

FIXED-MOBILE INTERCONNECTION:

THE CASE OF CHINA AND HONG KONG SAR

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1 General Situation Of China And Hong Kong SAR

1.1 People and Economy of China

China is a developing country with a population of 1.26 billion people. It covers an area of 9.6 million square kilometres, which makes it the fourth largest country in the world, after Russia, Canada and the United States. Despite a population density of 131 people per square kilometre, nearly one-third of China is sparsely populated due to harsh geographical conditions. As a result, China suffers high population pressure in its other regions. For this reason, universal telecommunications access for remote and less populated area has been a challenge for both the government and telecommunications operators.



Civil wars, foreign invasions and endless political movements since the beginning of the 20th century, have left China with an extremely fragile economy. This situation lasted until the end of the ten-year-long Cultural Revolution in the late 1970s. Since then, the Chinese government has taken a relentless stance in reforming its economic system, and has transformed the highly centralized planned economy into a so-called socialist market economy. An open-door policy has attracted substantial

foreign direct investment in most industries except for telecommunications operation and other politically-sensitive sectors. Economic reform efforts are proving effective and successful, and China has enjoyed two-digit growth rates in most of the 1980s and 1990s. In 1998, China was removed from the World Bank's low-income classification and placed into the lower-middle-level-income category.

1.2 People and Economy of Hong Kong SAR

Hong Kong became a Special Administrative Region (SAR) of China on 1 July 1997 after its handover to the Chinese Government by the United Kingdom. Under the regime of 'one country, two systems', Hong Kong SAR has independent financial, economic and legal systems. The total population of Hong Kong SAR is 6.9 million and its total area is 1,098 square kilometres. With 6,482 people per square kilometre, Hong Kong SAR is one of the most densely populated territories in the world.

Table 1.1: Basic economic and demographic indicators for China

	1993	1994	1995	1996	1997	1998
Population (Million)	1'196.4	1'208.8	1'232.1	1'246.2	1'251.0	1'255.7
Population Density	125	126	128	130	130	131
Gross Domestic Product (GDP) (Billion Yuan)	3'450	4'711	5'851	6'833	7,489	7,985
GDP Per Capita (US\$)	507	451	559	660	722	768
Average Annual Exchange Rate Per US\$	5.76	8.62	8.35	8.31	8.29	8.28
Unemployment Rate	2.6	2.8	2.9	3.0	3.1	3.2

Source: International Telecommunication Union; China Data Centre of the University of Michigan



Hong Kong SAR is widely regarded as having one of the most free and competitive economies in the world. In 1999, the Cato Institute in the USA, a nonpartisan public policy research foundation, headquartered in Washington, D.C. - in conjunction with 53 independent research institutes in other countries - named Hong Kong SAR the most free economy in the world¹. Also in 1999, the World Economic Forum ranked Hong Kong SAR as the world's second-most-competitive economy².

Over the past two decades, the Hong Kong SAR economy has more than tripled in size. Hong Kong's Gross Domestic Product (GDP) has been growing at an average annual rate of about 6 per cent in real terms, to US\$160 billion in 1999. Per capita GDP in Hong Kong SAR has more than doubled in real terms, equivalent to an average annual real growth rate of about 4 per cent. In 1999, it reached US\$27,000. However, Hong Kong SAR suffered seriously from the Asian financial crises during the period from late 1997 to early 1999. The property

market dropped almost 50 per cent while the unemployment rate jumped to 6.2 per cent - the highest in 30 years. Since late 1999, Hong Kong SAR has shown a momentum for recovery. The Hong Kong SAR economy turned out a spectacular performance in the first quarter of 2000, with its GDP rendering a 14.3 per cent growth in real terms over the previous year³.

2 Telecommunications Policy And Infrastructure In China And Hong Kong SAR

2.1 Telecommunications Development and Policy in China

China's telecommunications industry, like other industries, experienced sluggish development before the late 1970s. As a result, the teledensity was only 0.43 per cent in 1980, almost the lowest among 140 leading countries. Furthermore, international telephone service was only available in a limited number of cities. Telecommunications was treated not as a commodity, but an instrument for government and military uses. Given the poor economic returns from telecommunications services, the government had to take a policy of 'subsidizing telecommunications with postal service'⁴. Both services were jointly operated by the former Ministry of Posts and Telecommunications, which was renamed as Ministry of Information Industry in 1998.

Table 1.2: Basic economic and demographic indicators for Hong Kong SAR

	1993	1994	1995	1996	1997	1998	1999
Population ('000)	5'998.0	6'119.3	6'270.0	6'421.3	6'617.1	6'805.6	6'880.0
Population Density	5'450	5'559	5'700	5'837	6'065	6'217	6'482
Unemployment Rate	2.0	1.9	3.2	2.8	2.2	4.7	6.2
Gross Domestic Production (Million HK\$)*	690,223	727,506	755,832	789,753	829,017	786,426	810,225
GDP Per Capita (HK\$)*	116,967	120,540	122,778	125,139	127,500	117,602	118,402

* at constant market price of 1990. Exchange rate as in 1999 is US\$1 = HK\$7.75.

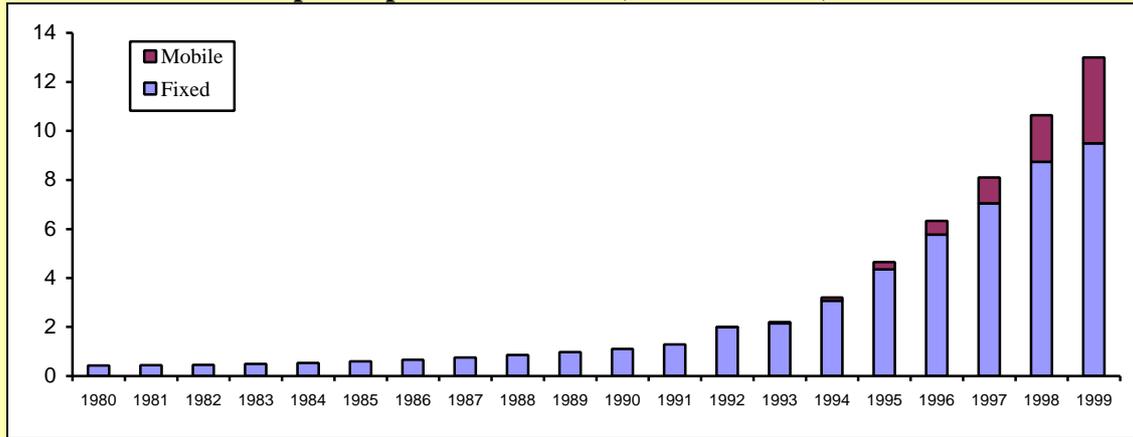
Source: Hong Kong SAR Government Information Centre <<http://www.info.gov.hk>>

¹ Hong Kong SAR Government Information Centre, <<http://www.info.gov.hk>>

² Ibid.

³ Ibid.

⁴ See Pitt, D. C., Levine N. and Xu, Y. (1996) Touching stones to cross the river: Evolving telecommunications policy priorities in contemporary China, *Journal of Contemporary China*, Vol.5 No. 3, 347-65

Figure 2.1: Growth of telephone penetration rate (fixed + mobile) in China.

Source: Ministry of Information Industry (MII)

When the Chinese government decided to reform its economic system in 1978, it soon realized that the poorly-developed telecommunications infrastructure had seriously deterred foreign investment and had acted as a bottleneck for domestic economic growth. To cope with this, the Chinese government granted several preferential policies to the Ministry of Posts and Telecommunications, giving priority to the development of telecommunications. These preferential policies included the ‘three 90% s’ policy: 90% of profit is retained by the local service provider (in other words, the tax rate is 10 per cent for telecommunications, much less than the 55 per cent tax rate for other industries); 90% of foreign exchange earnings are to be retained by the enterprise; and 90% of the central government’s investment is considered as un-repayable loans⁵.

In addition to these preferential policies, the Chinese government began to implement certain market schemes in the telecommunications sector at the beginning of 1980s. The main areas of reform lay in the decentralization of administrative power to lower government echelons, the development of market relations, the delegation of responsibility for performance to enterprise managers and the encouragement of incentive systems⁶. Detailed schemes included the “Contractual Responsibility System”, which uses contracts to clarify responsibility for success and failure at all levels of the industrial hierarchy and then decentralizes power to these levels accordingly. Directors of the provincial Posts and Telecommunications Administrations sign the contract with the governmental department annually. Through negotiation, objectives such as traffic, revenue, profits, quality and efficiency targets are contractually defined. Also quantified are the reward and penalty measures. Material rewards, which were not encouraged in the past, have been widely applied. In order to define the terms of the contract on profits precisely, an Economic Accounting System, which is similar to the international settlement scheme, has been used to reallocate revenues among all parties in the telecommunications process, so that the profits level, or economic performance, of each individual party can be measured properly⁷.

