	Other countries	3.6-4.6		3.6		3.0-3.5	2.6-3.0	3.2

Source: Homepages of each company.

Note: Jitong charges users on a six-second basis. The above figure is the charge converted to a one-minute basis.

However, China's IP telephony service industry, like that of other countries, has to rise to the challenge of improving the quality of service (QoS). In fact, despite the explosive growth of the IP telephony market, big businesses and clients with financial resources are showing little interest. Thus, if IP telephony is to replace the existing telephone line, service providers and equipment manufacturers need to put improving the quality of service high on their agendas. In this respect, the establishment of the IP network in China will serve as a valuable test to examine whether the IP network can serve as a major telecommunications network.

3.5. Mobile telephony

3.5.1. Overview of the mobile telephony market in China

The IT industry requires enormous investments in facilities and equipment. In the past, the IT sector has been operated mainly by the government. However, in more recent years, rapid developments in IT, together with the government's efforts in enhancing the functioning of the market, have meant that the government has tended to divide its functions into two parts: regulation and operation. The separation of the communications sector led to the emergence of a public corporation and the introduction of competition in the market. This is what generally occurs in countries when their telecommunications markets are liberalised and China, is no exception to the rule.

Chinese mobile telephony service was first introduced in 1987 in Guangdong Province by the then Ministry of Posts and Telecommunications (MPT) (*i.e.* the current Ministry of Information Industry).³⁰ At that time, mobile services were analogue but, starting in 1994, China Telecom established an extensive GSM digital mobile communications network and began to expand its digital service.

In 1995, the Chinese government launched China Telecom by separating the communications operation function from the MPT, where both regulation and communication network operation functions had been managed. In April 2000, the mobile telephony section was split off from China Telecom to form China Mobile.

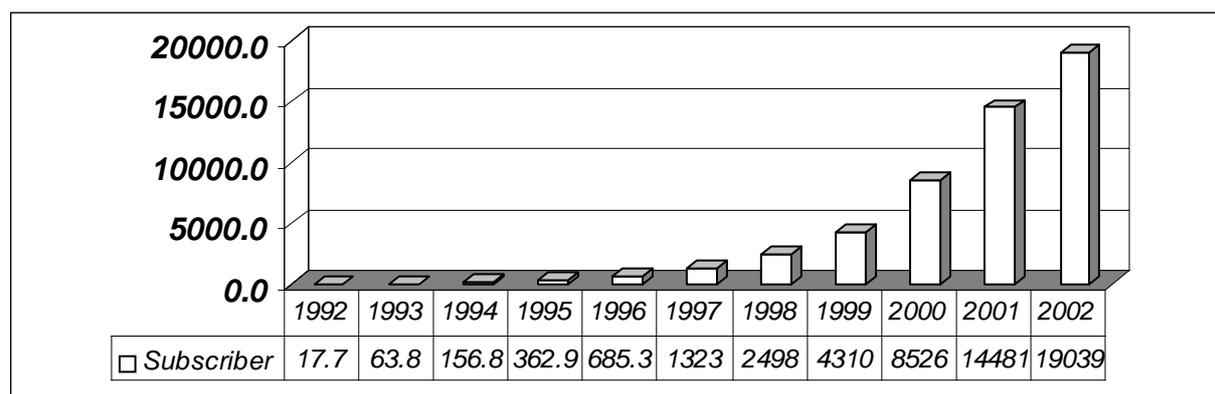
In July 1994, China Unicom was launched, transforming the Chinese mobile telephony market from a monopolistic to a duopolistic system, along with China Mobile. In July 1995, the then MPT and the People's Liberation Army jointly established the Chinese Great Wall Network Corporation (CGWNet), increasing the mobile service sector to three service providers. Then CGWNet constructed a CDMA-based mobile telephone service network and provided pilot services in areas such as Beijing, Xian, Shanghai and Guangxi until the end of 2000. However, the Chinese mobile sector reverted to a duopoly market structure in January 2001, when China Unicom acquired CGWNet.

The Chinese mobile telephony market has enjoyed a two-digit growth rate. In 2000, the number of mobile phone subscribers in the country grew by 97.8%, compared to the previous year, which recorded 85.26 million subscribers. The year 2001 saw a phenomenal growth rate of 69.8% for new subscribers compared to 2000, resulting in a total of 144.8 million users in China at the end of the year. The latest number of subscribers was 190.39 million, as of September 2002.

The explosive growth of subscribers in recent years is attributable to the increase in income per capita, the decrease in handset prices and service charges and the low wired-telephone distribution across the country, in addition to the Chinese government's strong drive for more competition in the market.

Figure 3.3. Increase in mobile telephony subscribers

Unit: 10 000 inhabitants



Source: Ministry of Information Industry Homepage (<http://www.mii.gov.cn>).

3.5.2. Geographical distribution of mobile telephone subscribers

Among the top ten mobile telephony markets, Guangdong Province ranks first in mobile telephone subscribers, with 6.73 million users based in 1999. This accounts for 15.6% of the total 43.1 million subscribers in 1999. Numbers of subscribers in other regions are: Zhejiang (3.42 million), Jiangsu (2.9 million), Fujian (2.79 million), Shandong (2.52 million), Liaoning (2.52 million), Shanghai (2.03 million), Beijing (1.87 million), Henan (1.82 million), and Sichuan (1.7 million). These top ten provinces have a growth rate of more than 50% compared with the previous year. Zhejiang, in particular, exhibits a growth rate of an astonishing 112.4%, followed by Jiangsu (95.9%), Liaoning (90.9%), Fujian (89.8%), Shandong (72.6%) and Beijing (70%).

In terms of mobile telephony penetration rates, Beijing ranks first with 14.7%, followed by Shanghai (13.6%), Guangdong (9.3%), Fujian (8.3%) and Zhejiang (7.5%). In view of the fact that the mobile telephony penetration rate in China was 3.4% in 1999, this is a relatively high rate of penetration. At the end of 1999, 65.4% of mobile telephony users were located in these ten regions situated on the eastern coast of China.

Table 3.10. Top ten regions in the mobile telephony market

Unit: 10 000 inhabitants, percentage

Province	Mobile telephone subscribers			Penetration rate compared to population, by provinces	
	1998	1999	Growth rate compared to previous year	1998	1999
Guangdong	406 (1)	673 (1)	65.8	5.2 (3)	9.3 (3)
Zhejiang	161 (2)	342 (2)	112.4	3.3 (6)	7.5 (5)
Jiangsu	148 (3)	290 (3)	95.9	1.9 (11)	4.0 (10)
Fujian	147 (4)	279 (4)	89.8	4.3 (5)	8.3 (4)
Shandong	146 (5)	252 (5)	72.6	1.5 (12)	2.8 (12)
Liaoning	132 (6)	252 (6)	90.9	3.1 (7)	5.9 (7)
Shanghai	127 (7)	203 (7)	59.8	7.5 (1)	13.6 (2)
Beijing	110 (10)	187 (8)	70.0	7.4 (2)	14.7 (1)
Henan	119 (8)	182 (9)	52.9	1.3 (16)	1.9 (21)
Sichuan	107 (11)	170 (10)	58.9	2.8 (8)	4.3 (8)

Source: BDA China Online; <http://www.bdaco.com>.

1. Rankings are shown in parentheses.

2. Tianjin (7.1%) ranked sixth and Jilin (4.0%) ranked ninth in terms of mobile telephone penetration.

3.5.3. Mobile telephony service providers

China Mobile

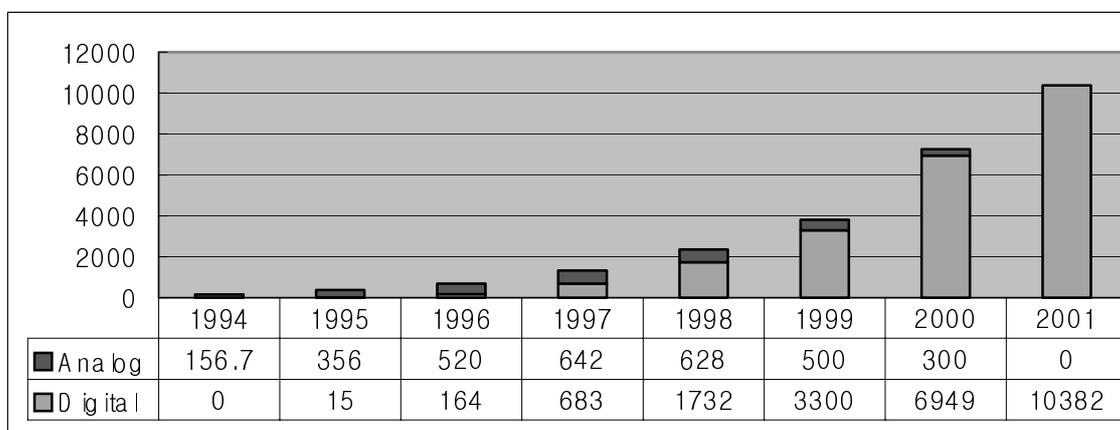
Introduction

The mobile telephony service company China Mobile was broken off from the leading Chinese communications provider, China Telecom, in April 2001. China Mobile is a holding company with subsidiaries in 31 provinces. The majority of its business involves cellular phones, data communication and IP telephones.

The mobile telephony network exists and covers 95% of the country. In relation to international roaming services, 152 GSM network providers in 90 countries and regions have signed contracts with China Mobile. Based on the number of GSM subscribers, China Mobile is the largest communications service provider in the world, having 130 million subscribers as of September 2002. Among them, more than 35 million are users of pre-paid service which started in December 1999 and rapidly increased its share among new subscribers.

As of the end of 2001, the total number of China Mobile subscribers has grown by 43% compared to 2000, to reach 103.82 million users. The market share of China Mobile, however, shrunk to 68.4% in September 2002, from 97% in 1997. Among the services provided, GSM digital service, launched in 1994, has recorded consistently high annual rates of growth. In contrast, analogue subscribers began to fall off from 1997, when the number of digital subscribers outnumbered that of analogue subscribers. Since then, China Mobile has been transferring analogue subscribers to digital services and ended analogue service at the end of 2001.

Figure 3.4. Analogue vs. digital mobile subscribers in China Mobile



Source: China Mobile Homepage. <http://www.chinamobile.com>.

China Mobile (Hong Kong) Ltd.

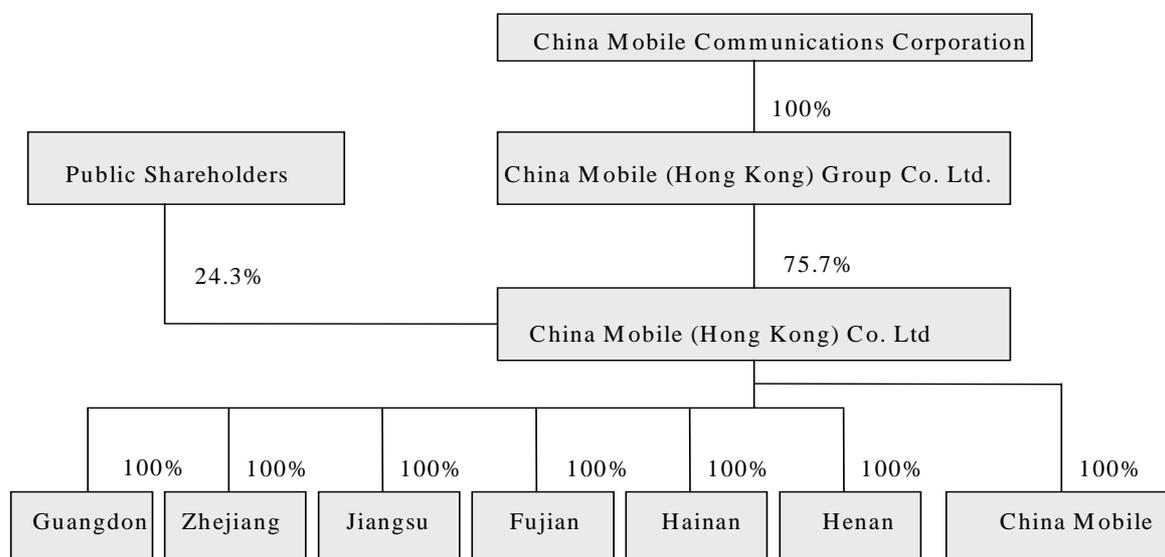
China Telecom (Hong Kong) Ltd. (CTHK) was established in Hong Kong on 3 September 1997 as a subsidiary of China Telecom.³¹ China Telecom (Hong Kong) was listed on the New York Stock Exchange on 22 October 1997. On the following day, the company was listed on the Hong Kong Stock market as well.

China Telecom was split into four companies between February 1999 and April 2000. In this process, China Mobile acquired all the shares of CTHK from China Telecom and became part of China Mobile. Consequently, in May 2000, China Telecom (Hong Kong) Ltd. changed its name to become China Mobile (Hong Kong) Ltd.

China Mobile (Hong Kong) Ltd provides mobile telecommunications services in 21 provinces, municipalities and regions in China, including Guangdong, Zhejiang, Jiangsu, Fujian, Henan, Hainan, Beijing, Shanghai, Tianjin, Hebei, Liaoning, Shandong, Guangxi, Anhui, Jiangxi, Chongqing, Sichuan, Hubei, Hunan, Shaanxi and Shanxi through its 21 wholly-owned subsidiaries. It also owns 100% of China Mobile (Shenzen) and 66.7% of Aspire Holdings Ltd.³²

The company's major shareholder is China Mobile (Hong Kong) Group Limited, which, as of 1 July 2002, indirectly held an equity interest of approximately 75.7 % in the Company through a wholly-owned subsidiary, China Mobile Hong Kong (BVI) Limited. The remaining 24.3 % of equity interest is held by public investors. China Mobile (Hong Kong) employs some 59307 workers, and had 111.4 million subscribers as of September 2002 (58.4% of total cellular phone subscribers in China for the year 2002).

Figure 3.5. Organisation of China Mobile (Hong Kong) Ltd. (as of July 2002)



Source: China Mobile (Hong Kong) Homepage. <http://www.chinamobilehk.com>

China Unicom

Introduction

After China Telecom, China Unicom is the second largest telecommunications provider in China. It was established on 19 July 1994 by a number of government bodies which included the Ministry of Electronics Industry, the Ministry of Electric Power, the Ministry of Railway. Until 1998, China Unicom faced difficulties in attracting cellular phone subscribers from the incumbent, China Telecom. China Telecom took full advantage of its monopolistic position and was able to throttle China Unicom's growth by postponing interconnection with China Unicom, charging high connection fees and granting a subsidy on handsets to new subscribers to China Telecom. Consequently, in 1998, China Unicom, with a 5.6% share

of the market, recorded low sales earnings of only USD 375 million in both mobile telephony and mobile paging services.

In 1999, the Ministry of Information Industry (MII) aimed to stimulate the telecommunications service market by strengthening competition policies. As a result of this measure, rapid growth in cellular phone markets has driven up earnings by a magnitude of five compared to the previous year, at USD 1.9 billion and China Unicom covered 12% of the mobile telephony market in 1999. Furthermore, China Unicom secured CDMA technology, by acquiring CGWNet in January 2001, in addition to the previously adopted GSM technology.

Since January 2002, China Unicom has begun to provide a CDMA commercial service, a little later than the target date of October 2001. At the beginning, China Unicom has set itself the goal of reaching 60 million mobile telephony subscribers, 20 million data service subscribers and 70 million mobile paging subscribers by 2005. However, China Unicom has already achieved one of its goals, by reaching 60 million mobile subscribers by September 2002, much earlier than expected.

As of September 2002, China Unicom had 60 million subscribers. Among these, 4 million are CDMA service subscribers. This subscriber growth was reached in nine months, faster than any country in the world. In December 2001, China Unicom had 41 million subscribers and covered 28.3% of the market. China Unicom subscribers in 2000 totalled 12.77 million. However, in just one year, the company has experienced phenomenal growth, with over 28 million new subscribers. The message is clear: the company has grown extremely rapidly in a very short period of time. Thus, the market share of China Unicom in the sector has also increased remarkably, from 5% in 1998, 15% in 2000, 28.3% in 2001 and 31.6% by the September 2002.

Table 3.11. Growth in China Unicom cellular phone subscribers

Unit: 1 000 inhabitants

System	Year of launch	1998	1999	2000	2001	2002.9
GSM 900	1995	2 000	5 000	12 770	41 000	56 000
CDMA	1998	n.a.	n.a.	n.a.	n.a.	4 000

Source: China Unicom home page (<http://www.chinaunicom.com.cn>).

The major reason for the rapid growth of China Unicom can be explained as follows: it reflects the Chinese government's strong intention to promote competition in this market, the benefit of preferential treatment and asymmetric regulation, especially in tariffs, by the government as a latecomer, and the high expectation of consumers in the commercial provision of CDMA technology. All these aspects and China Unicom's strategy worked in its favour.³³

Listing of China Unicom

Through its Initial Public Offering (IPO) on both the Hong Kong and New York Stock Markets, China Unicom raised some USD 4.92 billion in June 2000. The IPO of China Unicom was the largest in Asia (outside Japan) at that time. The asset listings of China Unicom include GSM mobile communications operating licences in 12 regions and cities, and exclusive rights to build a nation-wide CDMA mobile communication network. Other assets include wireless paging companies acquired from China Telecom, long-distance telephony service business including Internet telephony, data and Internet businesses. Existing China-China-Foreign (CCF) joint venture partners were able to acquire China Unicom shares six months after the IPO concluding date. Hutchison Telecommunications (Hong Kong) Ltd. acquired approximately 2% of China Unicom shares and 10% at the IPO.