The above preferential policies and the successful implementation of reform schemes have effectively propelled the development of telecommunications in China. China Telecom, the incumbent operator, currently owns the world’s second-largest fixed telephone network with a total capacity of 158.5 million mainlines (as of December 1999), while China Mobile, the mobile operator which has recently been divested from China Telecom, owns the world’s third-largest mobile phone network, with a total capacity of 98.3 million (as of May 2000). Figure 2.1 shows the exponential growth of the telephone penetration rate in China, including mobile service, since 1980. Telecommunications has not been subsidized by the postal service since the mid-1980s. To the contrary, profit from telecommunications has been used to subsidize the postal service, and in 1999, this cross subsidy reached 6.55 billion Yuan (ca. US\$791 million)⁸.

⁵ See Wu, C.G. and Zhang, X. (1992) An analysis of the seemingly high profit in the industry. *Posts and Telecommunications Economy*, Vol. 18, 6-9

⁶ See Xu, Y., Levine, N. and Pitt, D.C. (1998) Competition without privatisation: The Chinese path in S. Macdonald and G. Madden (eds.) *Telecommunications and Socio-Economic Development*, Elsevier: Amsterdam, 375-92

⁷ See Guo, R.C. and Xu, Y. (1992) *Economic Accounting System for Posts and Telecommunication Enterprises*, Beijing University of Posts and Telecommunications Press: Beijing

⁸ Ministry of Information Industry (2000) *1999 Statistical Report of Telecommunications Development*

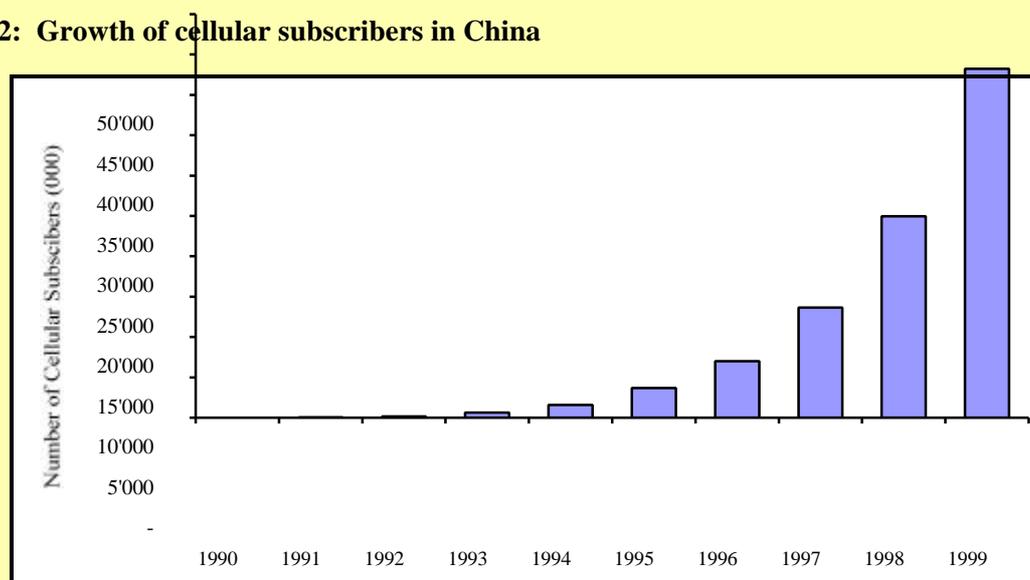
Table 2.1: Total telecommunications investment as a percentage of GDP

	1980 (%)	1985 (%)	1990 (%)	1994 (%)	1995 (%)	1997 (%)
US	0.76	0.56	0.36	0.33	0.32	0.25
Japan	0.72	0.51	0.53	0.55	0.68	0.84
UK	0.80	0.55	0.50	0.48	0.49	0.58
Singapore	0.95	1.11	0.67	0.48	0.52	0.78
India	0.28	0.28	0.51	0.66	0.67	0.56
China	0.06	0.10	0.33	1.45	1.70	1.41

Source: ITU World Telecommunication Indicators Database

In 1994, the former Ministry of Posts and Telecommunications formally announced that the telecommunications infrastructure in China was finally able to satisfy the basic demand of the public and the economy. This was a critical turning point - the Chinese telecommunications market had turned from a sellers' market into a buyers' market⁹. The Chinese government applauded this achievement, and, at the same time, accelerated its pace to transform the Chinese telecommunications sector into a market-orientated industry. Operational efficiency became more important, as the government clearly realized that the high growth of telecommunications in the past had mainly resulted from preferential policies and significant investment. Table 2.1 shows the total telecommunications investment as a percentage of overall GDP in selected countries. It clearly indicates that China has given an increasingly higher priority to public telecommunications investment since 1980, which has reached and surpassed investment levels in other major economies.

To ease the transition from support-driven growth to market-driven growth, the Chinese government has gradually withdrawn the preferential policies once granted to the telecommunications sector, and opted to deregulate the telecommunications market. On 17 July 1994, a new operator, China Unicom, was formally established to compete with the incumbent operator in all services. This was clearly a milestone in the development of telecommunications in China, which indicated the termination of the decades-long monopoly of the Ministry of Posts and Telecommunications (MPT).

Figure 2.2: Growth of cellular subscribers in China

Source: Ministry of Information Industry

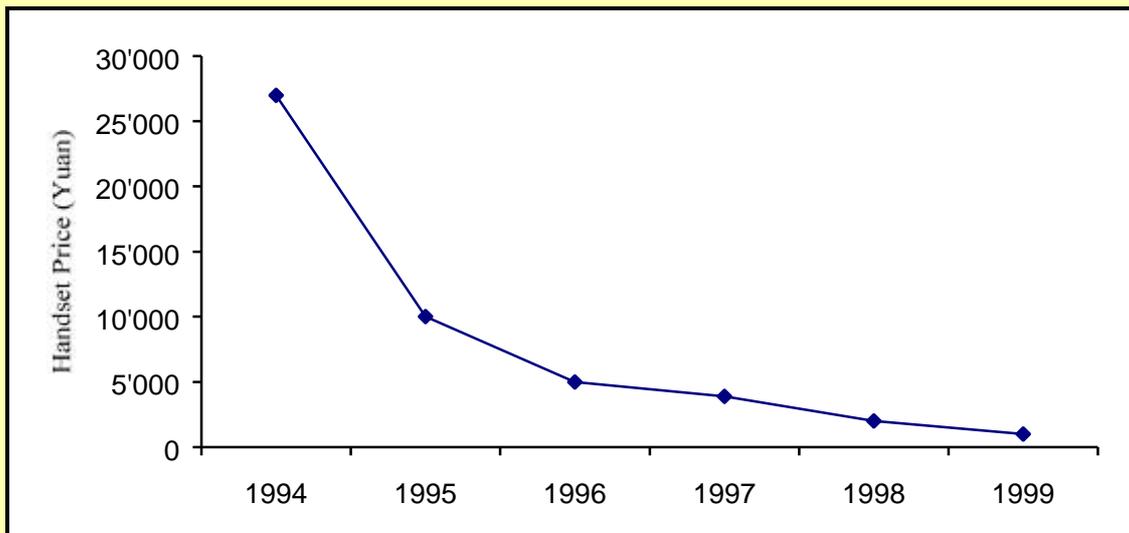
⁹ See Kan, K.L. (1999) Where to go for Chinese telecommunication industry? *Posts and Telecommunications Economic Management*, No.10, 2-8

Since the entry of China Unicom, the competition has led to impressive preliminary achievements¹⁰. First, competition acted as a strong catalyst for the development of telecommunications. Figure 2.2 shows the exponential growth of mobile subscribers in China since China Unicom entered the market in 1994. The averaged annual growth of mobile subscribers between 1994 and 1999 was 103.66 per cent.

Second, customers have benefited enormously from the competition between China Telecom and China Unicom. Since deregulation and the introduction of competition, the role of customers in the telecommunications market has changed from a passive one to an active one. They have already benefited from reduced handset price and installation fees, shortened waiting lists and improved quality of service. Figure 2.3 illustrates the drastic reduction in average mobile handset prices (including connection fees) since China Unicom entered the market. According to the ITU World Telecommunication Development Report 1999, the price of using a mobile phone in China is among the lowest in the world (Figure 2.4).

Third, the introduction of competition has advanced the technological level of the infrastructure. For the eight years prior to China Unicom's entry into the mobile market with GSM technology, the incumbent (China Telecom) had adopted the analogue Total Access Communications System (TACS) despite the fact that digital Global System Mobile (GSM) technology had been available as early as 1991. The high quality of the GSM system differentiated China Unicom service from China Telecom service, and this placed the incumbent under significant competitive pressure. As a result, China Telecom was forced to upgrade its own system from analogue to digital in 1995. By the end of 1999, 89 per cent of Chinese mobile subscribers were using the GSM system¹¹.

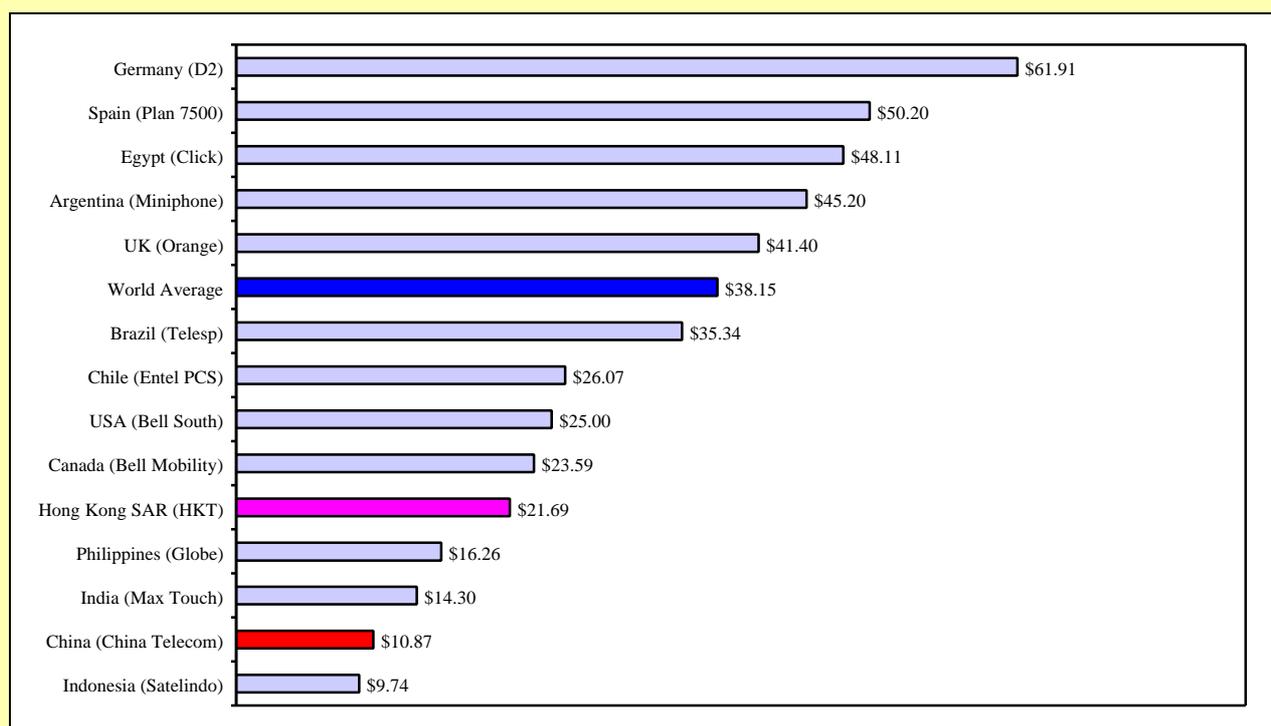
Figure 2.3: Price reduction of handset and connection



Source: China Unicom

¹⁰ See Xu, Y. and Pitt, D.C. (1999) One country, two systems – contrasting approaches to telecommunications deregulation in Hong Kong and China, *Telecommunications Policy*, Vol. 23, No. 3/4, 245-60

¹¹ MII, *op cit.* 8

Figure 2.4: Price of monthly subscription plus 100 minutes of mobile phone calls in US\$ (August 1999)

Source: ITU

However, because of the state ownership of both China Telecom and China Unicom, the full benefits of liberalisation could not be fully realised. First, due to regulatory concerns over “vicious competition” leading to the devaluation of state assets, both operators were to abide by a ‘price-umbrella’ set by the regulator, and China Unicom was only permitted to reduce this tariff by a maximum of 10 per cent below the regulated rate. Although some local operating companies of China Unicom and China Telecom tried to counter this regulation by offering dramatic discounts to subscribers, they were immediately banned by the telecommunications regulator or the Bureau of Price Administration, a powerful watchdog for price regulation in almost all industrial and commercial sectors¹². In April 2000, under the intervention of the regulator, China Unicom and China Telecom agreed to abide by the regulator’s set tariff without provoking a price war¹³.

Second, since the state-owned new entrant, China Unicom, operated the largest radio paging service in the country, the regulator was very reluctant to move to a CPP (Calling-Party-Pays) regime from a RPP (Receiving-Party-Pays) regime for mobile phone service. At present, in China, the mobile phone subscriber has to pay for both originating and receiving calls (RPP), and is not only responsible for the cost of originating calls (CPP). Due to this RPP regime, carrying both a mobile phone handset and a radio pager simultaneously has become a common phenomenon in many places across China. The mobile phone is mainly used to originate calls while the pager is used to help the subscriber decide whether or not a prompt reply is needed. The mobile phone remains in stand-by most of the time. In this way, the subscriber can save some money by avoiding receiving and paying for unimportant calls. However, this has frustrated the usage behaviour of subscribers as their convenience is sacrificed. As a result, there has been a strong demand for the introduction of the CPP regime in China.

The major concern behind the regulator’s reluctance to change is that a transition to CPP might lead to the immediate shrinkage of the paging branch of China Unicom, in which the Chinese government had invested

¹² In March 2000, China Unicom and China Telecom triggered a round of price war over mobile service in Guangdong and Chongqing, offering discounted connection fee and tariffs below the rate set by the regulator. In Guangdong, the Bureau of Price Administration intervened immediately blaming the operators of breaking the state price policy while in Chongqing the MII reaffirmed its stand and both companies withdrew their promotion.

¹³ In April 2000, the MII forced China Telecom and China Unicom to sign an agreement, and each party promised to follow the regulated tariff of the MII. For details, see <http://www.mii.gov.cn>

heavily in past years. Moreover, it was feared that the introduction of CPP would increase the overhead budget of governmental departments and state-owned enterprises still dominating the Chinese economy¹⁴. Currently, the Ministry of Information Industry is seriously reviewing its policy regarding the payment scheme for mobile phone service and is trying to make a balance between the interest of the state and that of the subscribers.

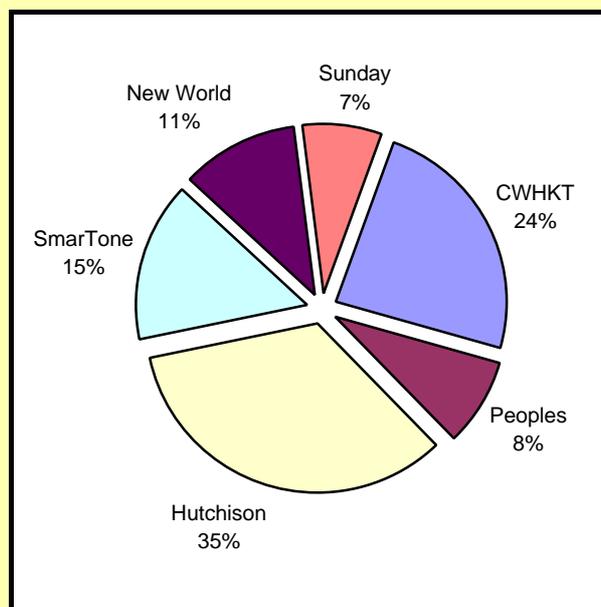
Although state ownership has led to the above controversies, experience in past years has shown that the largest barrier for subscribers to fully explore the benefits of competition comes from an ineffective regulatory framework. In spite of the fact that China Telecom (once the Department of Directorate General of Telecommunications of the MPT) was still acting as the operational arm of the MPT, the State Council designated the MPT as the regulator for national telecommunications. To some extent, therefore, the MPT enjoyed dual status as both regulator and operator. As will be discussed in Chapter III, this ineffective regulatory framework has put China Unicom at a significant competitive disadvantage, especially with respect to network interconnection.