The successful completion of the IPO for China Unicom is expected to increase the investments in equipment and facilities in the coming years.

Three-year expansion plan

China Unicom plans to invest some CNY 99.8 billion to expand its communication network by 2003 to put it in a position to compete against its rival, China's leading telecommunications company, China Telecom. As a first step, its GSM and CDMA mobile network has expanded to 75.96 million lines by the end of 2001, among them, CDMA capacity reached 15.8 million. In addition, the company's plan to expand its regional network of broadband optical cables in order to increase its level of coverage from 25 to all provinces and over 330 cities has also met its target in 2001.

Table 3.12. China Unicom's goals from 2000 onwards

Year	Objectives
By 2001	Hold 30% participation in cellular phone market
By 2005	Complete the nation-wide network
By 2010	Become the world's leading communications provider

Source: China Unicom Homepage (<http://www.chinaunicom.com.cn>).

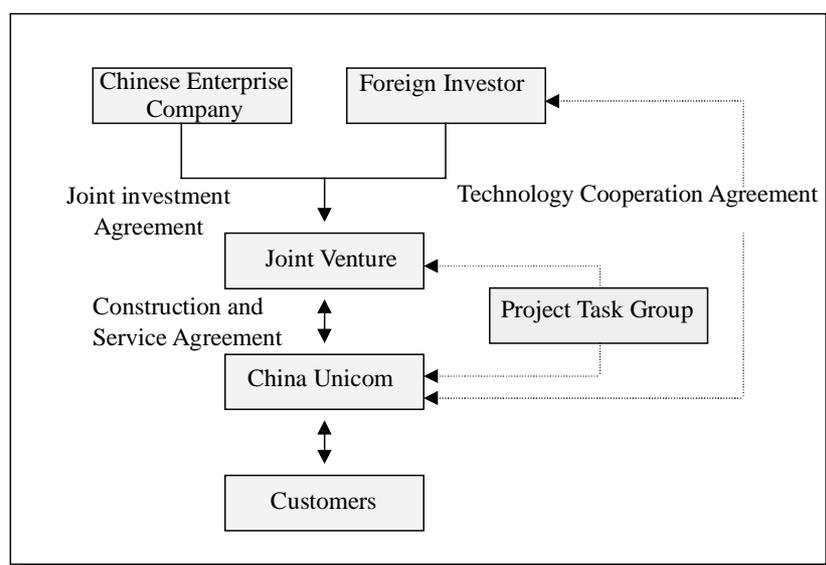
With the objective of expanding the nation-wide infrastructure, Alcatel was awarded the GSM network project to build the backbone network in Jiangsu Province utilising Dense Wave Division Multiplexing/Synchronous Digital Hierarchy (DWDM/SDH). Compared to 1999, China Unicom's revenues increased by some 44% in 2000, amounting to CNY 25 billion.

China-China-Foreign (CCF) joint ventures

At the time of its establishment in 1994, China Unicom found it very difficult to raise the funds required to build its telecommunications network. The lack of availability of domestic funding forced China Unicom to turn to foreign capital. However, foreign direct investment in the Chinese telecommunications service sector was prohibited according to Article 4 of the Enforcement Ordinance of the Foreign Capital Enterprise Law. To this day, foreign direct investment remains prohibited.

However, in searching for ways to circumvent the regulations prohibiting foreign direct investment and attract foreign capital, China Unicom formulated the China-China-Foreign (CCF) joint venture model.

This method involves establishing joint ventures between foreign companies and Chinese enterprises and making investment contracts with China Unicom. Joint ventures with foreign companies are prohibited from owning and operating telecommunications networks, and participation in business management was possible only through indirect methods such as separate agreements on technology co-operation.

Figure 3.6. China-China-Foreign (CCF) joint venture model

Source: KISDI.

By 1998, over 40 foreign companies such as France Telecom had established joint ventures with Chinese companies under the CCF model. Although the Chinese government had given its tacit consent to the CCF model, at the end of 1998, it banned its practice and ordered China Unicom to cancel any agreements made under this model. As a result, China Unicom and its foreign partners haggled for over a year about whether the joint partnership should be dissolved. Finally, in June 2000, they agreed that China Unicom should pay compensation amounting to USD 4 billion and reimburse their CNY 9.8 billion of investment capital.

However, China's membership of the WTO changes the structure of foreign investment. Upon joining the WTO, China allowed contracts equity joint ventures (EJV) to grant up to 25% of foreign ownership in Chinese mobile telecommunication companies upon its joining the WTO and will permit up to 49% ownership by 2004 in this sector.

3.5.4. Demographic characteristics of Chinese mobile subscribers³⁴

Distribution of mobile handset users by occupation

The main users of mobile handsets in China fall into the occupational categories of executive/managers, entrepreneurs or office workers. The number of mobile handset users among executives/managers and entrepreneurs is decreasing annually, while the number of users among office workers has increased from 21.2% in 1998, to 26.5% in 1999 and to 31.7% in 2000. This group has emerged as the most prolific cellular phone users in China, followed by entrepreneurs (27.0%) and executives/managers (20.9%).

Table 3.13. Distribution of mobile handset users, by occupation

Unit: percentage

Occupation	1998	1999	2000
Executives/Managers	28.9	22.9	20.9
Entrepreneurs	34.3	31.8	27.0
Professionals	10.1	12.6	12.3
Office workers	21.2	26.5	31.7
Students	0.6	1.0	1.66
Others	4.9	5.2	6.5

Source: 1999 More Mobile Phones for the General Public, D&A Consulting, May 2000.

The recent growth in use of mobile handsets among general workers signals that China's mobile services are becoming increasingly popular due to the decreases in mobile handset prices, subscription fees, and service rates. Students account for a rapidly growing group among mobile handset users, making up 1.66% of total users in 2000.

Distribution of mobile subscribers by income

In China, the largest mobile telephony subscriber group has a per capita monthly income of between CNY 1 000 and CNY 2 000. Subscribers with income levels of between CNY 2 000 and CNY 3 000 and with CNY 3 000 or over have shown an annual decrease in usage of mobile services while income groups below CNY 1 000 and between CNY 1 000 and CNY 2 000 are increasing every year.

Table 3.14. Distribution of mobile subscribers, by income

Unit: percentage

Monthly income (CNY)	1998	1999	2000
Below 1 000	15.9	16.3	20.7
1 000 2 000	35.8	39.5	42.4
2 000 3 000	16.7	16.6	14.8
Over 3 000	28.3	24.3	17.9
Undisclosed	3.3	3.3	4.2

Source: Ministry of Information Industry.

This trend is correlated with the increase of office workers and students in the mobile handset market described in Section 3 in Chapter 4, and indicates that the country is moving closer to a mass Chinese cellular phone market.

Distribution of mobile subscribers by gender

The increased participation of women in the global economy indicates that women are leading the rapid expansion of consumption. This trend can be witnessed in the Chinese mobile phone market as well.

Initially, men led the market in China as was the case in other countries throughout the world. In 1998, the distribution of mobile phone users according to gender was 83.3% for men and 16.7% for women. However, the participation of women has grown to 18% in 1999 and 2000. This provides an indication of the growth potential of women mobile phone users.

Table 3.15. Distribution of mobile subscribers, by gender

Unit: percentage

Gender	1998	1999	2000
Male	83.3	82.0	82.0
Female	16.7	18.0	18.0

Source: Ministry of Information Industry.

Distribution of mobile subscribers by age

In 2000, the largest share of the mobile market, 39.4%, is held by subscribers in 20-30 year age group, followed by users in the 30-40 year (37.3%), 40-50 (16.1%), 50-60 (4.5%), less than 20 (2.0%) and 60+ (0.7%) age groups (Table 3.16). The annual growth rate indicates that the youngest age grouping is growing steadily.

Distribution of mobile subscribers by level of education

Table 3.16 shows that in 2000, Chinese mobile subscribers with middle to high school education accounted for more than half (58.2%) of all mobile users. Mobile telephone users with college or higher education levels and those with less than primary education account for 36% and 5.7%, respectively.

Table 3.16. Distribution of mobile subscribers by age

Unit: percentage

Age	1998	1999	2000
Under 20	1.3	1.7	2.0
20-30	37.6	41.2	39.4
30-40	38.8	36.3	37.3
40-50	17.6	15.8	16.1
50-60	4.0	4.3	4.5
60+	0.7	0.7	0.7

Source: Ministry of Information Industry.

Table 3.17. Distribution of mobile subscribers by level of education

Education level	1998	1999	2000
Elementary school or less	6.9	10.8	5.7
Middle/High school	55.6	54.9	58.2
University or higher	37.5	34.3	36.0

Source: Ministry of Information Industry.

3.6. Internet and data transmission

3.6.1. The structure and performance of the market

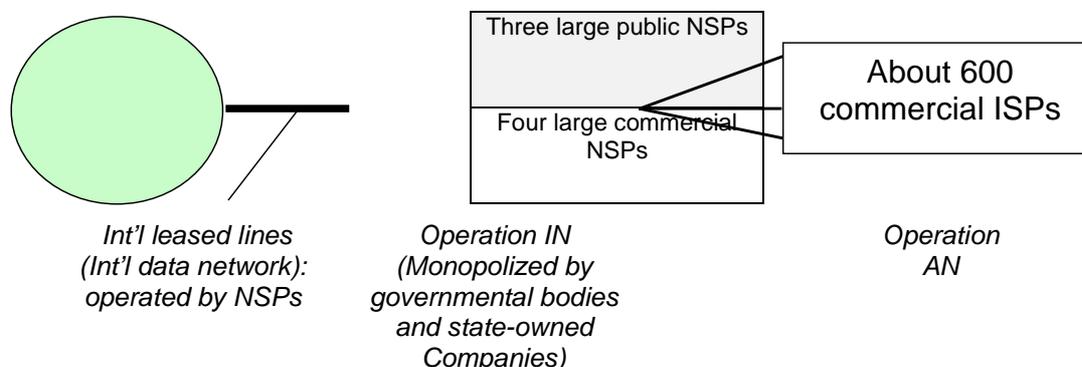
General outlook

The Chinese Internet access service sector is clearly divided into two categories: network service providers (NSP), which operate the interconnecting network (IN) and have direct access to the Internet; and internet service providers (ISP), which operate the access network (AN) and simply interconnect to the Internet through IN.³⁵ NSPs secure massive bandwidth of leased international connections and provides transit services to ISPs through the distribution of these leased international connections.

The Chinese government makes a clear distinction between NSPs and ISPs, and both public and commercial NSPs are exclusively operated by five state-owned enterprises under the Ministry of Information Industry (MII). Although not officially recognised, various invisible obstacles hinder the efforts of the private sector to enter the ISP market. These barriers explain why most of the larger providers among the 600 or so ISPs are state-owned companies within an IT-related governmental organisation in each province. It is clear that the Chinese government exercises a dominant influence over the Internet access service sector.

The total bandwidth of leased international connections in China as of July 2002 was 10,576.5 Mbps. This represents a 423-fold increase on the 25 Mbps which existed in October 1997 when the official data began to be collected, and shows that leased international connections are rapidly developing in China. However, China possesses the same bandwidth as a large dotcom company in the United States. This is totally insufficient in relation to the size of the Chinese population and geographic area covered.

Figure 3.7. Internet access services in China



Source: KISDI.

To make up for the shortages in network resources, the Chinese government has introduced a number of measures, including the establishment of backbones and the introduction of an Internet access service which utilises existing cable TV networks and satellites. These novel measures are expected to lead to rapid improvements in the sector.

The Network Service Provider (NSP) sector

The government also exercises complete control over the NSP sector. Five state-owned companies under the MII, including China Telecom and China Unicom, exclusively operate commercial Internet backbones and are currently strengthening their positions as major players in the market. The operations of three major public networks, including CSTNET, also come under the direct control of the governmental organisation. Moreover, NSPs compete rather than co-operate with each other, due to the current frictions between the former Ministry of Post and Telecommunications and the former Ministry of Electronic Industry in MII which manages commercial NSPs.

Table 3.18. Information on major network service providers

NETWORK	Operating Organisation/ Company	USAGE AND PURPOSE	TYPE
China Science & Technology Network (CSTNET)	Chinese Academy of Science (CAS)	Information exchanges among science research institutes in various fields	Public
China Education & Research Network (CERNET)	Ministry of Education (MOE)	Information exchanges among education and research organisations in various fields	Public
China Defence Network(CDN)	Ministry of National Defence	Military information	Public (confidential)
CHINANET (China Network) (so called 163 network)	China Telecom	The most commonly used commercial Internet service	Commercial
CHINAGBN (China Golden Bridge Network) (so called 167 network)	Jitong	Internet service mainly used for business field	Commercial
UNINET (Unicom Network) (so called 165 network)	China Unicom	Basic commercial Internet service	Commercial
CNCNET (China Netcom Network) (so called 171 network)	China Netcom	Basic commercial Internet service	Commercial
CMNET(China Mobile Network)	China Mobile	Basic commercial Internet service	Commercial

Source: KISDI.

Currently, the Internet backbones comprise four major commercial networks and three main public networks (Table 3.18). The former are operated by four state-owned IT companies serving as NSPs (e.g. China Telecom, China Unicom and China Netcom³⁶). The latter are also operated directly by governmental organisations, such as Chinese Academy of Science (CAS), Ministry of Education (MOE), and Ministry of National Defence (MOND), for their own purposes.

Among these eight networks, five commercial networks and state-owned NSPs practically monopolise China's commercial Internet networks and exercise enormous influence on the overall Internet industry. It is therefore essential that their conditions of operation and their relationships with one another be carefully scrutinised.

Total bandwidth of leased international connections

The total bandwidth of leased international connections in China is 10,576.5 Mbps, as of July 2002. Nine countries are directly interconnected: the United States, the United Kingdom, Italy, Canada, Germany, France, Korea, Japan, Australia. In July 2002, eight organisations had leased international connections.³⁷ Among these, CSTNET and CERNET are public networks, while the others are commercial networks. As indicated in Table 3.19, the total bandwidth of leased international connections is rapidly growing and overseas Internet connectivity is expected to gradually improve.

Table 3.19. Total bandwidth of leased international connections

Unit: Mbps

IT network	Oct. 1997	June 1998	Dec. 1998	June 1999	Dec. 1999	June 2000	Dec. 2000	June 2001	Jan 2002	June 2002
CSTNET	2	2	4	8	10	10	55	55	55	55
CERNET	2	2	8	8	8	12	117	117	257.5	257.5
CHINANET	19	78	123	195	291	711	1953	2387	6032	6452
CHINAGBN	2	2	8	18	22	69	148	151	168	n.a.
UNINET	/	/	/	12	20	55	55	100	418	693
CNCNET	/	/	/	/	/	377	377	355	465	2870
CIETNET	/	/	/	/	/	/	2	2	2	2
CMNET	/	/	/	/	/	/	90	90	200	247
Total	25	84 (233)	143 (69)	241 (68)	351 (46)	1 234 (252)	2 799 (127)	3 257 (16)	7 597.5 (133)	10 576.5 (39)

Source: Semi-annual Survey Reports on the Development of China's Internet, 1997-2002.

Note: The numbers in parentheses indicate growth rates (%).

ISP sector

There are some 600 ISPs in China, most of which are subsidiaries of five major commercial NSPs including China Telecom, or of state-owned companies under the auspices of telecommunications authorities in each provincial and municipal government. The operation scale of the ISPs is so small that only 10% hold more than 100 Mbps of the leased connection bandwidth. However, the majority of the ISPs are in financial difficulties due to the high rental fees charged by the NSPs. Although modems are the most frequently used access tool in the current Internet access services of ISPs in China, ISDN and ADSL services are gradually expanding. As of July, 2002, according to the Semi-annual Survey Report on the Development of China's Internet, ISDN users numbered 3.15 million and broadband users 2 million.

ISPs in China provide Internet access services to corporate and individual users by renting international connections from NSPs. ISPs are classified into two categories: *i*) medium-sized and large ISPs, with business networks in many provinces; and *ii*) small ISPs operating in a single province. The business scales of more than half of the 600 or so ISPs in China are not yet ready to provide services. Furthermore, only about 20% of the largest ISPs have more than ten subsidiaries in the country.³⁸ Of the large and medium-sized ISPs which have their own business networks in several provinces, only 10% are equipped with more than 100 Mbps of the bandwidth of leased connection and 19% have between 6 Mbps and 100 Mbps. The remainder possess less than 6 Mbps.

Currently, most ISPs in China are subsidiaries of the five major NSPs. ISPs which use CHINANET are subsidiaries of China Telecom, while those using CHINAGBN are affiliated companies of Jitong. UNINET and CNCNET are the exceptions.³⁹

Table 3.20. Information on major Internet service providers

ISP	Access number	Access type	Internet using charge	Telephone charge	Remarks
Beijing Cyberport	163	Account registration	08:00 23:00 : CNY 4 per hour		Stable and speedy service
	63062266 26050000	/ Access card	23:00 08:00 and holiday: CNY 2 per hour Registration charge: CNY 100		
	169	Account registration / Access card User name / Secret number:169	CNY 0.03 per minute (or for fixed rate subscriptions, CNY 100 per month) Registration charge: CNY 100 CNY 0.07 per minute 23:00-08:00 and holidays: 50% the full rate		Access limited to sites within China
Capital Online	2631 2632 2633	Public account /User name / Secret Number:263	08:00-22:00: CNY 0.15 per minute 22:00-08:00: CNY 0.10 per minute (or for fixed rate subscriptions, CNY 158 per month)	CNY 1.8 per hour	Access limited to Capital Online sites
	Soyo Card		CNY 66 for first month; CNY 48 from the second month on		
	Zong-heng Card		CNY 99 for first month; CNY 78from the second month on		
Xinnet	95777	Account registration / Access card Access card	CNY 2 per hour 08:00-23:00: CNY 3 per hour 23:00-08:00 and holidays: CNY 2 per hour		In operation as of September 2000
Changjiewang-yuan (2911)	2911	Public account /user name / Secret number: 2911 User name / Secret number: 2911	08:00-23:00: CNY 4 per hour 23:00-08:00 and holidays: CNY 2 per hour CNY 200 per month		

Source: *People Daily*, 15 August 2000.