Table 2.2: Telecommunications development in China

	1993	1994	1995	1996	1997	1998	1999
Main Telephone Lines in Operation ('000)	17'332	27'295	40'706	54'947	70'310	87'421	108'807
Main Telephone Lines Per 100 Inhabitants	1.45	2.26	3.30	4.41	5.62	6.96	8.59
Public Payphones ('000)	158	387	850	1'317	1'796	2'602	3'008
Mobile Telephone Subscribers ('000)	638	1'568	3'629	6'853	13'233	23'863	43'240
- Digital Mobile Subscribers ('000)	0	1	157	1'648	6'387	17'255	38'290
Mobile Subscribers per 100 Inhabitants	0.05	0.13	0.29	0.55	1.06	1.90	3.41
Estimated Internet Users ('000)	2	14	60	160	400	2'100	8'900

Source: International Telecommunication Union; Ministry of Information Industry; China Internet Network Information Centre

Figure 2.5: Mobile operator's market share in Hong Kong SAR as in March 2000



Source: Asiacom June 13, 2000

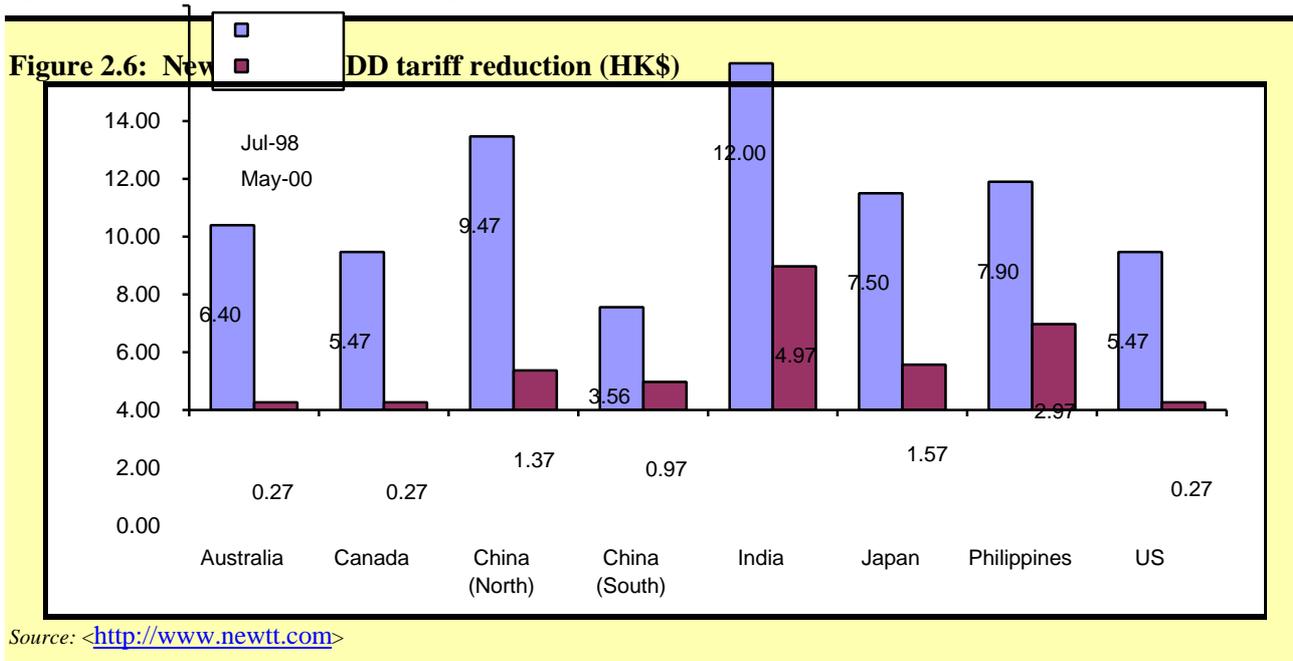
¹⁴ See 'The Ministry of Information Industry disclosed that the Calling-Party-Pay scheme is facing difficulty', China Communications Info <<http://www.cci.cn.net>>, 07/06/2000

2.2 Telecommunications Development and Policy in Hong Kong SAR

Although Hong Kong SAR has been called the ‘capital of capitalism’, local fixed service and international telephone service were monopoly services until 1995 and 1998 respectively, due to the exclusive franchises held by Cable & Wireless HKT (CWHKT), formerly known as Hong Kong Telecom. Compared with early mover countries, this was a very late starting point. However, the Hong Kong SAR government and its regulatory agency – Office of Telecommunications Authority (OFTA) - have taken a strong and aggressive stance in promoting telecommunications deregulation. For instance, Hong Kong SAR was the first region in the world to incorporate number portability into local fixed telephone service (July 1995) and the third region to provide number portability for mobile telephone service (March 1999). Currently, Hong Kong SAR has one of the most sophisticated and competitive telecommunications markets in the world.

Following the expiry of CWHKT’s monopoly over local fixed telephone service on 30 June 1995, four companies, namely CWHKT, New World Telephone Limited, New T&T Hong Kong Limited and Hutchison Communications Limited, were licensed to provide local fixed telecommunication services on a competitive basis. This has placed tremendous competitive pressure on the incumbent, and aggressive steps in strategy restructuring and service innovation by the CWHKT were witnessed in recent years. For example, CWHKT is the first operator in the world to have commercially launched Interactive TV (Video-On-Demand) service, and its broadband optical network now covers more than 90 per cent of households in Hong Kong. To further enhance competition in the local network, OFTA issued five fixed wireless local network licenses on 1 February 2000. At the same time, Hong Kong Cable Television Limited obtained its license for providing telecommunications services via its cable network¹⁵.

For mobile communications, the government followed a pro-competitive policy right from the beginning. By 1987, three licenses for analogue mobile service had been issued. In 1992, SmarTone obtained the fourth license and immediately began offering digital GSM services. In 1996, OFTA issued another six licenses for PCS service – the high-band GSM service, which triggered-off another round of fierce competition. After a period of mergers and alliances, there are now six mobile operators holding eleven licenses. With a population of only 6.88 million people, it may not be an exaggeration to claim that Hong Kong SAR has the most competitive mobile market in the world. Figure 2.5 indicates the March 2000 market share of these six operators, namely CWHKT, Hutchison, New World, Peoples, SmarTone and Sunday. Although Hutchison and CWHKT are the two leading operators in terms of market share, none of them is able to dominate the market due to the high subscriber churn that has been facilitated by mobile number portability. The billing regime for mobile phone service in Hong Kong SAR is Receiving-Party-Pays (RPP). Due to relatively low tariffs resulting from competition and relatively high per capita incomes, neither the regulator nor the operators have been subjected to the pressure moving to a Calling-Party-Pays (CPP) regime¹⁶.



¹⁵ For details, see <<http://www.ofta.gov.hk>>

Table 2.3: Telecommunications infrastructure of Hong Kong SAR

	1993	1994	1995	1996	1997	1998	1999
Main Telephone Lines in Operation ('000)	2'992	3'149	3'278	3'451	3'647	3'729	3'869
Main Telephone Lines Per 100 Inhabitants	50.70	52.18	53.25	54.69	56.08	55.77	56.20
Public Payphones	4'372	4'480	5,202	10'928	11'258	11'473	11'723*
Mobile Telephone Subscribers ('000)	291	485	798	1'362	2'230	3'174	3'973
- Digital Mobile Subscribers ('000)	37	252	720	1'350	2'229	3'174	3'973
Mobile Subscribers per 100 Inhabitants	4.93	8.03	12.97	21.58	34.29	47.47	57.71
Estimated Internet Users ('000)	80	170	200	300	675	1'000	1'500

* Estimated

Source: ITU Telecommunication Indicators Database; OFTA (Year beginning 1 April)

For the international telephone (IDD) market, CWHKT was granted a 25-year exclusive license for providing certain external telecommunication circuits and services in 1981. To fully explore the benefits of telecommunications deregulation, the Hong Kong SAR government reached an agreement with CWHKT in January 1998 regarding the early termination of CWHKT's franchise relating to IDD service which is due to expire in 2006. According to this agreement, CWHKT surrendered its exclusive license on 31 March 1998 in exchange for compensation of HK\$6.7 billion (ca. US\$864 million) from the government. At the same time, the fixed telephone network service (FTNS) license held by CWHKT was amended to extend its scope to cover external fixed telecommunications services and circuits. Parallel amendments were made to the FTNS licenses held by the other three FTNS operators to allow them to provide non-exclusive external services starting on 1 January 1999 and non-exclusive external facilities starting on 1 January 2000. After two rounds of consultation, the Government announced in October 1998 its decision not to set a limit on the number of licenses for the operation of external telecommunications services (ETS) from 1 January 1999 onwards. By the end of May 2000, there were 154 licensees providing ETS.

The liberalisation of the IDD market has brought immediate benefits to Hong Kong's economy and public in terms of diversified choice and reduced prices. Figure 2.6 shows the dramatic IDD tariff reduction to major destinations during the period from July 1998 to May 2000 offered by New T&T. New T&T is one of the local fixed network service licensees which used to provide IDD service, prior to liberalization, by means of call back.

From 1 January 2000 all telecommunications services in Hong Kong SAR have been completely liberalized in real terms. The early termination of the monopoly operation in the IDD market indicates that the Hong Kong SAR government has gone beyond its commitment to the WTO's Basic Telecommunications Agreement¹⁷.

3 Network Interconnection Within An Inefficient Regulatory Framework: Early Experience Of China

3.1 The Background of China Unicom

As mentioned in section 2.1, the development of telecommunications in China has been given high priority due to the official recognition that telecommunications was central to the modernisation ambitions of the Chinese government and would facilitate economic growth. With generous investment and favourable policies from central and local governments, telecommunications has been the most rapidly-developing industrial sector in China in the past two decades. This huge and highly profitable market has attracted investment proposals from other industrial sectors. All related ministries were eager to share a slice of this expanding cake with the monopoly operator, the former Ministry of Posts and Telecommunications (MPT), by either integrating their self-manufactured equipment with the expanding network or diverting part of the

¹⁶ Interview with Mr. M.H. Au of OFTA on 14 March 2000.

¹⁷ Due to the exclusive franchise of CWHKT, Hong Kong SAR was not committed to liberalise Hong Kong's IDD market before 2006 in its WTO agreement.

traffic to their formidable private networks. At the same time, the Chinese government decided to transform the telecommunications sector from a support driven industry into a market driven one.

In 1993, the State Council agreed to a joint proposal from several influential ministries for the deregulation of the Chinese telecommunications market. In July 1994, a joint venture between shareholders from the Ministry of Electronic Industry (MEI), the Ministry of Railways (MOR), the Ministry of Electrical Power (MEP) and thirteen other giant state-owned companies, was formally established as China Unicom. The establishment of China Unicom provided these ministries with a gateway to enter this huge market. Most importantly, it heralded a process of discontinuity in telecommunications policy - a break with the traditional centralised monopoly model.

However, the direct affiliation of the regulator, the MPT, with its operating arm, China Telecom, has placed China Unicom in an unfavourable position. Consequently, settlement over interconnection between China Unicom's mobile network and China Telecom's fixed network, the most critical issue for new entrants, has been controversial and problematic. This chapter will provide a thorough review of this uneven path during the period from 1994 to 1997.

3.2 Interconnection Charges: Settling under Political Intervention

Network interconnection has been the source of much dispute between China Unicom and the MPT as well as its operating arm (China Telecom). In an interview conducted in October 1994, China Unicom complained that the MPT appeared to have no intention of co-operating for interconnection. Whenever China Unicom officials approached MPT, they were always treated perfunctorily and negotiations with the MPT on interconnection were protracted.

Ironically, during an interview conducted at the Department of Telecommunications Administration (DTA) of the MPT earlier in the same month, a DTA official complained that visitors coming from China Unicom were usually senior officials rather than engineering experts, and they insisted on meeting MPT officials of the same official title rather than low status staff working in practically-relevant areas. The inevitable result was that the content of discussion was very general and failed to focus on the important issues.

The DTA suggested that China Unicom propose a technical scheme for interconnection and negotiate details directly with China Telecom. If a dispute arose, the DTA, as the regulatory arm of the MPT, could intervene to co-ordinate the two parties. However, due to the absence of published guidelines, negotiation between the two operators was a lengthy and drawn-out process. Eventually, the parties would end up approaching the DTA for a solution. The problem has been that it has proven very difficult for China Unicom to obtain fair support from the DTA due to the close organizational relationship between the DTA and China Telecom (both under the same MPT umbrella). One of the DTA officials told the author that China Telecom is a 'national flag team' in the Chinese telecommunications industry and therefore should certainly be treated favourably.

To obviate this kind of bias and discrimination, China Unicom had to fully utilize its advantages, notably the political clout of its shareholders. Its sponsoring ministries had a powerful influence in the State Council due to their pivotal positions as the sponsors of important industrial sectors in China. The settlement of the interconnection charge for China Unicom's mobilephone service provides a good example.

Mobile services, the first type of service to be provided by China Unicom to the public, commenced in late 1995. Negotiations on interconnecting China Unicom's mobile networks with PSTN and mobile networks of China Telecom started quite early. In addition to a problematic technical specification on network interconnection that was issued by the former MPT in June 1995, the main disagreement was on the interconnection charge. Since this dispute was stalled and neither side made any concessions, China Unicom was forced to utilize its political strength and reported the matter to State Council - the Cabinet of the Chinese Government. Ironically, this time, the State Council authorized the State Planning Committee (SPC) to deal with this issue, instead of the regulator (MPT).

Under the intervention of the SPC, China Unicom and China Telecom finally reached a compromise on interconnection. In March 1996, the SPC issued a regulatory document on the financial settlement of network interconnection¹⁸. The main elements of the document are as follows:

¹⁸ State Planning Committee Document No. 14101.

- China Unicom should pay China Telecom 0.08 Yuan (US\$0.0096) for every three-minute call originating from its mobile subscribers to China Telecom's local fixed telephone customers;
- China Telecom should pay China Unicom 0.01 Yuan (US\$0.0012) for every three-minute call originating from its local fixed telephone customers to China Unicom's mobile subscribers;
- No transfer payment will be made between China Telecom and China Unicom for communications between the mobile subscribers of each company (sender keeps all);
- For domestic long-distance calls, 92 per cent of the charges should be transferred to the party which undertakes the long-distance transmission element of the call;
- All China Unicom's income for international calls should be forwarded to China Telecom.

There have been arguments over the settlement of interconnection charges, as these rates were mainly based on the retail tariffs of China Telecom, which have remained unchanged for years due to the monopoly operation of the MPT. The cost, much less the incremental cost, was not considered as a factor when setting the interconnection charges. Thus, China Unicom argued that it was being over-charged¹⁹. However, upon closer examination, it seems that the real disadvantage for China Unicom stems from the MPT's technical specifications, and not just from the interconnection charges.

3.3 Technical Specifications: Tough Terms for China Unicom

The former MPT issued the "Technical Specifications of the Relay Mode and Gateway Switching Equipment for the Interconnection between the China Unicom GSM Network and the Public Main Network" in June 1995. This document provided technical details of the network interconnection between China Telecom and China Unicom. Although China Unicom had reservations about many of the terms of the specification, which it considered unfavourable, nevertheless the specification was issued because of China Unicom's urgent requirement for network interconnection. Experience in past years has shown that these terms have placed China Unicom in a very vulnerable position.

In general, the disadvantage of these technical specifications for China Unicom can be summarized as follows²⁰:

1) *Long Drawn-out Process for Business Approval*

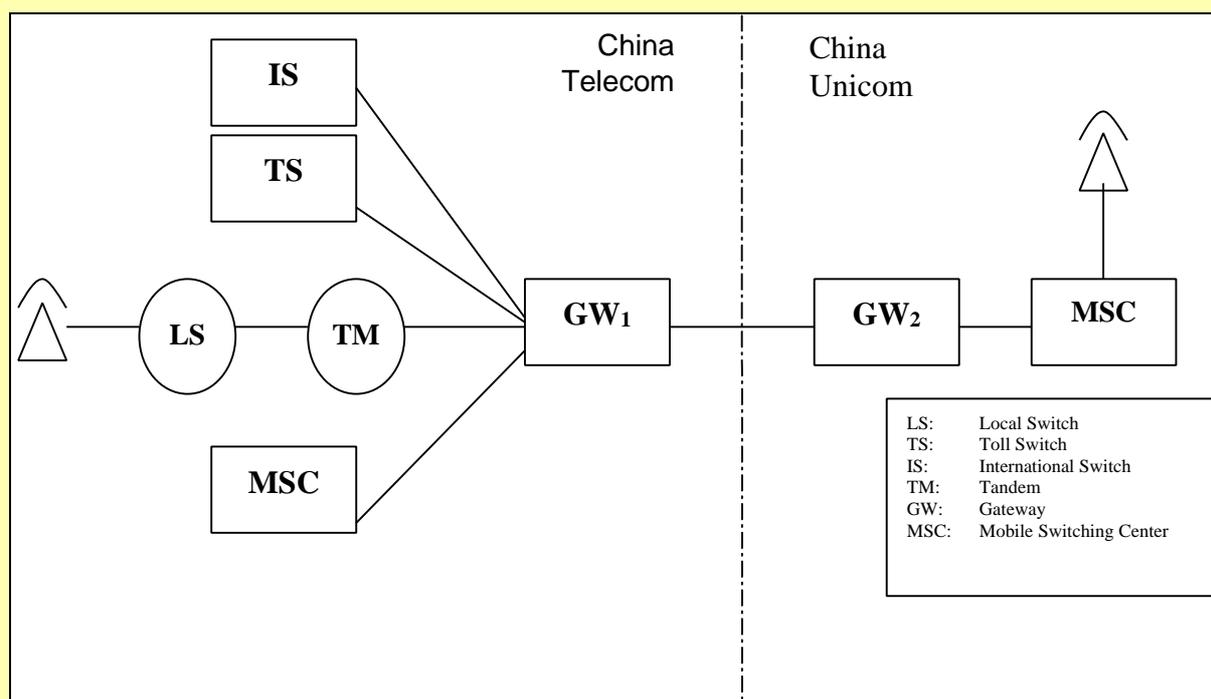
According to the master license from the State Council in 1994, China Unicom is authorized immediately to provide mobilephone service across the country. This means China Unicom can legally provide service anywhere in China, without obtaining any special approval. However, according to the former MPT, China Unicom was required to obtain approval separately for each geographical area. Documents that were submitted for approval include information on network structure, capacity and interconnection. As there was no time limit set for the approval process, China Unicom had to wait with uncertainty. Normally, if all the documents were ready, it would take at least 60 days before China Unicom could obtain approval from the former MPT. Consequently, this long and unnecessary approval process has artificially delayed the network deployment time. Simultaneously, it has also wasted China Unicom's labour and resources.