The small ISPs are private providers authorised by local governments and state-owned companies under the responsibility of the telecommunications authorities in each municipality and province. Since the NSPs tend to charge high rental fees for leased connections, the majority of the ISPs (excepting those which use CHINANET) operate at a loss.⁴⁰

MII has implemented a number of measures between 1999 and 2000 in an attempt to reduce the rental fees charged by NSPs for leased connections. However, fierce competition in the market forced the ISPs to lower their service charges in the same proportion as the decrease in leased connection rental fees. As a result, the operating conditions of the ISPs have improved only marginally.

Until now, most “netizens” in China have accessed the Internet through modems. However, there has been a sharp increase in the number of users utilising leased line connections such as ISDN, ADSL, DDN, etc. As mentioned above, 15% or 2.58 million of the 16.9 million Chinese “netizens” currently utilise leased-line connections. In response, ISPs are concentrating their efforts on the introduction of leased-line connections.⁴¹

Major issues and challenges

The following issues can be identified as future tasks which will need to be tackled in the Chinese ISP sector. Market inflexibility caused by the government monopoly: The Chinese government exercises an enormous influence on both the NSP and ISP sectors. It is no exaggeration to say that both sectors are practically monopolised by governmental bodies. Accordingly, the capacity of adaptation of Internet access service providers to technological and market changes is being downgraded, and they have become far less flexible than the Internet content providers (ICPs) or e-commerce-related companies. To cope with this situation, the Chinese government is attempting to restructure China Telecom and is planning to make China Netcom, the newcomer to the NSP market, operate in a similar way to the private companies. However, the results of these measures remain to be seen.

Difficulties in securing the resources needed for the expansion of infrastructure and a vicious circle caused by the lowering of rental fees. A tremendous amount of resources will be required to establish a telecommunications infrastructure able to cover the vast Chinese land mass. However, the majority of the Chinese ISPs, operate on a small scale and do not have access to reliable financial support programmes. Moreover, as mentioned above, fierce market competition caused the ISPs to lower users’ service charges in response to the decrease in leased connection rental fees. As a result, the ISPs will be hard pushed to improve their profit structures.⁴²

Future prospects

Since the Chinese government considers international Internet connections to be the backbone of the nation and a target which needs to be controlled, it is anticipated that a few state-owned companies under auspices of the government will continue to monopolise the NSP area in the Internet access service sector for some time to come. Reforms in this sector will continue to be carried out in accordance with the government’s will.

Meanwhile, the smaller ISPs face different problems. They will continue to seek out strategies to enable them to make profits and enhance their chances of survival. Until now, they have limited the use of their Web sites to providing a brief introduction to themselves and their services, without providing Internet access. On the other hand, some companies such as Capital Online (www.263.net), Shanghai Hotline (www.online.sh.cn), and EASTNET (www.east.net.cn), which started as ISPs but expanded their businesses to the ICP sectors, are obtaining synergistic effects by improving users’ perception of their services while retaining existing customers. These companies should be seen as a model to show the path the Chinese ISPs should take.⁴³

In the context of the bilateral negotiations with the United States which took place prior to China’s membership of the WTO, the Chinese government’s decision to allow foreign investment in the information technology area¹⁵ meant that foreign companies with advanced technologies would be likely to actively enter the Chinese ISP market. Gradual changes may also emerge in the Internet access service sector, which has been operating in a sub-optimal monopolistic way under government control. However, since the Chinese government is likely to try to maintain its current influence over the NSP sector, conflicts between the Chinese government and foreign companies appear inevitable.

3.6.2. Infrastructure development

Internet users

According to the semi-annual survey reports by the China Internet Network Information Centre (CNNIC), the number of Internet users in China has more than doubled each year since the first survey was conducted in October 1997. The survey estimates that there were around 45.8 million Internet users in China as of July 2002.⁴⁴ Among them, 16.06 million people used leased-line connections, 33.42 million used dial-up modems, 6.6 million used both methods. Besides computers, 1.29 million used mobile telecommunications terminal equipment including mobile telephones or other electrical appliances able to access the Internet. The broadband service subscribers via ADSL or cable modem in China are now around 2.0 million and 1.6 million among them are using China Telecom.

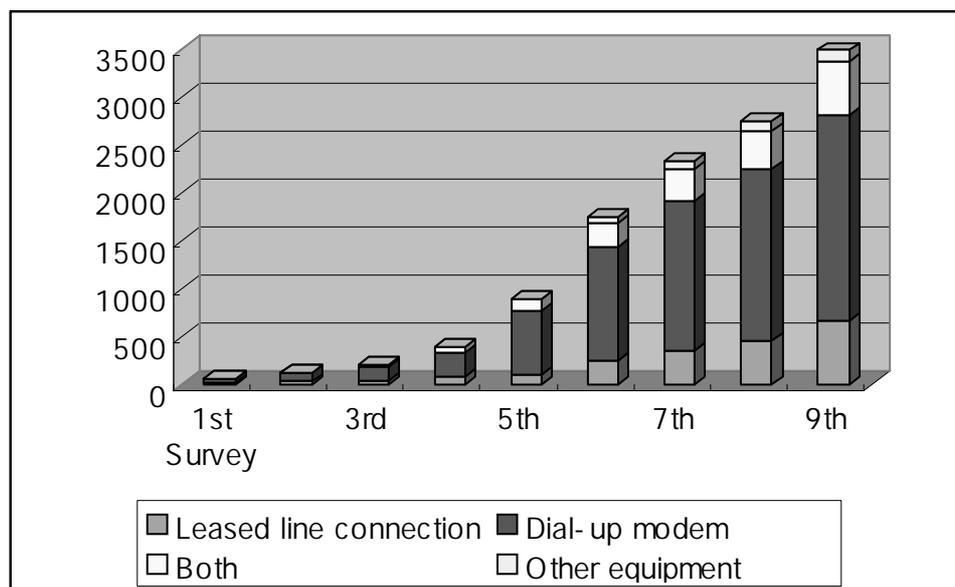
Table 3.21. Growth in the number of the Internet users in China

Unit: Tens of thousands, percentage

	1 st Surv. (Oct. 1997)	2 nd (June 1998)	3 rd (Dec. 1998)	4 th (June 1999)	5 th (Dec. 1999)	6 th (June 2000)	7 th (Dec. 2000)	8 th (June 2001)	9 th (Jan 2002)	10 th (June 2002)
Leased-line connections	15.5	32.5 (109)	40 (23.1)	76 (90.0)	109 (43.4)	258 (137)	364 (41)	454 (25)	672 (48)	1,606
Dial-up modem	46.5	85 (82.8)	149 (75.3)	256 (71.8)	666 (160)	1,176 (77)	1,543 (31)	1,793 (16)	2,133 (19)	3,342
Both (leased- line and dial-up modem)	/	/	21	68 (224)	115 (69.1)	256 (123)	343 (34)	403 (17)	565 (40)	660
Other equipment	/	/	/	/	/	59	92 (56)	107 (16)	118 (10)	129
Total	62	117.5 (89.5)	210 (78.7)	400 (90.5)	890 (123)	1 690 (90)	2 250 (33)	2 650 (18)	3 370 (27)	4 580 (36)

Source: Semi-annual Survey Reports on the Development of China's Internet, 1997-2002.

1. Leased line users refer to the users of LANs which connect to the Ethernet.
2. Internet users who adopt multiple methods are double counted, so the sum of different type of users exceeds the total number of the internet users in the 10th survey.
3. Other equipment includes mobile terminal equipment such as mobile phones
4. And electrical appliances able to access the Internet. Users with other equipment are excluded from the number of the Internet users. The numbers in parentheses indicate the growth rates from last survey date.⁴⁵

Figure 3.8. Growth in the number of the Internet users in China

Source: Semi-annual Survey Reports on the Development of China's Internet, 1997-2002.

Even though the most popular access method is through dial-up modems accounting for 60% of users in China, it is noteworthy that the number of leased-line connection users increased steadily while that of dial-up modem users increased only slowly, narrowing the gap from a 6:1 ratio to a 2:1 ratio. Considering the fact that those netizens who use both find leased-line connections faster than dial-up modems, it is clear that demand for leased-line connections will increase more rapidly in the future, if not moving to broadband services.⁴⁶

Domain names registered under “.cn”

The total number of domain names registered under “.cn”, the country code of China, was 48 695 in 1999, reaching peak in 2001 at 128 362, a 164% increase in 12 months and came down to 126 146, as of July 2002. Among these, the number of domain names registered under “.com”, which implies a company, was 98 835, or 78.4% of all domain names. If we consider that the majority of domains names registered under “.net” are corporations, this percentage will be even higher. Overall, an increasing number of domain names are being registered under “.com” and “.net”. In 2002, these domain names accounted for about 88% of the total.

Table 3.22. Domain names registered under “.cn”

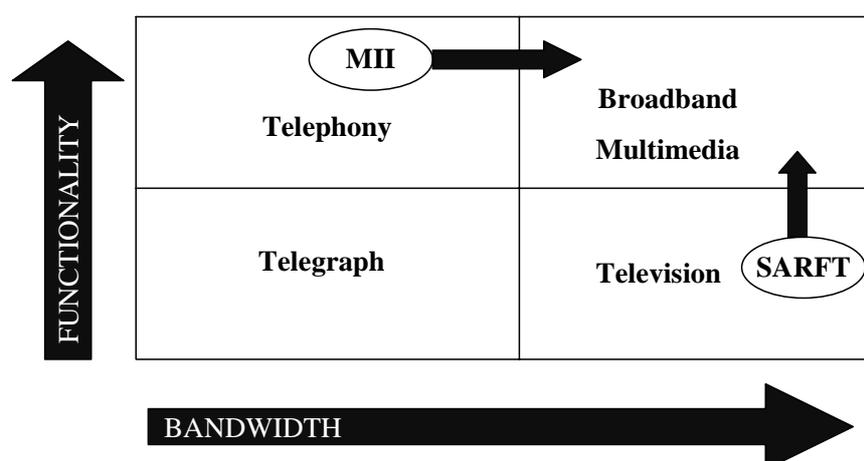
Domain Names	1 st surf.	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th	9 th	10 th
Ac	259	363	432	502	500	624	682	667	673	692
Com	2 131	6 559	13 913	22 220	38 776	78 878	96 221	99922	99123	98835
Edu	325	414	531	615	731	812	1127	1239	1354	1482
Gov	323	561	982	1 663	2 479	3 665	4 615	5181	5864	6686
Net	370	657	1 223	2 221	3 753	10 719	13 291	15055	14045	12248
Org	99	229	409	649	940	1 912	2 596	2864	2943	3031
Administrative Area	559	632	906	1 175	1 516	3 124	3 567	3434	3317	3172
Total	4 066	9 415	18 396	29 451	48 695	99 734	122 099	128362	127319	126146

Source: Semi-annual Survey Reports on the Development of China's Internet, 1997-2002.

3.7. Prospects for convergence in the IT sector

There is some truth in the statement that interconnectivity among networks in China is inadequate. Although the MII exercises significant control over the range of technologies to be used in network development, the building and maintenance of those networks is very much a local affair. Consequently, some data services are national in name alone. One such issue is the pricing of service provision, which is decided locally. In other words, a ChinaNet subscriber in Zhejiang is unlikely to pay the same monthly fee as a ChinaNet subscriber in Shanghai. The fact that something as simple as a uniform pricing system has yet to be achieved has negative implications for the development of data communications in China

Figure 3.9. Convergence in the IT sector



Source: KISDI.

The ambitious targets for connectivity cannot be met by the MII alone. At the same time, China has to maintain a certain degree of control over the activities of its telecommunications operators. The parties that would be able to deliver mass connectivity in the local loop while remain in “friendly” hands are the cable TV companies. Since the cable TV industry is governed and administered by the SARFT (the State Administration of Radio, Film and Television) –and not by the MII – there could well be an alternative power base in China’s telecommunications sector.

The emergence of the SARFT highlights the extent to which grey areas exist due to the regulatory ambiguity of China’s telecommunications sector. The SARFT was the successor to the former Ministry of Radio, Film and Television, which was subsumed into the MII in 1998. That move led to the SARFT losing ministerial status although it retained regulatory control over broadcasting despite the protests of the MII, and now operates under the direct supervision of the State Council. The MII’s counter-argument has some validity: the convergence of media and telecommunications means that a unified regulatory framework makes strategic sense. China’s cable TV network is, theoretically, no different from China’s fixed-line network; it is simply connectivity via a different access technology. Nevertheless, the regulatory split goes counter to technological convergence.

CHAPTER 4: THE INFORMATION TECHNOLOGY EQUIPMENT INDUSTRY IN CHINA

4.1. Overview⁴⁷

China has made huge strides in a relatively short period of time in IT manufacturing. In the early days, the development of public networks was tardy and equipment and technology were outdated. However, China has now become the third largest IT producer in the world and looks set to displace Japan next year as the second largest producer, behind the United States. According to the Chinese State Statistics Bureau, the electronics and information equipment manufacturing industry, that is, IT equipment industry, has become China's number 1 pillar industry.

For nearly ten years now, the output of this industry has been increasing at an annual average growth rate of 32.2%, way above the average annual growth rate of 14.2% for overall industrial output for the previous years. In 2001, the growth rate of the electronics and information manufacturing industry was 26.8% – the highest among all the industrial sectors – and it was 17% higher than that of the industry as a whole, contributing 1.85% to the growth of the total GDP, increasing industrial value by CNY 177.4 billion.⁴⁸

All these indicators point to the fact that the electronics and information manufacturing industry witnessed a dynamic and healthy boom, with a growth in both output and sales and a remarkable improvement in economic returns. In 2001, the electronics and information manufacturing industry forged ahead with output total of CNY 1,357.2 billion, a growth rate of 26.8%. Its output/sales ratio reached 98.4%, 0.5 percentage points higher than that of the previous year. The output/sales ratios of investment-oriented products and components were 97.3% and 98%, respectively, while that of consumer products increased considerably, bring about a fundamental change to the situation in the past where high output was accompanied by high stock levels. In 2001, this industry generated sales of CNY 824 billion, up by 20%, and profits of CNY 49 billion, a 4.9% increase, and paid CNY 26 billion of taxes to the state, an increase of 19.1%.

Communications and computer products maintained a strong growth momentum, accounting for an increasingly larger portion in the entire sector. However, consumer electronics products were increasingly diversified and percentages of market share became smaller. Furthermore, the production location of these industry was still concentrated in eastern and coastal areas, such as Beijing, Shanghai, Guangdong, Jiangsu, and Tianjin, to name a few.

Table 4.1. Output and sales of major ICT products, 2001

Item	Unit: 10 000	Output			Sales		
		Year	2000	Growth	Year	2000	Growth
		2001		rate(%)	2001		rate(%)
		total			total		
Mobile handsets		8714	5388	55.1	7923	4921	61.0
SPC switches		9370	8079	16.0	9432	7981	18.2
Telephones		4278	4484	-4.6	44149	4311	-3.8
Colour TV sets				-1.9			
					4280	4292	-0.3
		3952	4030	7.0		694	
Kinescope Integrated			708		751		8.2
circuits		758		2.9		5102	
			5354	0.2	5566	526294	9.4
		5510	547449	4.2	539587		2.5
		548272					

Source: Progress of China's Information Industry in 2001, 2001 Annual Report: China's Information Industry, August 2002.

Among major products, SPC exchanges and mobile handsets were able to balance output and sales. The output of mobile handsets was 87.14 million, a 67.2% increase, and the output/sales ratio was 90.9%. Exports totalled 39.68 million handsets, valued at USD 4.1 billion, 84.6% increase on the previous year. In early 1990s, colour TV dominated the entire electronics sector, however, outputs and sales of colour TV went down in 2001, along with telephone.

The focus is gradually shifting away from expanding production to optimising work organisation, quality and profits. Firms are paying greater attention to output control and structural adjustments in creating large-scale series of high-technology electronic products that respond to the demands of international and domestic customers and will become new growth points in the industry.

In the case of joint ventures, both solely foreign-owned ventures and co-operative ventures achieved rapid growth in output and profits, playing a major role in pushing the whole industry forwards.

The added industrial value created by joint ventures, solely foreign-owned ventures and co-operative ventures in the electronics industry accounted for 45% of the total for the industry as a whole, compared with only 30% in 1998. In 2000, joint ventures, solely foreign-owned ventures and co-operative ventures in the electronics industry had sales income of CNY 304.7 billion, a 34% increase; their profits amounted to CNY 21.7 billion, a 61.8% increase; their sales income and profits accounted for more than 50% of those of the whole industry. Their output and profits rank first among all types of enterprises and these firms play a very important role in stimulating developments in the electronics and information industry.

The Chinese government is pushing the top 100 electronics and information enterprises to attain even higher levels of growth and profits. To encourage these firms to keep abreast of the continuous advances in electronics and information technology and the expanding product portfolio, the MII has prepared a list of the "Top 100 Electronics and Information Enterprises," based on their operation revenues in 2001.