2) *Restrictions over Mobile Switching Centre (MSC) Coverage*

Due to the mobility of mobile subscribers, the structure of the mobile network should obviously be different from that of the fixed network. However, according to the technical specifications, each MSC of China Unicom can only cover the same area as that of China Telecom's local area fixed network, regardless of the size of the area and the capacity of the MSC. China Unicom has thus had to install separate MSCs even in small cities and towns, and this has dramatically increased network costs. In contrast, China Telecom's mobile network has not been subject to this restriction. Its MSC can cover more than one area, depending on the size of these areas.

¹⁹ Interview with Department of Interconnection of China Unicom in June 1996.

²⁰ See Xu, Y., Pitt, D.C. and Levine, N. (1997) Interconnection: a bottleneck to future Chinese telecommunications deregulation? In *21st Century Communications Networks*. Eds. P. Enslow and P. Desrochers and I. Bonifacio, IOS Press: Amsterdam, Berlin, Oxford, Tokyo, Washington DC, 106-14. Also He, G.P. (1998) Various technical problems in the interconnection between China Unicom GSM network and P&T PSTN Network, *China Communications*, July, 32-35

Figure 3.1: The relay mode of network interconnection

Source: Case study

3) *Inefficient Relay Mode*

According to the MPT's technical specifications, within the local network area where China Unicom provides MOBILE service, a dedicated Gateway (GW) with switching functions should be installed on both the China Unicom side and the China Telecom side for network interconnection. This relay mode is shown in Figure 3.1

According to Figure 3.1, the function of GW₁ and GW₂ are simply for interconnection and no switching function is necessary. Using two complex and costly exchanges as jumper terminals is undoubtedly a waste of investment. However, according to MPT's technical specifications, GW must have a switching function, and both GW₁ and GW₂ should be installed and financed by China Unicom. This has led to an increase in cost of nearly 5-10 per cent for China Unicom and the construction period was prolonged by at least eight months.

4) *Unfair Charging Scheme for Network Interconnection*

In China, mobile subscribers are charged per minute, while fixed network subscribers are charged per unit, a unit being three minutes in length. According to the technical specifications, the interconnection charge between the mobile and fixed network is levied per unit. However, China Unicom's statistics, based on more than twenty million calls, has revealed that the average calling time of its mobile subscribers is only 75 seconds, or 1.25 minutes. More than two-thirds of these calls last less than one minute. In this case, if the charging unit is changed into a single minute, the payment from China Unicom to China Telecom could be reduced dramatically.

5) *Unfavourable Routing Plan*

For calls between two networks, the technical specifications dictate that the long-distance call should be routed via the network interconnection point closest to the originating subscriber. Figure 3.2 shows the routing arrangement between China Unicom and China Telecom.

As shown in Figure 3.2, when China Unicom's mobile user A originates a long distance call to user B of China Telecom's fixed network, the call has to be routed via China Unicom's GW₁ to China Telecom's GW₁, and is then delivered over China Telecom's long distance circuit. In this case, China Unicom has to pay China Telecom 92 per cent of the charges it receives from user A. In fact, China Unicom has its own long distance network specifically for long-distance traffic routing. If China Unicom uses its own internal

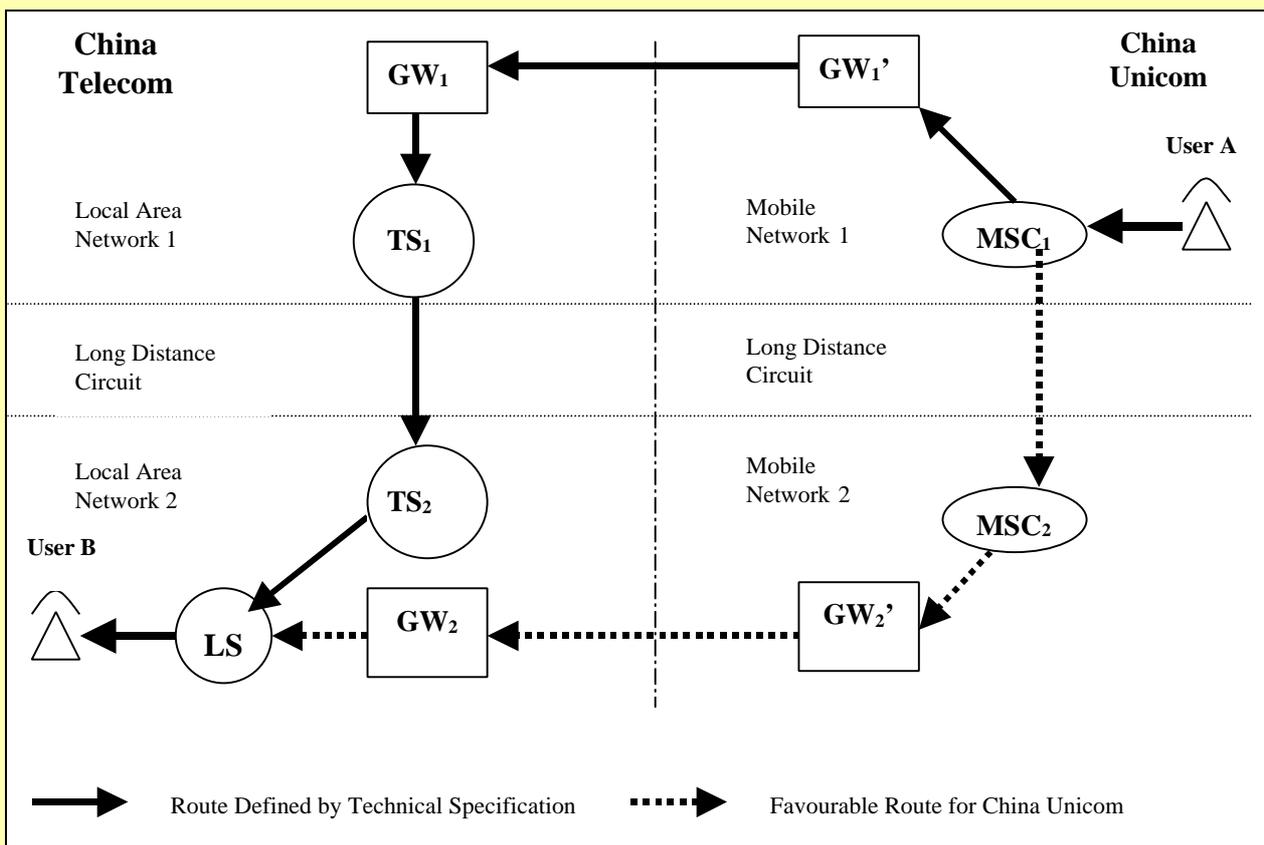
long distance circuit and accesses China Telecom's network via GW_2' , then China Unicom could keep most of its long distance income and pay China Telecom only 0.08 Yuan for every three minutes. However, this would go against the terms outlined in the technical specifications.