Table 4.2. Top ten electronics and information enterprises, 2001
(in CNY 10 000)

Rank	Company	Operation revenue	Total profits	Value of exports
1	PTIC	6424782	264383	1453258
2	Haier Group Corporation	6025556	200799	350311
3	Legend Group Holdings Company	3287658	140535	114951
4	Shanghai General Electronics Group	3000961	155386	953003
5	Panda Electronics Group Corporation.	2120500	97296	377054
6	TCL Holdings Co	2111196	71481	584941
7	Huawei Technologies Co.	1622895	265437	99873
8	Hisense Group Corporation	1615733	29961	52393
9	Shanghai Bell Co.	1510107	198425	128691
10	Peking University Founder Group Corp.	1166297	24490	18989

Source: Progress of China's Information Industry in 2001, 2001 Annual Report : China's Information Industry, MII, China , August 2002.

The top 100 electronics and information enterprises reached a higher level in size and economies of scale. In 2001, among the top 100, two companies earned revenue more than CNY 60 billion, none in 2000, four firms more than 30 billion (2 in 2000), six more than 20 billion (4 in 2000), and 23 more than 5 billion (20 in 2000). PTIC took first place, with annual operations revenue of CNY64.24 billion. Haier and Legend follow, in second and third place, respectively.

Profits of the top 100 electronics and information firms totalled CNY 25.2 billion in 2001, representing 6.1% decrease than the previous year, due to the global downslide in IT sector. Huawei, which ranks first in the top 100 in this category, earned CNY 2.9 billion in profits in 2000 and only got 2.6 billion, is a case in point. Forty-four of the top 100 earned profits of more than CNY 100 million, six less than in 2000.

Imports and exports in the IT sector continue to show substantial growth, indicating significant economic activity and a greater contributor to Chinese foreign trade. In 2001, supported by state export policies, imports and exports of electronics and information products continued to grow at a strong pace. According to the customs statistics, the total volume of IT import and export trade in 2001 reached USD 121.4 billion, accounting for roughly 24.3% of China's total imports and exports, after exceeding USD 100 billion in 2000 for the first time in history. The value of exports of electronics and information products was USD 65 billion, representing a 17.9% increase and accounting for 24.4% of the total value of exports from

China. The value of imports of electronics and information products was USD 59.08 billion, representing a 9.6% increase and accounting for 24.2% of the total value of imports to China. The trade surplus in this industry totalled USD 5.94 billion, accounting for 26.4% of the total Chinese surplus.

4.2. The network equipment manufacturing market

4.2.1. Overview

Riding the crest of the computerisation boom, the network equipment market in China has performed remarkably, recording growth rates of 38.1% in 1998 and 34.1% in 1999. Growth continued through 2000, with the sector recording rates of 28.5%, while total sales amounted to CNY 10 billion. Major market successes have included a switchboard and a router. In 2000, sales of switchboards and routers totalled CNY 4.2 billion and CNY 4 billion, respectively, while sales of modems, hubs and network cards amounted to a mere CNY 0.7 billion, VNY 0.6 billion and CNY 0.5 billion, respectively.

Switchboards

The market for switchboards, a network product, grew rapidly due to a sharp fall in prices in 1999. The market has progressed and now produces some 241 000 switchboards a year (a 48.8% year on year increase). The market has been all but monopolised by companies such as 3Com, Cisco and Nortel.

3Com is expected to secure an unparalleled leading position in the market, as its product quality is highly rated among users. It has the advantage of excellent user-oriented designs and is able to supply the full range of these kinds of products. Its competitiveness in distribution lines, which are directly connected to retailers, is another positive feature and the company is able to adapt promptly to market demand. Cisco has concentrated its efforts on making its way into the market since 1999, but it seems unlikely that Cisco will surpass 3Com in terms of market share. At present, its market share is 20% and it lags 3Com by 5%. Cisco's product lists feature a range of goods that are compatible with each other. On the other hand, Nortel swiftly strengthened its competitive position after its merger with Bay. Nortel also boasts an advantage in after-sales services.

Domestic brands, of which The Legend Group, The Start Group, The Great Wall, and The Unisplendour Group are good examples, manufacture a series of products targeting the mid-to-low-priced product market. A distinctive feature linking these firms is that, with their basic competitiveness in distribution, they are currently reinforcing their marketing capability. Given that competitiveness based on price and quality is a key factor in the mid-to-low-priced product market, the market shares of these firms are expected to increase sharply.

Routers

The market for routers, which recorded sales of 155 000 units, has been led by foreign network equipment providers. Cisco is a case in point; its market share in the high-priced product market is no less than 78%. Juniper, the company with the second largest portion of the market share, has so far been unsuccessful in its efforts to catch up.

Some Chinese manufacturers, including Huawei Technologies, The Start Group, and Great Dragon Technology, continue to compete ferociously with foreign brands. Among these companies, Huawei's Quidway Net-engine Series, which develops its own high-priced products, targets core networks of telecommunications providers and large companies. The growth of these companies has led to a downward trend in the prices of these products.

Network cards

The situation of the network card market has been quite different from that of the hub product market. Despite generally slow development, it has been steadily improving, exhibiting growth rates of nearly 20%. Last year, 6 million network cards were sold in the market, an 18.8% year on year increase. This market has an advantage in that there are no wide technological differences between domestic and foreign companies, since the production of the network cards does not require a high level of technology. This explains why domestic and foreign providers have been competing fiercely for market share.

In terms of market share, 3Com ranked first in 2000, with D-Link of the Legend Group in second position and Intel in third place. Market shares were 28%, 25% and 13%, respectively.

Modems

The modem market has been experiencing rapid growth. In 2000, 1.9 million products were sold and the sector displayed a 31% increase over one year. This figure was, however, 58.1% below that of 1998 and 113.2% below the 1999 level. Nevertheless, given the fact that the market has been in keen competition for the last couple of years, it remains a remarkable growth record. In particular, the inner modem market is expanding steadily, in contrast to the built-in modem market. GVC ranked first with a market share of 29%, The Legend Group came second with 23%, and The Start Group was placed third, with 22%.

4.2.2. Future prospects

With the exception of the hub product market, the Chinese network equipment market is expected to show rapid growth for the next three years. It is estimated that total sales will reach CNY 12.5 billion in 2001, CNY 15.3 billion in 2002 and CNY 18.3 billion in 2003. The rapid development of the Internet and the sharp increase in the number of netizens are considered to be the main forces driving this trend. Also, demands for hardware from dotcom companies, which are struggling to survive, are likely to have a positive effect on the development of the market.

In terms of individual markets, analysis shows that the market for routers will maintain stable growth, thanks to the establishment of IP networks and to increases in the provision of data telecommunications services. Unit sales of routers are expected to reach 180 000 in 2001, 207 000 in 2002, and 270 000 in 2003. The switchboard market is also expected to grow rapidly due to the development of corporate computerisation and a gradual withdrawal of hubs from the market. Unit sales of switchboards are estimated to attain 350 000 in 2001, 490 000 in 2002, and 671 000 in 2003.

The network card market will join the overall market trend, with an annual growth rate of at least 25%. Unit sales of network cards are expected to total 7.5 million in 2001, 9.22 million in 2002, and 11 million in 2003.

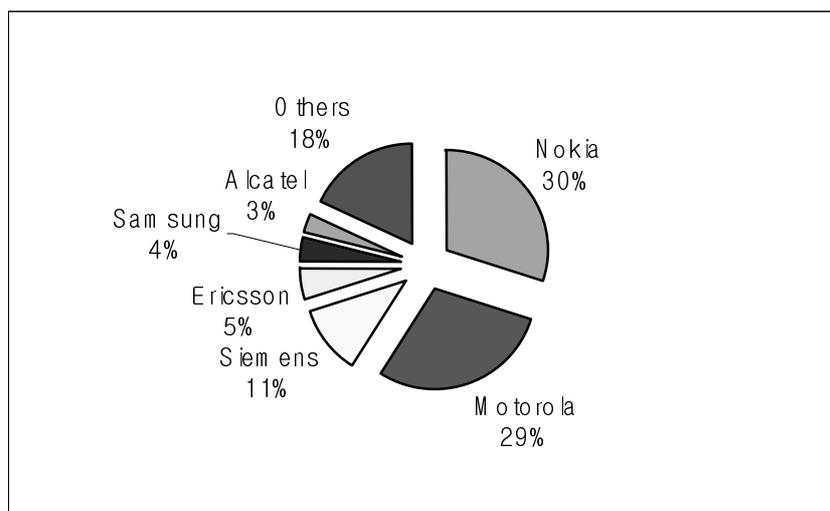
A 30% annual growth rate is forecast for the modem market, with sales of 2.5 million modems in 2001, rising to 3.25 million in 2002 and 4.095 million in 2003.

4.3. The mobile equipment market

4.3.1. Market shares of mobile handset manufacturers

Nokia, Motorola and Siemens are the three leading foreign companies that dominate the Chinese mobile handset market, with a combined market share of 70% at the end of 2001. The second leading group consists of Ericsson, Samsung, Alcatel, with a 12% share of the market. The market share of most of the Chinese handset production companies remains less than 1%, and around 7% when combined, with Kejian and Xiahua representing the companies in China.

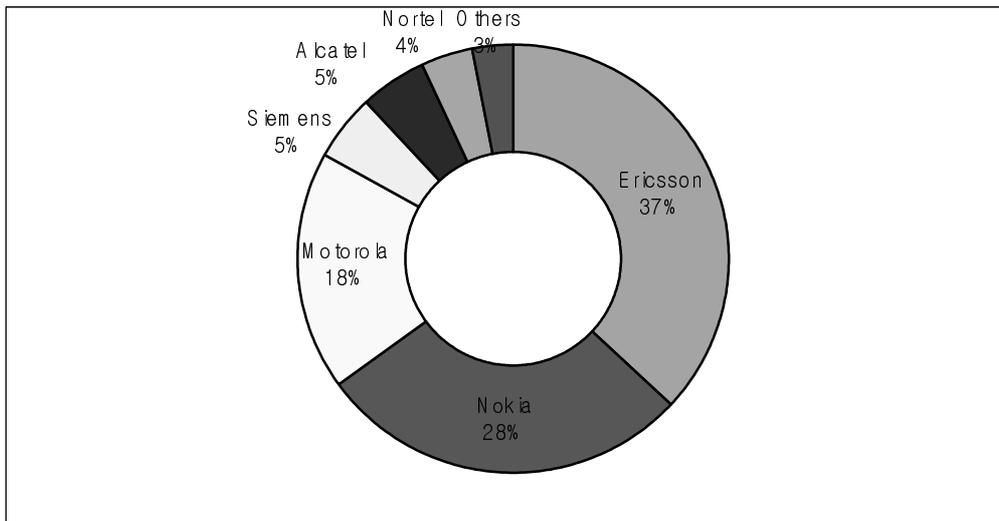
Figure 4.1. Market share of mobile handset manufacturers



Source: IDC, "Global IT Market Trends and China IT Forum," May 2002.

4.3.2. Market share of the mobile network equipment

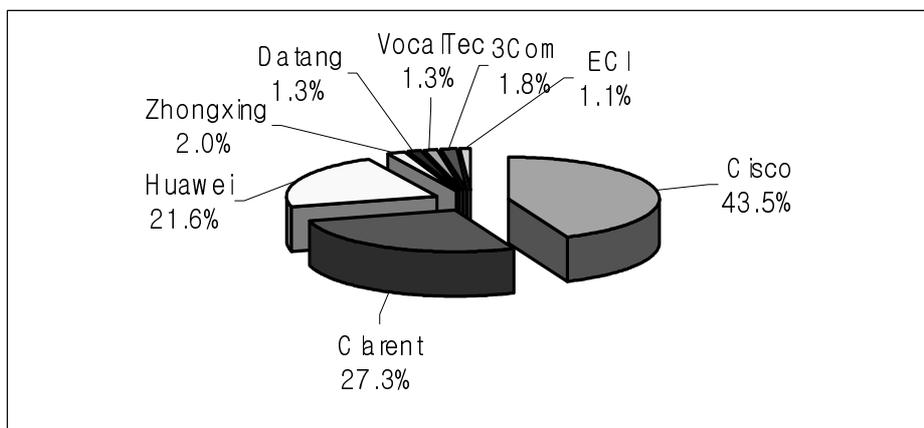
Even though China boasts in having the largest number of mobile telephony subscribers in the world, it depends on most of its network equipment on foreign manufacturers. Ericsson, Nokia, and Motorola cover 83% of China's mobile network equipment market, and Siemens, Alcatel and Nortel come next. These top six companies almost 97% of market, are only leaving 3% to others. In April 2002, China Unicom's procurement for CDMA network equipment went to USA or European companies, such as Lucent (27.4%), Motorola (25.7%), Nortel (16.8%), Ericsson (15%), including two Asian companies, China's ZTE (8.6%) and Korea's Samsung Electronics (7.5%). This kind of dominance by foreign companies over Chinese mobile equipment is expected to continue for a while.

Figure 4.2. Market share of Mobile network equipment

Source: IDC, "Global IT Market Trends and China IT Forum," May 2002.

4.4. The IP telephony equipment market

China's IP telephony equipment market is headed by three major firms: Cisco, Clarent, Huawei. Taking advantage of its advanced technology and high brand image in IP communications solutions, router equipment and data communications, Cisco takes 43.5% of the market share. Clarent, the number two player, has 27.3% of the share, and is showing strength in software. Clarent's experience in working with major telecommunications service providers such as China Telecom and China Mobile is also proving useful. Huawei, the leading Chinese telecommunications equipment manufacturer, has 21.6% of the market share. Huawei has strengths in switchboard manufacture, and has been able to take advantage of the support offered by the Chinese government. Besides the three major firms, Zhongxing, Datang, VocalTec, 3Com, ECI hold 2.0%, 1.3%, 1.3%, 1.8%, and 1.1% of the market shares, respectively.

Figure 4.3. Market share in the IP telephony equipment market

Source: IDC, "Global IT Market Trends and China IT Forum," May 2002.

IT telephony equipment manufacturers in China have their unique features and characteristics, and thus have different strengths and weakness in the market (foreign vs. local producers; hardware producers vs. software manufacturers, etc.) (Table 4.3).

Service providers pair up with equipment providers in order to ensure a stable supply of equipment to meet the strong demand for IP telephony service. As demand for IP telephony service soars, major service providers are establishing VoIP on a large scale. Equipment providers supplying major service providers are shown in Table 4.5.

Table 4.3. Major features, strengths and weakness of IP telephony equipment manufacturers

Manufacturer	Business	Strengths	Weaknesses
Cisco 3Com	IP communications hardware	IP communications solution High quality router Name value in data communications area	Relatively expensive
Huawei Zhongxing Datang	Chinese manufacturer	Support from the Chinese government Network solution utilising the company's strength in the switchboard field Strength in distribution network and after-sales service	Lacking technology in data communications and other high-tech areas Low brand image in data communications area
Clarent VocalTec	Software manufacturer	High technology in IP telephony Early entry into the market Experience in the establishment of key infrastructure with China Telecom, China Mobile, etc.	Weakness in hardware Weak distribution network and poor after-sales service

Source: KISDI.

Table 4.4. Equipment providers supplying service providers

Service provider	China Telecom	China Unicom	China Mobile	China Netcom(Jitong)
Equipment provider	Clarent, Huawei, Cisco, VocalTec	Cisco, 3Com, Huawei, Zhongxing, Datang	Clarent, Cisco, ECI	Clarent, Cisco, ECI Zhongxing

Source: KISDI.

4.5. Government policies in support of technological advancement

4.5.1. Localisation policy on IT equipment in China

As the telecommunications business gains momentum, the Chinese government is pushing aggressively with regard to local production and technology transfer. In particular, the government aims to reduce the influence of foreign companies in the mobile telecom sector as it did in the switchboard equipment sector.

This policy is clearly shown in the State Council's "Report on the Strengthening of Control and Supervision to Promote the Sound Development of Mobile Telecommunications Equipment Industry." The main lines of the report are as follows:

- China cannot produce high added-valued products and the technological level and technical transfer rate are currently low. Domestic production is in its infancy. Thus, the focus should be on stimulating domestic production and quality improvements.
- Central/local governments should not approve the establishment of joint ventures with foreign companies or foreign capital invested firms that produce GSM equipment, unless they have a pre-agreement to export their products.
- Supervision needs to be strengthened so that GSM producers guarantee the transfer of technology. Also, the ratio between export and domestic sales and the rate of use of domestic parts needs to be scrutinised. In particular, it is important to ensure that illegal trafficking of mobile phone handsets does not occur.

The government should fight to secure intellectual property rights. Five per cent of installation expenses between 1998 and 2000 should be allocated to R&D for mobile telecommunications equipment.

- The government will designate between three and five telecommunications R&D centres and will provide active support. R&D centres should focus on acquiring and catching up with advanced foreign technologies.
- The MII and the Ministry of Science and Technology (MST) should jointly push for the development of IMT-2000, to ensure that it is adopted as a technology standard at ITU.

Meanwhile, the Scheme to Accelerate the Mobile Telecom Industry sets out the goals for using domestic mobile telecom equipment as illustrated in Table 4.6.

Table 4.5. Goals for the use of domestic mobile telecom equipment

	2000	2001	2002	2003
Mobile switchboard	40	60	70	80
Base radio station	25	40	50	60
Mobile phone hand-set	10 15	30	40	60

Source: Localisation Policy of Telecom Equipment in China, *Weekly Technical Trends*, 2001. 2. 14.

CHAPTER 5:

GOVERNMENT POLICIES FOR THE CHINESE TELECOMMUNICATIONS SECTOR

5.1. Overview

China has fostered the telecommunications industry as its core and strategic industry based on the belief that this sector would significantly contribute to the national development. China also believes that the telecommunications industry will lead the industrial structure transformation and eventually enhance China's economic and technological strength. It considers that the telecommunications industry serves as the nation's backbone and is a leading industry playing a central role in the national economy.

With this aim, the Chinese government has boosted the telecommunications sectors through preferential policies, not only from the macroeconomic point of view, but also through the implementation of sector-specific regulatory policies. This section will look at the major targets of China's Tenth Five-year Plan for the IT sector and at various regulatory policies and investment policies uniquely targeting the IT sector.

5.2. Major targets of China's Tenth Five-year Plan for the IT sector

After the completion of the Ninth Five-year Plan, China set out another grand economic development plan covering the period to 2005. Among the targets outlined in the Tenth Five-year Plan, the Chinese government made it clear that continuous and sustained economic development was highly dependent on advances in science and technology. To that end, the fostering of leading-edge industry and human resource development was placed high on policy agenda. The major elements of this plan as they relate to the IT sector are described in the following sections.

5.2.1. *Telecommunications industry as a driving force for economic growth*

Between 2001 and 2005, the telecommunications industry is expected to grow by 20%, while market volume is set to double. These growth rates will enable the infrastructure network and information service to fulfil the demands of the national economy and enhance social development. China will join the ranks of the advanced countries in the telecommunications field.

5.2.2. *Building the telecommunications infrastructure*

China plans to establish an information infrastructure that is cost-efficient, stable, efficient and reliable and can treat huge volumes of information. Through strategic restructuring in the network area, and through the adoption of advanced technologies such as DWDC, third-generation mobile communications and IP, China's networks will be upgraded. The network will increasingly adopt broadband, integrating voice, data and video capabilities.

Further, MII's goal is to gradually improve the quality of the telecommunications service so as to effectively solve the "last mile bottleneck".

5.2.3. *Establishment of research centres*

China will enhance its research and development ability in the field of military electronic technology. By 2005, the market volume of the manufacturing sector will be one of the highest in the world, and exports will double compared to 2000. In the light of China's WTO membership, corporations are extremely eager to explore business opportunities abroad. By exporting products and facility sets, and building comparative advantages in such fields as communications and home electronic appliances, China will export production lines to developing countries. Also, through the establishment of local networks, China will expand its business in foreign markets.

5.2.4. *The IT infrastructure*

Through the reform of traditional industries, the establishment of the information network will pursue. The Chinese economy has not yet reached the level of the industrialised world and China should not follow the advanced countries' development model. Rather, the country should focus on using IT to reform the traditional industries while taking account of the present situation. Between 2001-2005, the Chinese government plans to push for the following measures with regard to Internet access by the government, corporations and households.

In order to fully realise the promise of the information society, concrete infrastructure projects are important. In implementing projects to facilitate access to networks by the government, corporations and households, telecommunications companies, ASP firms, ISP, ICP, hardware manufacturers and system integration (SI) companies should collaborate and provide technical support for computerisation and the creation of a network environment.

5.2.5. *The State management system of providers*

The government can play a central role in creating an effective corporate management system through rational administrative management. Through the utilisation of policy tools such as laws, plans, policies and technology standards, the government should be able to put into place a long-term vision for corporate development.

By strengthening the administration of the electronics industry, China will be able to implement an electronic information product coaching policy and special policy targeting core products. This will help foster the development of corporations and allow them to keep abreast of the market developments.

5.2.6. *Enterprise restructuring*

China should establish a framework for corporate reform and create a core economic management mechanism. China understands that corporate development in the future will be based on the market mechanism, in which competitiveness is the key factor. Telecommunications companies should be liberated from the existing framework based solely on policies. They should be free to explore market-based reform and development.

5.2.7. *Enhancing network security*

Through flexible political measures, China will strengthen the security of networks and information. With China due to join the WTO in the near future, the country is coming under severe pressure in the field of information security. In order to effectively respond to these concerns, based on the principle of “promoting development, strengthening management and going for ‘excellency’, leaders in all fields, application institutions and society as a whole should pledge themselves to the ‘security first’ principle in the development of networks”.

5.2.8. *Maintaining relationships among operators and manufacturers*

Based on developments in the information industry, operators and manufacturers need to adjust their relationships with one another. Since China’s telecommunications operating business and electronics manufacturing sector are two elements of the information industry, the characteristics of individual companies and rules of operation should be integrated with the goal of enhancing mutual development. As demand increases at a rapid pace, the telecommunications operation business, the facility manufacturing sector and the parts manufacturing business should be linked in a coherent chain. Telecommunications operators and electronics manufacturers need to work together to identify market openings and promote alliances so that the telecommunications industry can continue to grow.

5.3. *Regulatory policies*

The Chinese government has made great strides in regulatory policies in the last decade. It has relaxed its control on the telecommunications sectors for three main reasons: *i)* to boost the telecommunications industry and meet the demand of a rapidly-growing economy; *ii)* to introduce competition in an attempt to alleviate the strains on the telecommunications market where demand is in short supply and to make up for shortages in central government investment; and *iii)* to enable the sector to adapting to the opening of the global telecommunications market and pave the way for China’s integration in the global economy. In this regard, the central government has taken major steps to introduce competition in telecommunications service markets and adopt the Telecommunications Decree to ensure a coherent and transparent policy environment.

5.3.1. *Rules affecting market entry*

Market entry and regulation

In 1993, the Chinese government clarified the definition and scope of those telecommunications services that were to be liberalised,⁴⁹ and granted rights allowing the non-post and telecommunications companies to provide basic telecommunications services. These proposals issued by the State Council opened the door to participation in the telecommunications market. As a result, the monopoly of the telecommunications industry by a single department was broken. The establishment of China Unicom in 1994 is a case in point.

The Chinese government continued to deregulate the telecommunications market, opening paging services and IP telephony services to new entrants. The restructuring of China Telecom into four entities gave a positive boost to the loosening of government control on market entry.

- The Telecommunications Decree divides service providers into basic and value-added telecommunication services. Basic telecommunications providers obtain operating licences from the MII, while value-added telecommunications providers obtain licences from either the MII or, if they operate in only a single province, the local telecommunications office under the Ministry of Information Industry.
- Further, the regulations set out the minimum requirements for applicants for basic telecommunications and value-added telecommunications licences. However, the regulations do not specify the criteria that will be used by regulatory authorities in awarding licences. Therefore, more transparent entry regulations are necessary in order to attract greater numbers of qualified service providers.

Future tasks

It is necessary to make the screening criteria for entry clearer and more transparent in order to promote new candidates. Also, since there are more incentives to enter long-distance service and IP telephone service markets compared to local markets, less strict market entry criteria should be applied to these sectors. An example of unnecessary and overly stringent market entry conditions, as set out in the Decree, is for paging and resale services where new entrants have to meet the same conditions as new entrants for other basic telecommunication services (*e.g.* local services or mobile services). Such requirements are far from meeting best practice regulatory needs.

Currently, foreign companies are only rarely permitted to enter the basic telecommunication service market, although these restrictions will be gradually eliminated after China's entry in WTO in accordance with its commitment to allow foreign companies to operate on the Chinese telecommunication market.

5.3.2. Interconnection

Overview

The concept of interconnection first appeared with the establishment of China Unicom in 1994. Its importance grew with the emergence of new entrants such as China Unicom and China Mobile. At that time, the Ministry of Post and Telecommunications established regulations and provisions for interconnection. However, these laws were never enacted due to the lack of established laws at this early stage and the conflict between MII and the Ministry of Electronics Industry, responsible for China Unicom. As a result, China Unicom experienced great difficulties in maintaining its mobile telephony subscribers. However, when ownership of China Unicom was transferred to the newly established MII, the number of subscribers increased rapidly as a result of the improvements in interconnection.

Interconnection came under the responsibility of the MII and the Telecommunications Management Office. The MII was responsible for establishing and implementing interconnection regulations at the national level, while at the regional level, this was done by the Telecommunications Management Office in various provinces and regions under its jurisdiction.

Reform of interconnection

Currently, the highest law on interconnection in China is the Telecommunications Decree. However, the Decree is lacking in details on the method or settlement framework for interconnection. In response, the MII announced the Act on the Method of Cost Settlement for Interconnection between Networks on March 2001, and established a detailed process for implementing interconnection on May 2001. This Act provides the systematic and legal basis for implementing interconnection for telecommunications providers.

According to the regulations, the dominant carrier cannot refuse requests for interconnection by competing carriers. The dominant operators are defined as those having more than a 50% market share and control of basic telecommunications equipment. This means that the operators that have entered these sectors of telecommunications market are able to exercise a certain amount of market power. Dominant telecommunications providers are decided by the MII. Currently, this is the case of China Telecom.

The leading telecommunications operators determine the specific details of the interconnection regulations including procedural understanding between network companies, terms, and network details, etc., in accordance with non-discriminatory practices and transparency. Provisions in interconnection regulations must be evaluated and approved by the Ministry of Information Industry.

The networks regulated for interconnection include fixed-line local, domestic long-distance, international, IP-telephony, mobile, satellite mobile and Internet backbone networks.

For the interconnection for public networks and between public and private networks, the negotiation process and mutual agreement must follow the regulations set by the MII. Interconnection agreements must be registered with the MII. If a mutual agreement is not reached, the non-requesting provider can apply for further preparation in accordance with the interconnection services to the MII and relevant local governments within 60 days of the request for interconnection.

The interconnection applicant must follow Section 17.1 of the Telecommunications Decree and promote reciprocal interconnection between networks. If an agreement cannot be reached within 45 days of a single or mutual application for network interconnection, the framework for the interconnection network will be submitted based on the public inspection by telecommunications technology experts and specialists

Dominant carriers have the responsibility of providing interconnection networks to competing carriers at a quality level that is comparable to the interconnections provided to subsidiaries and affiliated companies. The cost of interconnection must not exceed the standards set out in the relevant regulations. The technology standards, method of cost settlement and detailed management principles in network interconnection are established by MII.

Current measures

Shortly after the lower long-distance and leased-line charges became effective, changes were made to interconnection charges. The key changes are summarised in Table 5.1. Overall, mobile operators will have to pay an extra CNY 0.01/minute to the fixed-line operator China Telecom for local mobile-to-fixed calls. This additional payment is partially offset by a reduction in interconnection charges on certain mobile-to-mobile calls routed through China Telecom's network.

Reductions in long-distance revenue sharing were anticipated in the wake of the falling tariffs of recent months. The exception is that mobile operators would keep more of their IDD revenue if they carry the

traffic via their backbone networks. This would act as an incentive to these carriers to utilise more of their long-distance networks.

However, the increase in interconnection charges on local mobile-to-fixed calls is unexpected, given the lack of reciprocity on fixed-to-mobile calls. In the longer term, it is expected that mobile operators will be compensated for local fixed-to-mobile calls, in line with global practices.

Lastly, the additional payment made by mobile operators to China Telecom on VoIP domestic long-distance calls effectively raises the mobile operators' cost base and could discourage aggressive tariff discounting.

Table 5.1. Settlement agreement on interconnections

Type of call	New arrangements	Changes
Local call		
M→F	CM/CHU CNY 0.06/minute	+20%
F→M	No revenue sharing	
M→M	If two mobile networks connect directly, the operator may negotiate for interconnection; if routed via the fixed-line network, the mobile caller (operator) will pay CNY 0.03/minute; there is no charge for the receiving mobile (operator)	-40%
Domestic long-distance(DLD)		
M→F(Circuit)	CMHK/CHU keep CNY 0.06/minute	
M→F(VoIP)	CMHK/CHU pay CNY 0.06/minute	
F→M	CT keeps CNY 0.06/minute	
M→M	Calling operator keeps CNY 0.06/minute	
F→F(via CHU's backbone)	Calling operator keeps CNY 0.06/minute, CHU pays receiving fixed-line operator CNY 0.06/minute	
IDD		
M→F(Circuit)	CMHK/CHU keep CNY 0.06/minute	
M→F(via CM/CHU's backbone)	CMHK/CHU keep CNY 0.54/minute	
F→M	CMHK/CHU receive CNY 0.06/minute	

Key:

F: Fixed-line call; M: Mobile call; CM: China Mobile, CHU: China Unicom; CMHK: China Mobile-HongKong.

Under these new arrangements, mobile operators China Mobile and China Unicom continue to collect an interconnection fee for domestic long-distance and international calls, effectively sharing the revenue with the fixed-line operator.

Cases in interconnection

Following the Telecommunications Decree, China Unicom applied for interconnection to various sections of China Telecom, including long-distance, international and IP telephony. However, China Unicom did not receive the response it was looking for and re-submitted its application to the MII on 17 February 2001 in line with the relevant clause of the Telecommunications Decree.

The MII notified China Unicom on 19 February 2001 that it would be granted interconnection rights before 8 March despite the ongoing conflict between China Telecom and China Unicom and technological problems. On 20 February 2001, China Telecom encouraged each of the public companies to open its international service, long-distance service, intelligent networks, customer service system, IP networks and Internet beginning 14 March 2001.

The significance of this example is that it provides a detailed legal basis for reciprocal interconnection in China (this point has been widely publicised as part of the Chinese government's manifesto). It also demonstrates the impact of decisions made by the Chinese government with respect to the telecommunications market. Moreover, the fact that the problem of interconnection with China Unicom was resolved in less than of one month highlights the strength of will of the government.

Remaining issues

Interconnection arrangements and regulations have significantly improved since 1995. These improvements will contribute in an important measure to the growth of non-dominant players such as China Unicom and China Mobile, China Netcom, and China Railcom.

However, there is room for further improvement. To ensure that regulations reflect the needs of the market, the method of interconnection established and announced on March 2001 will be applicable for a period of one year, ending March 2002; thereafter new regulations will be established.

Another problem, similar to the example of China Unicom, is that government decisions are applied absolutely. This is a problem pertaining not only to interconnection, but also to other regulations. Since the MII exercises absolute power on providers, the conditions of competition will inevitably be managed by government action.

5.3.3. Tariffs

Overview

As mentioned above, telecommunications tariffs in China are divided into three categories: market-adjusted prices, government-guided prices, and government-set prices. The charges for basic telecommunications fall in the categories of government-guided prices and government-set prices. Basic charges are enforced through government-set prices, government-guided prices and finally market-adjusted prices. In addition, charges for value-added telecommunications services are enforced through market-adjusted prices and then through government-led prices. Market competition among telecommunication operators will lead to adjustments in the charges for telecommunications services.

Categories of telecommunication charges that include government-set prices, government-guided prices and market-adjusted prices are established and implemented based on the 'Management Catalogue of Service Tariff Classification', managed by MII with guidance from the State Council which is in charge of price issues. Currently, fixed local telephony, long-distance telephony, international telephony and mobile telephony fall under the category of government-set prices, while IP telephony is categorised under government-guided prices. Market-adjusted prices are applied to charges for value-added telecommunications services. However, rather than market forces fully adjusting the prices for services falling under this category, the government participates in the setting of prices.

The standards for telecommunication charges are prepared by the MII, after consultation with the Ministry of Finance, and implemented after the State Council has given its approval. The levels of the government-guided charges are decided by the MII, who first obtain recommendations of the Ministry of Finance. Telecommunications providers are able to decide independently on exact charges within the set pricing standards; these are then registered with the relevant local governments.

The government-set and government-guided prices for telecommunications charges are established based on a formal public hearing of the views and opinions of the telecommunications providers, users, and other related groups. Telecommunication providers must provide accurate and complete data and information on costs in response to requests by the MII and local governments.

Recent measures

In early 2001, MII launched a major tariff-rebalancing exercise, which involved an increase in local fixed-line tariffs, and a major reduction in long-distance tariffs, leased-line fees and Internet access fees. This tariff rebalancing led to a reduction in tariffs across all service categories, except local service. As an example, long distance charges were metered on the basis of six seconds instead of per minute. With this tariff rebalancing, China has now adopted a cost-based approach to tariff pricing, in line with global practices.

5.4. Higher local fixed-line tariffs

From March 2001, the basic monthly fixed-line charge is no longer divided into different grades based on the switching capacity of the local network. Instead, the charge is broken down into four categories: provincial capitals, cities, rural areas, and business users. This change has resulted in an overall increase in monthly fixed fees. Meanwhile, usage tariffs will be based on these four categories instead of the eight different grades of switching capacity previously in place.

The result is rather mixed, with tariffs increasing by as much as 25% on certain intra/inter city routes, although reductions have been introduced on other routes. At this stage, it is difficult to quantify the magnitude of change, but it could well result in an overall increase in fixed-line revenue.

5.5. Lower long-distance and leased-line charges

Under the new tariff scheme, charges for international calls, leased lines and Internet access will fall by 50%. In addition, operators are allowed to adjust their tariffs for peak/off-peak and holidays in order to balance their traffic load.

The rebalancing was long overdue and long-distance tariffs in China were extremely high by international standards. This was reflected in the flatness of total IDD minute growth over the past few years despite the rapid growth in number of subscriber. The reduction in long-distance tariffs should stimulate usage, although the impact will be less in the case of China Unicom as the price cut effectively narrows the price advantages that China Unicom is entitled to.