Indeed, it is necessary to access the mobile network via the gateway located at the originating subscriber's area, as the mobile system needs to clarify the location of its subscribers first and then forward the call accordingly, especially when the mobile subscriber is roaming. However, for fixed network subscribers, because the destination is definite, the call can be directly sent to the receiving party's located area via the long distance circuit of the originating party's network. In this case, it is obvious that the routing arrangement provided for by the technical specifications is unfavourable to China Unicom. Most of China Unicom's income from the long distance service must be passed on to China Telecom and China Unicom's long distance network is simply being used to facilitate its roaming service.

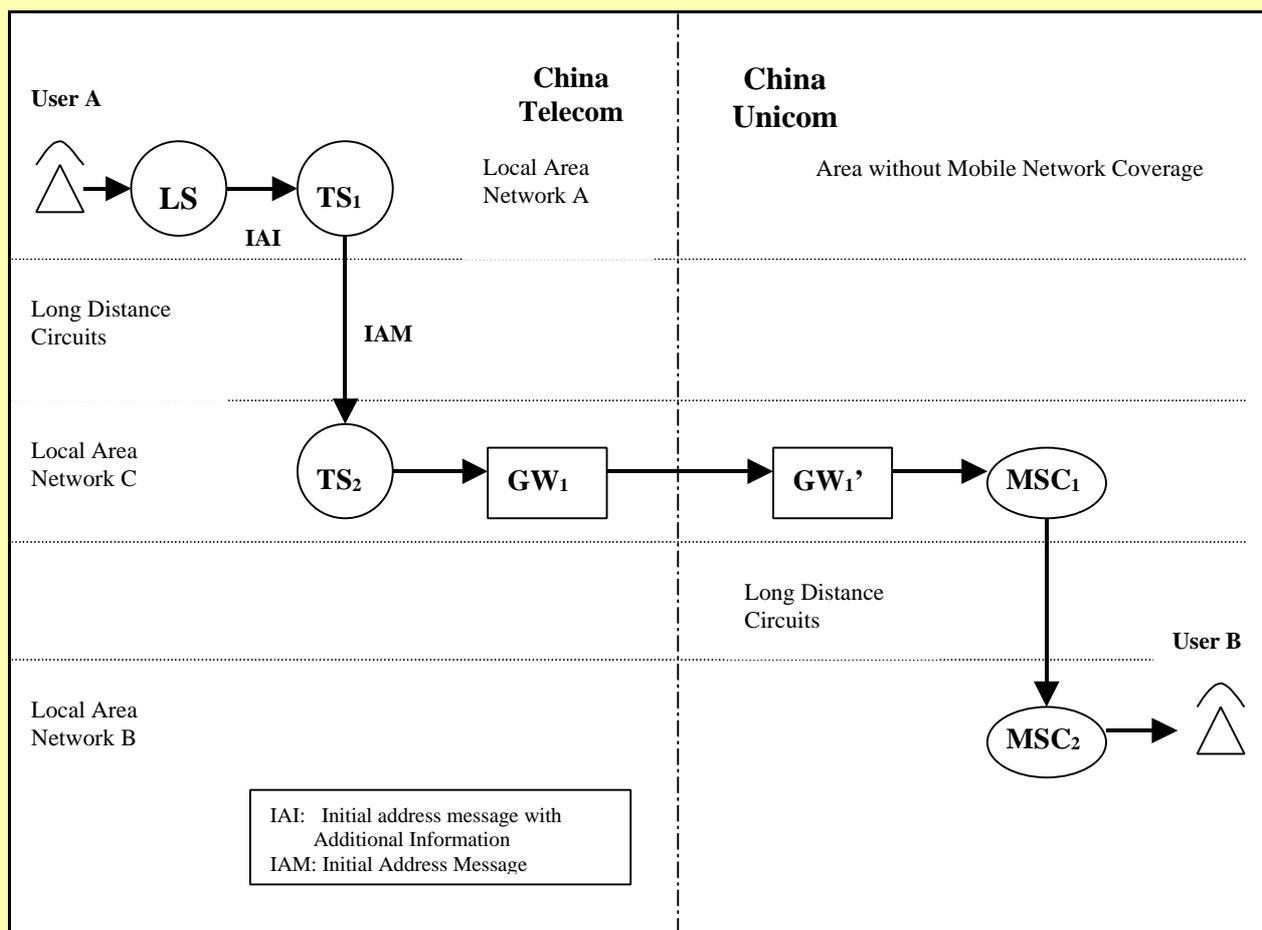
6) *The Signalling Problem*

Due to the fact that China Unicom is a new entrant, its mobile coverage is still limited. For areas that have not been covered by China Unicom, gateways have not been installed. Therefore, if customer A of China Telecom's fixed network in these areas originates a call to customer B of China Unicom's mobile system in a different area, the call has to be forwarded by China Telecom's long distance circuits to another area where China Unicom has installed a gateway. However, as shown in Figure 3.3, the signalling system of China Telecom's network has made this process problematic in terms of billing information processing.

Figure 3.2: Routing arrangements for a long-distance call



Source: Case study

Figure 3.3: Call routing for areas not covered by China Unicom's mobile network

Source: Case study

According to figure 3.3, when customer A who is located in Area A originates a call to customer B located in Area B, the call has to be delivered to Area C, by default, due to the fact that China Unicom has not yet established its mobile network in Area A. In Area C, the call is transferred to China Unicom via GW_1 and GW_1' , and is then re-routed through China Unicom's proprietary long distance circuits to Area B, or in the case of roaming to another area. Certainly, this call should be defined as a long distance call, as China Unicom's long distance circuits were used. However, as the signalling signal from TS_1 to TS_2 is IAM (Initial Address Message), which is different from the IAI (Initial Address message with Additional Information) between LS and TS_1 and does not carry the caller's number information, China Unicom cannot identify the caller's information and make relevant billing arrangements.

In fact, this problem can be sorted out much more easily by changing the signalling signal from IAM to IAI. The signalling system of China Telecom was configured for the monopoly operation model and should be reconfigured to accommodate the increasing openness of the telecommunications industry.

7) *Quality Assurance of Network Interconnection*

Once China Unicom had constructed its two gateways at each point of interconnection, the one on the China Telecom side was to be transferred to China Telecom for maintenance and operation. In this case, China Unicom was not able to monitor the operation of networks connected to the gateway and thus could not make relevant routing arrangements. This has created a serious problem with quality of service. The technical specifications of the former MPT did not contain any terms regarding the quality of interconnection, that is to say no defined standards on parameters such as voice echo, line noise, cross talk, time delay, voice volume and distortion. Many of China Telecom's subscribers complain about the high congestion rate for calling China Unicom's mobile subscribers, while China Unicom, at the same time, has found that there was a large amount of spare capacity in the trunk connection between the two gateways. This means that the interconnection facilities have not been used effectively due to poor co-ordination between the gateway on the China Telecom side and China Telecom's network.

8) *Emergency Service*

As the incumbent operator, China Telecom has been given certain universal service obligations, including free calls for emergency services, whereas China Unicom has not. However, according to the technical specifications, no network interconnection arrangement is to exist between China Telecom and China Unicom for the provision of emergency services such as 119 (fire brigade), 110 (police), 120 (ambulance) and 122 (traffic accident). This means that China Unicom is required to install its own direct connections to individual emergency service providers and to bear the full cost.

The above examples clearly illustrate that the close affiliation between the regulator and the incumbent operator has left the new entrant in a vulnerable bargaining position for network interconnection. Almost one third of China Unicom's income had been forwarded to China Telecom during the period from 1995 to 1997, whereas China Telecom only had to pay two per cent of the amount back. The poor quality of interconnection has also damaged China Unicom's reputation. A new but improperly interconnected network is not dissimilar to an isolated network, and network externalities remain a concern for subscribers who would benefit from demand-side economies of scale. As a result, in an industry in which positive feedback is a dominant phenomenon, China Unicom had been the victim of an ineffective regulatory framework. By the end of 1997, China Unicom had only been able to acquire three percent of the mobile market share. As discussed in the next chapter, this situation remained unchanged until 1998, when the telecommunications regulatory framework in China was restructured.

4 Regulatory Framework Restructuring And China Unicom Revival

4.1 Regulatory Framework Restructuring: The Context

The close affiliation between China Telecom and the former Ministry of Posts and Telecommunications (MPT) had led to an ineffective regulatory framework. As was seen in Chapter III, China Unicom had been placed in an unfavourable position for competing with the incumbent operator. China Unicom and its shareholding ministries have since made strong appeals for the restructuring of the regulatory framework, and namely for complete functional and organizational separation between China Telecom and the MPT.