In conjunction with the lower long-distance tariffs, China lowered leased-line tariffs nation-wide. Leased-line fees have historically been well above global norms (four times higher than European rates for a 2Mbps line, for example) and gradual reductions are to be expected over the next few years. Leased-line rates are currently being lowered by 58-81%, although a carrier such as China Mobile (Hong Kong) may lose its 20% volume discount. The lower rates will have a positive impact on all mobile operators, since leased-line costs, which accounted for 10% of mobile revenue in 2000, could fall considerably.

Accomplishments and future tasks

Monopoly and a market in which supply was outstripped by demand have kept telecommunications services prices high in China, while on the world market prices were dropping substantially. In 1997, for instance, the price for international long-distance call was USD 0.58 per minute in the United States, but was six times higher in China at CNY 29 (the equivalent of USD 3.5). Chinese consumers had also to pay a high installation fee for fixed telephones and a high network access fee for mobile phones.

In the last three years, however, telecommunication services prices have fallen continuously and, with the abolition of the installation fee for fixed telephones and the network access fee for mobile phones in July 2001, Chinese consumers can access telecommunication services at lower prices.

As noted above, the Chinese government still intervenes in the prices of nearly all telecommunication services. To that extent, the reduction of service prices can be assumed to be the result of governmental decision rather than that of competition among businesses as would be the case in developed countries. It could be assumed that price competition is in a rapid progress in the IP phone service market. However, in fact, since price competition takes place within a range set by the government, this cannot be regarded as true price competition.

With the exception of the price of local calls, telecommunication service prices in China are expected to continue to fall. For the coming five years, however, price reductions will be determined by the government rather than by the market.

5.6. Universal service

The Telecommunications Decree stipulates that telecommunications companies should provide universal service in accordance with the relevant regulations established by the State. However, the Chinese government has yet to lay down detailed regulations concerning universal service.

So far, China Telecom, the largest fixed-line service company, has been providing universal service without proper compensation. If this situation were to continue, the financial situation of China Telecom will continue to deteriorate. Moreover, if the introduction of universal service system is delayed, the extension of communications infrastructure in the Western region, which lacks sufficient communication infrastructure, will be held up.

It is therefore necessary to share the costs related to universal service among the service companies in a reasonable way and to establish a framework immediately in order to stimulate the expansion of the communications network in backward areas.

5.7. Spectrum allocation⁵⁰

The PLA has a significant role in frequency allocation through the CMC and SRRC. Essentially, the MII and the CMC run the latter. The two bodies share frequency; the MII using its allocation for civilian and commercial purposes while the PLA uses its allocation for military purposes. While the PLA might be considered a potential competitor to the MII in the wireless sector, several factors suggest that its role will be reduced.

Table 5.2. Spectrum allocation table

Transmission method	Frequency allocation	Comment
AMPS/CDMA	824-849MHz and 869-894MHz	Split between military and civilian bodies. Eventual plan is for China Unicom to use its allocation for wireless local loop services and for China Mobile to use its allocation for CDMA.
TACS	890-903 MHz(BS transmission) , 935-948 MHz(BS reception)	TACS bandwidth is split into A band and B band and controlled by China Mobile. It was originally split between the two original wireless network suppliers (Motorola and Ericsson).
GSM	890-915 MHz(BS transmission) , 935-960 MHz(BS reception) GSM spectrum overlaps with TACS	China Mobile and China Unicom share GSM spectrum. China Mobile controls 24-25 MHz, depending on area, and China Unicom controls 6 MHz (954-960 MHz). Multi-channel access networks, radio equipment and relay machines were either migrated out of these frequency ranges or terminated.
ETACS	880-890 MHz(BS transmission) , 925-935 MHz(BS reception)	Reserved for FDD Mode WLL applications.
Wireless local loop/ PCS	1880-1900 MHz and 1960-1980 MHz 1975-1980 MHz 1890-1895 MHz and 1970-1975 MHz 1900-1920 MHz 150 MHz/450 MHz	Reserved for China Telecom's wireless access networks in Shanghai, Beijing, Guanzhou, Shenzhen, Fuzhou, and Xiamen. Allocated to China Unicom's wireless access networks in Tianjin, Chongqing and Chengdu.. Reserved for TDD mode WLL Reserved for domestically developed WLL products.
Wireless data	821-825 MHz and 866-870 MHz	Reserved for wireless data. No voice traffic permitted on these frequencies. The interval between reception and transmission is 45 MHz. Channel spacing is 25 KHz. 866-870 MHz is used for BS transmission while 821-825 MHz is used for terminal transmission.

Source: "China Telecoms", Nomura Research Institute, 7 August 2000.

The principal reason is that the PLA's withdrawal from commercial services appears to be genuine, and a direct confrontation with the MII over such a sensitive issue as wireless-service provision would reflect badly on the army. The second reason is that the split between civilian and military allocations is such that the frequency bands allocated for commercial purposes are internationally interdependent. Frequency bands allocated to the PLA are used for internal communications purposes and, hence, would raise internal security issues.

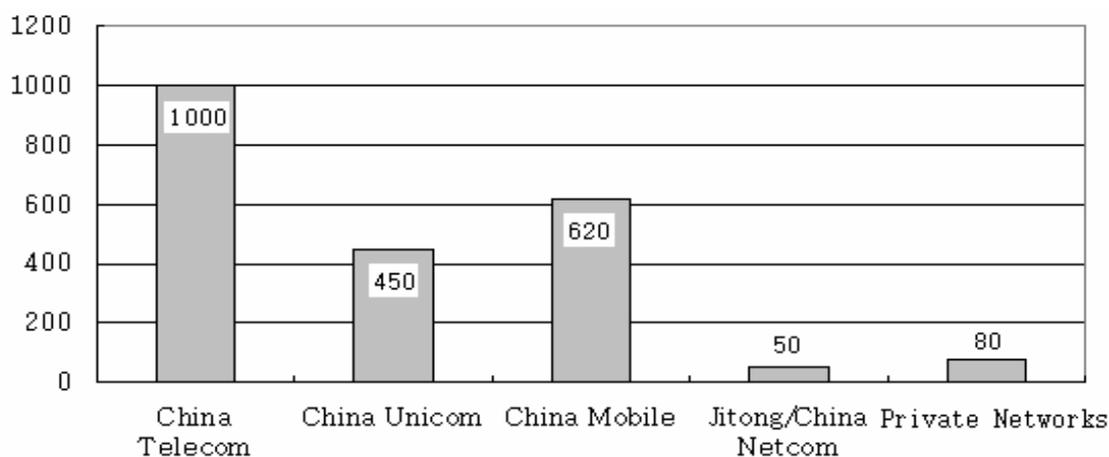
On a commercial level, the MII controls spectrum allocation, radio standards and planning. In conjunction with the PTAs, the MII allocates GSM 900 MHz and GSM 1800 MHz frequency for use by the country's two wireless operators. Such frequency cannot be leased to third parties without prior approval by MII. Frequency is allocated at the planning stage of a provincial network. Only then can the network rollout commence; once completed, it is subject to MII examination and approval. At this stage, the pre-allocation is made official, usually for a period of three to five years. Issues are resolved at the provincial level and appeals made to the MII.

5.8. Investment in the Chinese IT industry

The Chinese IT sector recorded high investments in 2000, reaching CNY 20.54 billion in fixed asset value, an increase of some 28% over a year.

Figure 5.1. Investments by telecommunications service providers, 2000

Unit: CNY 100 million



Source: China Centre of Information Industry Development, 2001.

Note: China Telecom led the investment race, with CNY 100 billion, followed by China Mobile, with CNY 45 billion.

5.8.1. Investment in the Chinese IT industry: A history

As the IT industry sector in China has undergone reforms and developments, its investment and financing system has seen many changes. It has shifted from a conventional planned system to a market economy system. The process of the shift can be divided into four stages.

First stage (1950-81)

At the initial stage, when the postal service and telecommunications service as well as the government and business were integrated in a single system, the bulk of investment funding came from the government and a limited number of companies. In fact, 90% of the nation's postal and telecommunication investment was funded by the government with only 10% financed by companies. Since China's post and telecommunications sector a monopoly, government investment was the most significant element of the investment and financing system, and other investment or financing mechanisms were in their infancy. Over the 31 years between 1950 and 1981, the fixed asset investment and financing fund totalled CNY 6.4 billion.

Second stage (1982-93)

Since the 11th National People's Congress, the post and telecommunication industry has been considered one of the pillars of the nation's economic development strategy. The Chinese government put forward a plan for the establishment and development of telecommunication with the aim of bringing about the development of four different sectors: the state, the provinces, business and individuals. In line with this plan, the government implemented a range of preferential policies for the post and telecommunication industry.

These plans and policies led to a fundamental and important reform in the industry. At this stage, post and telecommunication businesses were run by loan management. Loan management in the industry was first adopted in Guangdong Province, before spreading across the nation. At the time, it represented the main means of attracting foreign capital. The foreign capital invested in the industry came mainly in the form of loans from foreign governments, joint loans from foreign governments and commercial banks, or partly subsidised government loans. Domestic capital investments took mostly the form of preferential loans from banks.

Fixed asset investments over this ten year period amounted to CNY 90.5 billion (seven times that of the previous stage). Rapid progress was achieved in the quality and quantity of the skills and equipment of the post and telecommunication industry.

Third stage (1993-99)

Deep-seated changes took place in the social and economic environment in China from 1993 onwards, and the number of preferential policies in tax, financing and banking began to fall. Consequently, it became increasingly difficult for post and telecommunication businesses to obtain loans. The nation's basic demands for telecommunications were already met since the industry had made great steps forward during the second stage. As the government gradually shifted its focus towards support and development policies, preferential policies in relation to taxes and loans for the industry were reduced or abolished.

As reforms in the industry progressed, access to finance also underwent fundamental change, shifting from bond financing to stock financing. China Telecom (Hong Kong) Ltd. was listed on the Hong Kong Stock Market on 29 September 1997, the first Chinese telecommunications company to be listed on the Hong Kong Stock Market. USD 4 billion was raised in the first public offering and the stock of China Telecom (Hong Kong) Ltd. became the biggest listed stock in the nation. This represented a very important step towards the development and reform of the Chinese post and telecommunications industry. It also meant that China had begun to tap international capital markets for finance.

Fourth stage (since 2000)

As China draws nearer to joining the WTO, management, investment and financing reforms in the industry will be put high on agenda. International capitals are showing a great deal of interest in China's telecommunications market with its enormous potential; a variety of investment and financing alternatives will thrive in the industry.

5.8.2. Factors relevant to investment and finance in China's telecommunication industry

The Chinese government has used various policy tools to stimulate better investment in the IT sector. The simplest method is to collect the initial installation fees and reinvest them in the sector. The second method is loan management.

Initial set-up fee

Charging an initial set-up fee was one way of raising funds for the building of infrastructure during the infant phase of the telecommunications industry. The huge amounts of set-up fees collected in China was an essential source of funds for the development of the telephone industry and an important catalyst for the post and telecommunications industry.

The initial set-up fee increased significantly during the past several 5-year Economic Plans. In the 6th five-year plan period (1981-85), the total initial set-up fee collected reached CNY 797 million and it accounted for 35.7% of the total investment by the industry during that period. In the 7th five-year plan period (1986-90), the total initial set-up fee collected was CNY 4 686 million, more than 6 times more than in the previous period and it accounted for 30.3% of total investment in the period. As shown in Table 5.3 the collection of a set-up fee has played an important role for the development of the industry.

Table 5.3 Total of Initial Set-up Fees and Total Investment in the IT Industry during the five-year Economic Plans

Economic Plan	Total of initial set-up fees (A)	Total investment in the industry (B)	Share in Total investment (A/B)
6th EP	CNY 797 million	CNY 2.23 billion	35.7%
7th EP	CNY 4,686 billion	CNY 15.24 billion	30.3%
8th EP	CNY 83.13 billion	CNY 210.9 billion	39.4%
9th EP	N.A.	N.A	About 30%

Source: Investment and Loans in the Information and Communication Industry, People's Post and Telecommunications Publishing, 2000. 12,

In general, once telephone penetration rates reach a certain level, initial set-up fees begin to drop. With the huge strides made by China's telephone industry in the last decade, initial set-up fees are now dropping rapidly. Regulations have been set for the initial set-up fee not to exceed CNY 5 000. Prior to discontinuation of the initial set-up fees as a result of tariff rebalancing in 2001, the fees were on average CNY 1 000.⁵¹ The drop in initial set-up fees is due to the rise in the number of new subscribers, which helped in replacing internal funds lost from the initial set-up fee. However, the decrease and eventual abolishment of the initial set-up fee means that there is a reduction in internal financing, and if carriers want to maintain a similar level of investment as before, they have to increase the proportion of external financing to raise investment funds.

This policy had a very serious effect on the financing of the industry. The drop in initial set-up fees has led to a reduction in the proportion of financing using internal funds. If companies wish to maintain their level of investment, they will have to increase the share of external financing.

Loan management

Loan management is the main channel used by Chinese post and telecommunications companies to acquire foreign capital. At the beginning of the economic reform in China, the Department of Post and Telecommunications of Guangdong Province invented the concept of loan management in order to fulfil rapidly the increasing demand in the market. Internal funds of companies and social funds were insufficient to build up a substantial amount of investment funding.

As a result, the concept of loan management was invented to meet the demand for communications development demand; this concept enabled companies to obtain loans as long as there was a market and profits either in or outside the country. In 1984, Guangdong Province raised CNY 15 million of loans from domestic banks and USD 485 million of loans from Hong Kong for two microwave projects. Since 1984, Guangdong Province has extended the size of loan and, in 1988, the total amount of loan exceeded CNY 600 million – ten times the amount borrowed in 1984.

Today, post and telecommunications companies in other provinces are able to raise funds through large-scale loans from domestic or foreign governments, international financing organisations or domestic banks. Loan management has brought about a number of changes in the Chinese post and telecommunications industry.

Development phases of loan management

The types of loan management undertaken by the post and telecommunications industry are closely related to the state of supply in the equipment market. The shifts took place in two phases.

Phase One

Developing countries usually try to attract foreign capital at low interest rates in order to build networks. At the same time, telecommunications equipment manufacturers from developed countries are seeking to enter new overseas markets. Consequently, as developing countries bring in foreign capital, equipment manufactured in the investing country is introduced to the market.

Japan was the first country to invest in China's post and telecommunications industry. Along with the Japanese investment capital, large quantities of equipment manufactured by NEC were introduced on China's market. Belgium, Canada and France followed suit. During this phase, large amounts of foreign capital were required to fulfil the demand engendered by the introduction of foreign equipment in large quantities.

Phase Two

As eight new production lines for telephone switchboards were established in China and domestically made equipment came onto the market, it became apparent that there was little difference between Chinese manufacturing skills and those of foreign countries. Domestic products are slowly taking over the market for communications equipment and substituting foreign-made products. In the market for digital switch and light communication equipment, supply has already exceeded demand.

Some products are exported to foreign countries and, in the same manner as for foreign investments in China, Chinese capital is invested in the form of loans when products made in China are introduced on foreign markets. The redemption of instalments by communications equipment manufacturers has become an important means of financing post and telecommunications businesses. Unlike the previous phase, the bulk of business financing now depends on domestic loans rather than on foreign loans.

5.8.3. *Problems with investment mechanisms for the Chinese information industry**Problems with China Telecom's investment mechanism of service business*

- *The Chinese government is not only the key investor in the telecommunications industry, it is also the main body with intangible property rights. However, the investment mechanism does have some deficiencies; unlike individual investors, it is unable to avoid risks. Also, when investing in several items, it does not take investment efficiency into account.*
- *Competition in the telecommunications service product market is not perfect. While a competitive product market operates in conditions of perfect competition, the service product market is not in fair competition. Also, due to entry barriers, there has been no effective monitoring of the system and it is impossible to monitor investment activities in the market.*
- *There are some problems with the management mechanisms of Chinese telecommunications providers. Chinese telecommunications operators have been unable to develop a corporate system due to the long-standing existence of a cosy relationship between politics and*

economics. Furthermore, no systems exist to enable capital markets and private capital to be effectively monitored. The absence of such mechanisms has resulted in the past in the adoption of careless management practices, concentrating on growth with insufficient attention being paid to market or investment efficiency.

The adoption of efficient decision, profit, budget and risk liability mechanisms will lead to gradual improvements in the investment patterns of the telecommunications companies.

Problems with the investment mechanisms of the Chinese information product industry

- *The shortage of investment resources remains serious.* Massive funds are required to operate a company. In general, companies raise funds either by borrowing from the bank or by listing themselves on the stock market. However, the number of Chinese companies eligible for listing is very limited. This shortage of investment resources is emerging as an obstacle not only for market expansion of information product manufacturers but also for the introduction of foreign investment. In particular, small and medium-sized enterprises face severe difficulties in obtaining loans.
- *Many companies have relatively high debts.* Currently, most equipment manufacturers are seriously indebted. In particular, the situation of non-listed companies is worsening. Since taking out loans has been the only way to raise funds, firms continue to maintain a high debt ratio. This negatively affects management of the firms as well as their ability to attract investment etc.
- *The level of corporate capital management is low.* Capital management remains a problem for Chinese information product manufacturers due to their operation systems and the environment of the domestic capital market. Chinese firms are held back, while foreign manufacturers vigorously take over their business. This pressure is becoming increasingly strong as the country attempts to fulfil its commitments regarding WTO membership and integrate the global economy.

CHAPTER 6:
**THE IMPACT OF CHINA'S WTO MEMBERSHIP ON THE TELECOMMUNICATIONS
SECTOR**

6.1. Progress of the negotiations in view of WTO membership

China's bid to join the World Trade Organization (WTO) began in July 1986, when China started talks on joining the then General Agreement on Tariffs and Trade (GATT). In May 1987, the Chinese government set up a task force to oversee entry to the GATT and began to exert its best efforts for accession. Since 1995, when the GATT was replaced by the WTO, the Chinese government has passed a number of milestones on the road to WTO accession. As a result, the Chinese government concluded a bilateral agreement with WTO members including the United States and Canada in 1999, and with the European Union (EU) in 2000.

Table 6.1. The road to China's WTO membership

Date	Key milestones
Jul. 1986	China applies for entry to the GATT
May 1987	China establishes a Task Force for entry to the GATT
Aug. 1997	Korea and China reached a bilateral agreement (<i>i.e.</i> tariff reductions on 1 584 products)
15 Nov. 1999	The United States and China conclude a bilateral agreement
26 Nov. 1999	Canada and China conclude a bilateral agreement
May 2000	The EU and China conclude a bilateral agreement
Sep. 2000	US Senate grants PNTR (permanent normal trade relations) status to China
Dec. 2000	14 th working group meeting: – Closer to agreement on issues such as judicial inspection and agricultural subsidy – Continued disagreement between the United States and the EU on major issues such as services, anti-dumping, safeguards, etc.
Nov. 2001	– Approved at the Doha the Fourth WTO Ministerial Meeting
Dec. 2001	– Official member of the WTO

Source: OECD.

However, disagreements remained with China's trade partners over agricultural subsidies, services, anti-dumping practices and special safeguards over excessive periods of time. These delayed China's WTO membership, but, China submitted the application documents at the Fourth WTO Ministerial Meeting in Doha, Qatar on 11 November 2001 and officially became a WTO member on 11 December 2001.

6.2. Analysis of China's concession schedule in the telecommunications sector

6.2.1. China's commitments⁵²

According to the agreements signed with the United States and Europe on Chinese commitments to WTO accession, China has agreed to adopt the WTO's Basic Telecommunications Accord's pro-competition principles. This means that after China's entry into WTO, foreign suppliers may use whatever technology they choose to provide telecommunications services.

Furthermore, China will allow foreign service providers to establish joint ventures and gradually reduce the limitations on foreign ownership in Chinese telecommunication service markets. In mobile telephony services in the basic service sector, China will allow foreign investment up to 25% in joint ventures in three major metropolitan cities, such as Beijing, Shanghai and Guangzhou, upon accession to WTO. These areas are expected to account for 75% of national telecommunications traffic by 2002. This foreign equity limit will increase to 35% and geographical restrictions will be lifted in 14 more cities, such as Chengdu, Chongqing, Dalian, Fuzhou, Hangzhou, Nanjing, Ningbo, Qingdao, Shenyang, Shenzhen, Xiamen, Taiyuan, Xi'an, Wuhan in 2002. The foreign equity limit will increase to 49% by 2004, and by 2006, all geographical restrictions will be abolished in the mobile telephony sector.

The paging in basic service and value-added network (VAN) services, including e-mail, will have a similar schedule, with quicker market access plans than others. Foreign ownership of a level of 30% will be allowed and joint ventures in the three major cities as for the mobile telephony. In 2002, China will allow foreign equity holdings up to 49% and expand the geographical areas into 14 more cities. By 2003 there will be no more geographical restrictions on joint ventures and foreigners will be able to hold up to 50% in equity in these service sectors.

According to the provisions of the WTO's Information Technology Accord (ITA) and basic telecommunications agreement, and in line with the agreements signed between China and other nations on China's accession to WTO, China will allow foreign ownership at a maximum of 25% in three major cities by 2004 in the fixed basic telephony service sector. However, until 2003, foreign investment will still not be allowed in this service. Around 2006, that limit will be increased up to 35% and geographical restriction will be lifted in 14 more cities. By 2007, all geographical restriction on foreign joint ventures will be completely removed and equity limit will be increased up to 49% in this service.

Table 6.2. Concession Schedule of the Chinese Telecommunication Market

Scheduled Year		Geographical restrictions (gr) and permitted levels of foreign ownership in a joint venture					
		Upon Accession (2001.11) (A)	2002 (1 year after A)	2003 (2 years after A)	2004 (3 years after A)	2005 (4 years after A)	2006 (5 years after A)
Services							
Value-added Services		3 cities; 30%	14 more cities; 49%	No GR; 50%			
Basic Services	Paging	3 cities 30%	14 more cities 49%	No GR; 50%			
	Mobile	3 cities 25%	14 more cities 35%		49%	No GR	
	Fixed	No foreign ownership allowed			3 cities 25%		14 more cities 35%

Source: Compiled from "Schedule of Specific Commitments: People's of Republic of China", WTO, WTO/GATS/SC/135, 14 February 2002.

Notes: 3 major cities: Beijing, Shanghai, Guangzhou; 14 more Cities: Chengdu, Chongqing, Dalian, Fuzhou, Hangzhou, Nanjing, Ningbo, Qingdao, Shenyang, Shenzhen, Xiamen, Taiyuan, Xi'an, Wuhan.

6.3. The impact of WTO membership on the Chinese IT market

WTO entry will propel the Chinese economy to new levels, bring: *i*) economic growth; *ii*) diversification of the economy; *iii*) tighter integration of the Chinese economy with the rest of the world; *iv*) a more competitive domestic market; and *v*) improved national infrastructure. China's membership in the WTO will have profound and far-reaching effects for the Chinese economy. The major impacts of China's accession to the WTO on the Chinese IT-related industry will affect the following aspects:

- Fair competition: China will have to apply the same standards on taxes (such as value-added tax or tax deductions) to all firms, regardless of their origin (domestic or foreign). This will create a level playing field for all market players.
- Autonomous management strategy: After its entry in the WTO, China has pledged to respect the WTO's TRIMs.

- Comprehensive management environment: Foreign companies will be free to produce and sell their products in China. Within a year of China's accession to the WTO, companies with foreign investors will be allowed to sell imported products.
- Protection of technological sovereignty: Within the China-US Agreement, China agreed to abolish the requirement for technology transfer and to remove the restrictions on investment permits and imports arising from the technology transfer requirement.
- Protection of intellectual property rights: China has agreed to improve the protection of IPRs.
- More flexible operation of multinational enterprises: As mentioned above, China has to remove all customs duties on items covered by the ITA.
- Opening up the domestic market: With China's accession to the WTO, foreign companies will be free to provide computer software and hardware services as well as infrastructure and value-added services.⁵³

These macro influences will have a tremendous impact on the Chinese IT market. First, since China Telecom has a virtual monopoly over local call services and since profits are expected to be low compared to the large investment requirements, the incentives for new entrants to enter the market appear to be insufficient. Therefore, China Telecom is expected to maintain its market dominance even after WTO membership. Given the low penetration rate of 15% for telephone services, the power line communications industry shows promise as a substitute for fixed line networks. Furthermore, firms involved in the construction of high-speed networks (such as B-WLL and ADSL) have a high potential for growth.

Long-distance call services are currently shared under a duopolistic system involving China Telecom and China Unicom. Although there is some marketability in comparison to local telephony services, the incentives for market entry remain low. To promote market competition after accession to the WTO membership, principles for fair competition will need to be established in sectors such as interconnectivity and unbundling. Other related promising industries are the optical cable industry and the leased line service for voice and data industry.

Mobile telephony sector is currently operated under a duopoly involving China Mobile and China Unicom. With Chinese entry to the WTO, foreign firms are very likely to branch out into manufacturing terminals or facilities. There will be an increase in strategic alliances among service providers with equity shares. Promising areas include CDMA handset or equipment industry, CDMA services and roaming services in the mobile telephony industry.

Growth in paging services is expected to slow as the mobile telephone industry expands. In addition, WTO membership is expected to bring about stronger market competition, although there will be little incentive for foreign companies to enter the market.

Table 6.3. WTO Accession: Attractiveness of and Prospects for Chinese IT Services

Service areas	Market attractiveness	Promising areas
Local telephony services	<ul style="list-style-type: none"> • Monopolised by China Telecom • Low profits can be expected considering the amount of investment required; incentives for new market entrants are low • Regulations on foreign firms • No widespread changes expected in the wake of WTO entry 	<ul style="list-style-type: none"> • PLC equipment shows promise as an alternative telecommunications network, given the low (15%) penetration rate for telephone service • B-WLL industry • High-speed broadband networks such as ADSL
Long-distance telephony services	<ul style="list-style-type: none"> • Duopoly by China Telecom and China Unicom • Some marketability compared to the local telephony services, but incentives for new market entry remain low • To stimulate competition after the WTO membership, a basic framework needs to be established to ensure fair competition in areas such as interconnectivity and unbundling 	<ul style="list-style-type: none"> • Optical cable industry • Remote terminal (RT) industry
Mobile telephony services	<ul style="list-style-type: none"> • Duopoly by China Mobile and China Unicom • Foreign firms likely to branch out into manufacturing terminals or facilities • Strategic alliances with equity stakes 	<ul style="list-style-type: none"> • CDMA • Terminals or equipment industry • Equity ownership in CDMA of mobile telephony industry • Roaming services
Mobile paging services	<ul style="list-style-type: none"> • Led by China Unicom • Upon WTO membership, market competition will increase, but there are no strong incentives for foreign companies 	<ul style="list-style-type: none"> • Paging equipment
Value-added telecommunications services	<ul style="list-style-type: none"> • Rapid expansion of Internet-related industries such as Internet telephone services • CHASDAQ to be established • Active entry by foreign firms foreseen with Chinese WTO membership 	<ul style="list-style-type: none"> • Internet phone solutions • Internet contents • Internet equipment industries • Wireless Internet

Source: OECD.

The value-added telecommunications market has a very high potential for growth with rapid expansion of Internet-related industries, such as Internet telephone services. As a result, increased market entry by foreign firms is expected to follow on from Chinese WTO membership. Unlike other basic telecommunications services, the Telecommunications Decree controls the Chinese telecommunications market but does not prohibit business in value-added services by foreign firms, thus making it possible for foreign firms to make legal inroads into Chinese markets. Promising areas include Internet telephony solutions, Internet content, Internet equipment industries and wireless Internet business.

CHAPTER 7: CONCLUSIONS AND RECOMMENDATIONS

7.1. General assessment of current trends, strengths and weakness

7.1.1. Trends⁵⁴

China, with its potential to become a super economic power in the near future, will be a significant player in the global digitisation process. Therefore, it is important to identify macroeconomic trends over the next ten years before analysing IT sector-specific strengths and weaknesses. The following box summarises macroeconomic development trends in China.

Trends
<ul style="list-style-type: none">• The country will continue to open its economy and its society to the world.• It will adopt a more capitalistic economy with Western-style financial markets and economic system.• Greater attention will be paid to communications technologies.• The vast and deep pool of human resources will be strengthened.• Consumer markets will be expanded and efforts will be made to fulfil sophisticated consumer needs.• Technology will be used to increase efficiency in all sectors of industry.• Chinese manufactured goods will gain in importance on world markets.

In the 1970s, China realised that bringing in foreign management and technology was key to economic growth and to China's accession to the WTO; this trend is set to continue. China will continue to open its economy and its society to the global market, resulting in increased interaction with the rest of the world.

In the process, China's economy will become more and more capitalistic, and its financial markets and economic system will increasingly resemble those of the West. This will include the establishment of stock exchange markets and the development of a framework pertaining to intellectual property right management.

Spending on telecommunications infrastructure will continue at a fast pace as has been the case for the past few decades. The Chinese government's focus on communications and technology will continue to increase. China's human resource pool is deep but has yet to be fully utilised. With proper training and the right system in place, this vast reserve human resources will develop valuable R&D capabilities over time.

China's GDP is already the third largest in the world on a PPP basis. With a growth rate exceeding 7% for the last 15 years, China will likely to become the largest consumer market in the world in the next two decades. The spectacular growth in computers and mobile phones is a case in point. The consumer market will continue to grow, and consumer needs will become increasingly more sophisticated as Chinese citizens adopt different lifestyles and forms of entertainment.

The transition from a centrally planned economy to a market-oriented enterprise system in less than 30 years has left China's industries, in most cases, woefully inefficient by Western standards in terms of capital efficiency. New technology and management tools, such as supply chain management and customer relation management, will play a key role in increasing efficiency in all sectors of the economy.

With its vast and growing economy, China will no doubt become the key market for many multinational organisations and will play an important manufacturing role for global corporations. In today's era of global competition, any company without a manufacturing base in China would probably lose competitive advantage over time. Thus, China is set to become a key element in any global organisation's overall strategy, especially in the area of manufacturing.

Along with these general macroeconomic trends, the following are seen as the specific strengths and weaknesses of the IT sector.

7.1.2. *Strengths*

Strengths
<ul style="list-style-type: none"> • Continued introduction of competition policy for telecommunication services. • Huge potential for growth of demand. • Localisation policy for telecommunications equipment. • Inauguration of the Ministry of Information Industry. • Establishment of regulations on telecommunications. • Stronger competition following WTO membership.

Continued introduction of competition policy for telecommunications services

Since the 1990s, the Chinese government has facilitated the development of telecommunications infrastructure by the gradual introduction of some competition policies for telecommunications services. In doing so, it has diffused telecommunications services and was able to achieve a competition framework for mobile phone markets early in the process.

For example, in 1993, the then Ministry of Post and Telecommunications introduced competition system to replace the monopoly structure that had enabled the transformation of planned economy based on authoritative directives to a market economy. In 1994, by establishing China Unicom, the second largest telecommunications company, a practical competitive framework was introduced to the market. Later, in February 1999, the Chinese government took the decision to split China Telecom, a monopolistic enterprise, into four parts: fixed-line telephone services, mobile telecommunications, mobile paging services and satellite communications.

Furthermore, the government is continuing its efforts to expand the network and facilitate competition in the market by allowing new companies such as China Netcom and China Railcom to enter the VoIP market. This shows the willingness and determination of the Chinese government to push the IT service market in the direction of greater competition.

Huge potential for growth in demand

Despite the lack of technology development and the low telecommunications penetration rate, China has enormous potential demand due to its large territory and huge population. In the case of the mobile telephone market, following the commercialisation of digital services in 1995, it took only five years to attract 85 million users. As a single company, China Mobile, the leading provider, enjoys the greatest number of subscribers in the world. Due to such an explosive demand potential, many foreign companies are attempting to enter the Chinese telecommunications market.

The extent to which the rapid demand in telecommunications services during the past several years will continue in China is open to question. One factor which may slow growth is that the income level that support demand for telecommunication services is relatively lower than more developed nations. However, despite the sluggish global economy, China has enjoyed a high growth rate in its economy each year and this growth is expected to continue for the next five-years. In addition, in the future, telecommunication service charges and the average price of handsets are expected to be lower than they are now. These factors could serve to support the growth in telecommunications service market in China.

Localisation policy for telecommunications equipment

China has become the world's third largest producer of IT products, with a huge potential for growth. With its massive spending on telecommunications infrastructure, China aims to develop its own telecommunications equipment industry by implementing policies for increased R&D support and lower dependence on technology imports. Efforts are continuously made to improve telecommunications technologies which lag behind those of other countries.

In this context, the Chinese government emphasises local production and technology transfers and aims to successfully apply the localisation of the switchboard industry to current markets such as that for mobile telephony.⁵⁵

Inauguration of the MII

At the 1st Session of the National People's Congress in the 9th annual meeting, held in March 1998, the Ministry of Information Industry (MII) was formed, by merging the Ministry of Posts and Telecommunications (MPT) with the Ministry of Electronics Industry (MEI). The MII, as the sole ministry in full charge of IT sector, establishes communications-related policies, specifies laws and regulations, provides planning, and negotiates with foreign enterprises, etc. The MII will provide a more consistent and strong voice in IT policy.

Establishment of regulations on telecommunications

In order to close any loopholes concerning telecommunications matters, China released its regulations on telecommunications, the Telecommunications decree, passed by the State Council (Directive No. 291) in September 2000. The general principles of this decree are to regulate the telecommunications market, safeguard the legitimate rights and interests of telecommunications users and proprietors of telecommunications businesses, and ensure the safety of telecommunications networks and information. It is an important document in the sense that it provides a legal framework for major regulatory policies and is an administrative act in the transition to a full-scale legal framework for telecommunications sector.

Stronger competition following WTO membership

China's accession to the WTO is now reality as China became an official WTO member in December 2001. Upon its entry to the WTO, the telecommunications market will become far more competitive as it opens to the outside world. However, the Chinese government needs to ensure that it implements its schedule of commitments to the WTO with respect to telecommunications and it puts in place the principles in the reference paper of the Agreement on basic telecommunications services.

Greater competition enhances the build-up of the telecommunication infrastructure, stimulates investment and will improve the efficiencies of the various industries, leading to productivity improvements and economic growth. The expanding economy will further attract foreign investment and induce further efficiency enhancement. Foreign direct investment and access to foreign markets may help reduce the cost of investment.

7.1.3. Weaknesses**Weaknesses**

- Lack of information infrastructure and the digital divide.
- Insufficient investment by the private sector.
- Legal framework needed to enhance competition.
- Ineffective competition safeguards for the telecommunications sector.
- Dependence of the Ministry of Information Industry upon other authorities.
- Lack of regulatory reform for efficiency and user-friendliness.
- Weak competition in voice telephony markets.

Lack of information infrastructure and the digital divide

Although telecommunications services have become more accessible with the introduction of competition, the penetration rate in fixed-line telephony remained low, at 11.4% at the end of 2000.

In addition, the regional gap between the East Coast and inland is so enormous that counteractive measures are urgently needed. As yet, there is no effective system in place to narrow the economic gap and cope with the severe lack of infrastructure.

Insufficient investment by the private sector

Private investment, whether domestic or international, is crucial for strengthening the information infrastructure. However, the market environment is sufficiently mature and suffers from a lack of transparency and stability. Currently, entry to the private telecommunication service market, especially in the basic telecommunication markets, is controlled by government and foreign direct investment to the telecommunications service markets are severely restricted so that it is very difficult to raise investment from the private sector. Although foreign investments are expected to increase with China's accession to the WTO, the government should move ahead with clear statements on the telecommunications service market an opening schedule, improvements in transparency and predictability of policies and implement fair competition safeguards in the telecommunications market.

Legal framework needed to enhance competition

Currently, no established telecommunications law exists, although the State Council has passed regulations on telecommunications sector, upon or after accession to the WTO. The regulations are either simply an administrative declaration to regulate the proprietors of telecommunications businesses, enforce interconnectivity, and ensure the safety of telecommunications networks and information or provisions to the foreign-invested telecommunication enterprises. A comprehensive legal framework is required since policy consistency and transparency are keys to the successful development of the telecommunications sector.

Ineffective competition safeguards for the telecommunications sector

No practical mechanism exists that can guarantee fair competition in such areas as interconnectivity, telecommunications network safety and pricing. Furthermore, the MII virtually controls all the major service providers in the Chinese telecommunications market: China Telecom, China Unicom, China Mobile. Competition among these companies appears to be controlled by the MII.

Therefore, ensuring the implementation of a competitive system requires a fixed period of time and preparations for detailed strategies. Facilitating competition in the market calls for: greater flexibility in entry regulations affecting fixed-line telephony; improvements in interconnection; and the immediate introduction of universal service requirements for all market players.

Dependence of the MII upon other authorities

Although the Ministry of Information Industry was established as the organisation responsible for telecommunications, many other governmental authorities are involved in general IT-sector policies and their implementation. This leaves less room for MII to make independent decisions. The majority of the IT-leading countries are striving to improve the efficiency of their regulatory systems by ensuring the independence of their regulatory bodies and separating the policy function from the regulatory one. This entails the creation of an independent regulatory body on the lines of the FCC in the United States or OFTEL in the United Kingdom.

Lack of regulatory reform for efficiency and user-friendliness

Corrections are needed to rectify economic distortions arising from market intervention through unlawful “advice” or resulting from biased policies aimed at ensuring the success of a particular manufacturer or company.

Weak competition in voice telephony markets

Despite some superficial advances in competition, for example in new market entrants, there have not been significant changes in terms of market structure except for business segmentation and transitions into a business structure. In the case of a voice telephony markets, China Telecom continues to monopolise the market. Regulatory policies are needed to encourage competition.

7.2. Policy recommendation for further reform

Policy recommendations
<ul style="list-style-type: none"> • Expansion of the information infrastructure. • Comprehensive legal framework for the effective implementation of IT policies. • Strengthening the independence of the responsible organisation. • Transparent and impartial regulatory mechanism. • Reforming regulations to stimulate competition. • Re-examination of the scope, effectiveness and compulsory measures of competition policies.

7.2.1. Expansion of the information infrastructure

While promoting the expansion of the information infrastructure, China does not have a firmly established institutional system with which to achieve its policy goals. Since the operation of the system is based on past policy routines, the results of stimulating competition do not attain the policy goals or the levels of other countries. Therefore, a comprehensive policy programme needs to be developed for increasing competition and technology in the telecommunications network by learning from the experiences of other countries.

It is necessary to ensure that investments are allocated to appropriate areas in a transparent manner. In addition, competition must not take place in such a way that it distorts markets. Substantial reforms are required to allow the institutions to benefit from active competition. Restrictions on market entry need to be lifted and a new regulatory regime developed to promote greater competition in the market. Effective competition calls for the urgent introduction of concrete measures on interconnection and universal service.

7.2.2. Comprehensive legal framework for the effective implementation of IT policies

China currently lacks a written law on telecommunications. As for related laws, some regulations have been established by the State Council from upon which the MII, State Development Planning Commission, State Economy & Trade Commission, and Overseas Trade Co-operation Committee base their decisions. Although the Telecommunications Decree was passed by the State Council in September 2000, this decree is no more than a passing regulation before the introduction of a comprehensive telecommunication law. The MII is apparently in the process of finalising the written law. This new law should contain specific and detailed provisions to ensure a more comprehensive and effective competitive environment relating to interconnection, unbundling, tariffs, universal service and number portability.

Fundamental reforms are necessary in order to enhance market competition. The developed countries have generally enacted a separate law for telecommunications. The adoption of such a legally binding system in China would remove institutional uncertainties and increase administrative transparency.

7.2.3. Strengthening the independence of the responsible organisation

Although the Ministry of Information Industry (MII) was established in 1998 as the governmental organisation responsible for telecommunications, many other bodies, such as the State Council and Technology Committee, are involved in the setting of policies and regulations for the IT sector. MII is responsible for co-ordinating all such activities, thereby strengthening its independence. If regulatory controls are combined in one organisation, this will result in greater expertise and effectiveness. In the longer term, once the MII becomes fully independent and market competition matures, policy separation of the regulations can be considered following the general trend adopted in other developed countries.

7.2.4. Transparent and impartial regulatory mechanism

First, market barriers need to be alleviated by transforming the licensing systems. Under the current system, the MII can become overly involved in the licence-granting process. In other words, since the criteria for licensing are not clear, this can open the way to arbitrary intervention. Transparency should be ensured by clearly specifying the conditions for licence applications. For the telecommunications industry, a registration system or a return system would be more appropriate than a licensing system. Moreover, there is a need to examine the consequences of changing from a business authorisation system to a class licensing system.

Second, communications pricing regulations need to be gradually reformed. The current system is influenced by political factors rather than by market competition, often to the detriment of market growth. Many different price charging systems can be introduced, and there can be two separate pricing systems for businesses and households. The current system, in which the government directly sets the prices, will be abolished in the future, and the scope of government-guided prices should be kept to a minimum in order to promote effective tariff competition.

Third, transparency and efficiency are called for in the process of interconnection. The Telecommunications Decree has defined basic rules such as the duty and procedures of interconnection by telecommunications networks; however, more detailed regulations have yet to be established. Detailed regulations on cost settlement and management are decided by the MII but for interconnection pricing, the currently applied interconnection charges are determined by the MII, but are not based on cost.

Therefore, the future telecommunications law should allow interconnection charge to be set according to either the FDC (fully distributed cost) method or the LRAIC (long-run average incremental cost) method. Transparency in interconnection is important since China Telecom is vertically integrated. Accordingly, transparency and fair conditions need to be pursued and promoted in relation to interconnection.

Fourth, universal services need to be defined and reasonable operation methods set. Currently, China Telecom assumes responsibility for universal service obligations. However, in the absence of proper compensation for China Telecom and due sharing by other service providers, the profitability of the China Telecom will deteriorate and will lead to delays in the expansion of the nation-wide network.

This universal service obligation will play a key role in expanding the telecommunications infrastructure and network in the western region. China has declared only those provisions that ensure the right to universal services, guaranteeing access to telecommunications. With the growing importance of telecommunications services, the concept, scope and pricing methods should continue to be strengthened.

7.2.5. *Reforming regulations to stimulate competition*

Markets with more capable players will stimulate further competition and benefit consumers. In this sense, limitations on foreign ownership in the fixed and wireless markets in the WTO concession schedule should be further relaxed. China needs foreign investment to build up its public switched telephone networks (PSTN), mobile telephone networks, and local, long-distance and leased-line markets. In the long term, restrictions on foreign ownership will impede the entry of the new and more eligible players, and hence the development of the IT sector in China, in general.

7.2.6. *Re-examination of the scope, effectiveness, and compulsory measures of competition policies*

All IT-related regulations need to be re-examined on a regular and systematic basis in order to ensure that the regulations are still in the public interest, or whether they should be abolished or supplemented. The introduction of “forbearance” would enable unnecessary regulations to be removed.

NOTES

1. This paper was written initially around September 2001. Thus, most data and information cited here are for the end of 2000 or earlier. Since then, major events and developments have occurred in China, especially the break-up of the China Telecom. The paper has been revised following meetings in China in October 2002. However, most data are based on the earlier version of the paper for consistency and due to data availability. Therefore, any data before the end of 2001 reflect the old market structure and market participants and only 2002 figures, when available, reflect new changes.
2. Wang Wei, "China's Integration with the World Economy: Repercussion of China's Accession to the WTO", International Workshop Proceedings, August 2001.
3. Liu Cai, "Reform of Telecommunication Industry in China", *People's Posts and Telecommunications*, No. 2, 1999. Only three years after this comment, China became the world leader in terms of total subscribers.
4. Press conference statement by the Deputy Minister of Information Industry, Lou Qinjian, 21 June 2001.
5. A recent issue of *AsiaWeek* (3 August 2001) has a cover story on the Chinese IT sector which describes China's enormous potential and lists the following economic and societal raw materials essential to a vibrant technology industry: *i)* huge market; *ii)* modern network; *iii)* manufacturing base; *iv)* manpower and brain power.
6. The proportion of mobile telephony subscribers among total subscribers in China reached 47.9% in September 2002, up from 17.4% in 1995. China Mobile stopped providing analogue service completely from 31 December 2001.
7. Based on "2001 Annual Report: China's Information Industry", Ministry of Information Industry, China,
8. The newly formed China Railway Telecom began recruiting subscribers in July 2001.
9. As of May 2002, the Chinese government decided to split China Telecom into two regionally split companies, China Telecom and China Netcom, in order to foster competition in the country's near monopolistic fixed line market.
10. Since the founding of the People's Republic of China, the drafting of the first Electric Communications Law, Post and Telecommunications Act began in 1955 and was completed in 1958 but was never enacted. A draft of Electric Communication Law, which separated mail and telecommunications, was later reviewed by the National Assembly in 1982 and again in 1986, but was vetoed both times.
11. However, the Telecommunication Decree is expected to have desirable effects such as reduction of system uncertainties, fair practice regulation of market leader, and more effective.
12. Under the Telecommunications Decree, telecommunication services are divided into basic service and value-added telecommunication services. Basic telecommunication service consists of "public telecommunications network" and "provision of public data transmission and basic voice telecommunication services". Value-added telecommunication service means "provision of information

service by utilising public telecommunications network facilities”. As a follow-up measure, MII announced a Notice on the Telecommunication Service Classification Catalogue in June 2001.

13. The Ministry of Finance manages asset and ownership issues, SDPC has a say in investment decisions, and SETC has influence on technology renovation matters. The State Council takes the final decisions.
14. Based on the Ministry of Information Industry’s homepage, <http://www.mii.gov.cn> and “2001 Annual Report: China’s Information Industry”, Ministry of Information Industry, China.
15. This section provides an introduction to the basic principles of regulatory policies set out in the Telecommunications Decree. A more detailed analytical review of regulatory policies in China is presented in Chapter 5.
16. With reference to old China Telecom.
17. This section introduces the major features of the Telecommunications Decree. More detailed analysis of the Decree will be presented in Chapter 5.
18. The current Telecommunication Decree does not have provisions, such as foreign equity level and market opening schedules in the telecommunication sector. To overcome this shortcoming, after the accession to the WTO in December 2001, Chinese government announced a Regulation of Foreign Invested Telecommunications Enterprises (“FITE Provisions”).
19. During our meetings in China, we were informed that a new telecommunications law has been drafted, although not yet published, and is under the review by the relevant parties.
20. The analysis of the following three chapters from Chapter 3, 4 and 5 are mostly based on data and information available at the end of 2000, unless otherwise noted.
21. There is no concrete information on specific equity ownership for each telecommunication service provider. This is why we only provide the ownership chain among shareholders.
22. However, during meetings in China, it was claimed that China Telecom is a state-owned company and the MII is not the owner of China Telecom, but rather only acts as a regulatory body.
23. Chinese officials have stated that there are six ways for the Chinese government to asymmetrically regulate China Telecom: *i*) market access, *ii*) resource allocation, *iii*) tariffs, *iv*) quality of service, *v*) universal service, *vi*) interconnection requirements.
24. In a sense, China Telecom companies are multi-layered, under the guidance and influence of many organisations, such as the Ministry of Finance, Ministry of Information Industry, SDPC, and the SETC.
25. An October 2001 report by Gartner stated “China Telecom to be divided: instead of one, the dragon will have two heads”.
26. In a report on the listing by the Chinese government of China Telecom on the New York and Hong Kong stock markets in November 2002 to raise around USD 3 billion. It was stated that to attract foreign investment, the Chinese government hinted that it will not lower China Telecom tariffs in the next three years.
27. China Telecom officials informed us that CT has the right to do business in the 10 Provinces of CNC service areas and recently set up new branches for services in those regions. However, it was clear that there would be no “price war” between the two companies in the market.

28. A portion of this section is based on analysis by the Daiwa Institute of Research, "China Telecom Sector Update", February 2001.
29. For IDD PSTN services, China Unicom was further allowed by the authorities to set its rates 20% below the State guidance rate for a period of one year ending in April 2001.
30. A brief history of the mobile sector can be found in Table 1.1.
31. China Telecom before it was divided into four companies.
32. The organisational structure in Figure 3.5 does not fully depict the ownership structure, due to space constraints.
33. For example, China Unicom has the flexibility to match the $\pm 10\%$ range of the China Mobile on both ends, giving 20% in total. However, China Unicom has faced a unique situation, having two technologies, GSM and CDMA, in one company. This has caused the company some headaches, bringing difficulties and conflicts in terms of investment decisions, funding and technology development aspects. For more details, see Han-Joo Kim, *Mobile Communication in China: History and Future, Telecommunication Review: special issue on Chinese Mobile Telecommunications: Current status and Prospects*, SK Telecom, 2002.
34. The analysis in this section is based on "1999 More Mobile Phones for the General Public", D&A Consulting, May 2000.
35. As stated in Article 6 of the "Provisional Regulations on Internet Access Operation for Computer Networks in China".
36. China Netcom and Jitong merged on 16 May 2002. Thus, in Table 3.19, total bandwidths of these companies are noted separately before the merger and combined after the merger.
37. Excluding the China Defence Network.
38. Analysis of the Chinese ISP Market at Present, CCIDNet.com (7 July 2000).
39. For example, Shanghai ISP, Shanghai Online (www.online.sh.cn), and Lianing Province ISP, SY Online (www.ln.cninfo.net), are both subsidiaries of China Telecom.
40. According to the above-mentioned report by CCIDNET, only 21% of medium and large-sized Chinese ISPs were profitable as of July 2000.
41. For further information on ISPs in China, refer to the Beijing Cyber Port home page (www.bta.net.cn) operated by BTO.
42. Among the ISPs mentioned in Table 3.19, Changjiewangyuan (2911) became famous for offering total exemption from Internet usage charges in July and August 2000.
43. China WTO schedule allows up to 49% of foreign equity share would be allowed. The share will be expanded even further to 50% after two years.
44. Here, Internet users are counted as anyone who uses Internet more than one hour a week.
45. From the 10th survey undertaken in June 2002, the CNNIC has changed the data collection method which double counted multiple method users. Therefore, it would be meaningless to compare the growth rates with previous survey data in any two survey periods.

46. This trend is supported by the fact that low Internet connection speeds are one of the most serious complaints cited by Chinese Internet users. This will be discussed later.
47. This section is mostly based on the 2001 Annual Report on “Progress of China’s Information Industry in 2001”, August 2002.
48. According to 2001 China Information Industry Annual Report, the Chinese information industry as a whole, including postal and telecommunication service sectors as well as IT equipment sector, contributed 4.2% to total GDP in 2001, including a 2.53% contribution from postal and telecommunication service sectors.
49. On 3 August 1993, the State Council issued a document containing proposals by the Ministry of Post and Telecommunications on further tightening up management of the market for telecommunications services. According to this document, the decontrolled telecommunications services were to be categorised as follows: *a)* some services, such as paging, 800MH group telephones, 450MHZ mobile telecommunications and domestic VSAT telecommunications were subjected to a permit system whereby the resources and the demand were under quantitative control; *b)* an application system was instituted for some services, such as telephone information, computer information, e-mail, electronic data exchange and facsimile transmissions, so that their demand and resources were in principle free from control; *c)* international and domestic long-distance telephone, local or inner-city telephone service, and 900m cell phone service were placed under strict government control. These stipulations are still in force today, but there have been modifications. For example, due to the fact that some Chinese telecommunications enterprises, such as China Telecom and China Unicom, have been quoted on the international stock market, this has enabled foreign investors to indirectly invest in domestic telecommunications services (Chen Xiaohong, “Chinese Telecommunications Industry: Changes in Policies and Industrial Organisation and Proposals”).
50. See “China Telecoms,” Nomura Research Institute, 7 August 2000.
51. At that time, basic charges were approximately CNY 20.
52. Dr. Wang Wei, *op.cit.*
53. A recent report on the impact of China’s accession to the WTO mentioned that even though China provides a vast market and potential demand, IT remains a high risk investment environment. To encourage investments the promise, foreign investors need more incentive to offset the risks.
- For inside analysis of impacts of China’s accession to the WTO, see Patrick Hogan, “China Telecom Market: Post WTO and opportunities,” *APCO Worldwide*, October 2002.
54. Based on Gabriel Li and Edmond Wong, “The Rise of Digital China: Investing in China’s New Economy”, 2001.
55. The localisation rate for switchboards was 5% in 1996, increasing to 40% in 2000.