Furthermore, the increasingly rapid development of individual private networks, especially the network of the Ministry of Radio, Film and Television (MRFT), has raised governmental concern over 'duplicative construction'. The main driving forces for the expansion of MRFT's network are the high rental fees and notoriously poor quality of service provided by China Telecom. For example, it would cost 54 million Yuan (around US\$6.5 million) for Shanghai Radio, Film and Television Bureau to rent network resources from China Telecom for a period of three years, while it would cost them only 20 million Yuan (US\$2.4 million) to build a private optical network with the same coverage area²¹. This type of economically unsound offer has been the main reason why the MRFT and other ministries were reluctant to co-operate with China Telecom. Consequently, the demand for private networks has grown.

These private networks have raised concerns for government, as they were perceived as threats to the public network in which the government had invested heavily in the past twenty years. In addition, since all these private networks were owned by the state, the cash-strapped government has considered such "duplicative investments" to be a waste of public resources. In this case, preventing over-investment and improving the utilisation of the PSTN became another major incentive for the government to restructure its regulatory framework²².

In April 1998, a new ministry, the Ministry of Information Industry (MII), was formally established. It was the result of the merger between the former Ministry of Posts and Telecommunications, the former Ministry of Electronic Industry and the Network Division of the former Ministry of Radio, Film and Television. The MII is thus an extremely powerful ministry, and all networks and IT manufacturing industries are now subject to MII's regulation. According to the State Council, MII's main commitments include development

²¹ See Yun T., (1997) By whom, the Ministry of Posts and Telecommunications or the Ministry of Radio, Film and Television. *China Computer World*, 15 December

²² See 'Report to Ninth National People's Congress on Institutional Restructuring' by Luo Gan, former State Councillor and Secretary-General of the State Council, March 1998

strategy stipulation, policy-making and overall regulation of the information industry, including telecommunications, IT product manufacturing and the software sector.

The establishment of the MII is undoubtedly a positive step towards further deregulation of the Chinese telecommunications market. The most revolutionary step taken by the MII since its establishment was to split the former China Telecom into four independent groups in mid-1999, namely China Telecom, China Mobile, China Satellite and Guo Xin Paging Company. Instead of following the approach of the United States when it divested AT&T from regional Bell operating companies, the MII adopted a strategy of 'vertical separation' - that is to say, China Telecom was split up into four groups according to specific services. China Mobile is specifically dedicated to mobilephone services; China Satellite is specific in satellite communications while Guo Xin Paging Company focuses on radio paging services only. Both China Mobile and China Satellite are financially and operationally independent, and the government is hoping that they can provide other services and compete with other operators in the future. The Guo Xin Paging Company was subsequently merged with China Unicom as a measure to enhance China Unicom's financial strengths.

However, China Telecom remains responsible for both long distance services and local fixed network services. In other words, China Telecom still controls the fixed network for both local and long distance services. Hence this organizational restructuring of China Telecom is not a thorough revolution, as China Telecom still enjoys significant dominance in the fixed network, and the barriers to entry remain as high as they were before the restructuring. However, as has been witnessed in other Chinese industrial sectors, step-by-step seems to be the most commonly used approach of system reform in China²³. Over expectation to the MII hence remains premature - the industry should appreciate each and every step that has been taken by the MII in driving competition, however small and, in some cases, problematic they may be.

Although the MII is still a governmental department and not an independent regulatory agency in a real sense, the operational functions of China Telecom have been separated from MII's regulatory commitments. According to the State Council, both China Telecom and China Mobile are defined as part of the top 100 large-scale state-owned-enterprises in China and are directly under the supervision of the Central Enterprise Industry Commission (a newly-established governmental department that is specifically responsible for the administration of state-owned-assets without directly intervening in each individual company's routine operation). The MII currently enjoys a relatively neutral status over telecommunications regulation because it no longer affiliates with any operators. As will be highlighted below, this status has enabled the MII to take a more pro-competitive stance to facilitate competition in the Chinese telecommunication market. The progress that the MII has made on network interconnection, for instance, is a good illustration.

4.2 Reshaped Landscape for Network Interconnection

Soon after the establishment of the Ministry of Information Industry (MII) in March 1998, much progress has been made in facilitating competition between China Telecom and China Unicom, including regulatory adjustment for network interconnection. The first major step was that China Unicom was permitted to provide service in any city without gaining specific permission from the regulator. This has greatly reduced the time and resources needed for China Unicom to launch its services in each individual city and region. Another favourable change is that China Unicom is now permitted to use one mobile switching centre (MSC) to cover more than one local area network. This will undoubtedly reduce the overall cost for China Unicom and enhance its network efficiency. The most recent regulatory move has obliged China Telecom to provide roaming service to China Unicom's subscribers in areas that have not yet been covered by China Unicom's mobile network. Thus, China Unicom's subscribers can benefit from nationwide roaming services, as do China Telecom's subscribers. This will greatly reduce concerns about network externalities. The MII also allocated the number block 191 to China Unicom for its mobile service expansion²⁴.

Given that China Unicom had expanded its service beyond mobile communications and taken a more aggressive stance in entering into fixed local, long distance and international telecommunication service markets, and that China Netcom and Jitong Communications Co. had been issued licenses to provide

²³ Pitt, *op cit.* Ref. 4

²⁴ See Xu Y. and Pitt, D.C. (1999) Chapter 15: Competition in the Chinese cellular market: promise and problematic, in D.G. Loomis and L.D. Taylor (eds.) *The future of the Telecommunications Industry – Forecasting and Demand Analysis*, Kluwer Academic Publishers: Boston, 247-64

IP Telephony services²⁵, clear guidelines for network interconnection were urgently required. On 7 September 1999, the MII formally issued “Provisional Regulation over Telecommunications Network Interconnection”²⁶.

The main contents of this regulation are summarized below:

1) *Obligations of the Dominant Operator*

According to the regulation, an operator with more than a 50 per cent share of the market is defined as a dominant operator. A dominant operator is obliged to provide interconnection to all other operators requesting network interconnection at any technically possible and economically reasonable point, as long as network security is not compromised. The dominant operator is also obliged to provide all necessary network information about network interconnection to the party requesting interconnection, and is to make relevant network modifications to facilitate interconnection.

As for quality of service, the regulation clearly specifies that the quality of communications across networks should be the same as the quality of internal communications. The dominant operator is also requested to provide interconnection within a defined time limit. Delays without a valid reason are not permitted.

Moreover, the dominant operator is obliged to provide interconnection for all services that it is currently providing to its own subscribers, including emergency services. It must also provide directory enquiry services for subscribers of other operators. After negotiating the terms with other network operators, all subscribers should be able to access the other operator’s number system via the dominant operator’s enquiry system.

2) *Technical Guidelines*

The technical guidelines clearly define the points of interconnection and their locations. The gateway does not necessarily have to be an exchange dedicated to interconnection, and can also be shared with other network facilities. It can also be shared between both interconnecting parties. This will greatly reduce the costs incurred by China Unicom. Furthermore, subscribers will have a choice of operators for their long distance service, either on a subscription basis or on a call-by-call basis. Phone numbers would be centrally allocated and administrated by the MII.

3) *Cost Allocation for Interconnection*

Under the new regulation, the party requesting the interconnection is not responsible for the full cost of the interconnection. Instead, the regulation specifies that each party is to cover the cost of interconnection only on their own side, with full ownership of interconnection facilities. That is to say, China Unicom is now only responsible for installing gateway on its own side, while China Telecom should install a gateway on another side. However, the party requesting the interconnection should still cover the cost of installing trunk lines between the two gateways. The requesting party will also have to pay for renting ducts owned by another party.

As for interconnection charges, the regulation clarifies that these should be based on actual cost. Each party is to submit cost data to the MII, which then makes a settlement based on these costs with the help of an independent auditing agency. Until cost data is available, interconnection charges out to be based on the current retail tariff.

The regulation also defines other terms of interconnection, including the time limit for interconnection installation, the content of interconnection agreements, arbitrary procedures and penalty rules.

This provisional regulation provides relatively clear guidelines on network interconnection. Although it is not as sophisticated as those in early mover countries (for instance, there are no terms requiring accounting separation, a factor which could seriously influence the accuracy of the cost data), it is still an improvement on the situation witnessed from 1994 to 1997. In accordance with these guidelines, the MII revised the former MPT’s 1995 technical specifications for network interconnection between China Unicom’s mobile network and the PSTN network of China Telecom. As will be summarized in the next section, these revised terms have gone a long way towards addressing China Unicom’s vulnerable position.

²⁵ See ITU IP Telephony Workshop Website at <<http://www.itu.int/iptel/>>

²⁶ Ministerial Document No. [1999] 728 of the Ministry of Information Industry

Table 4.1: Contrasting regulatory settlements over fixed/mobile network interconnection before and after the regulatory restructuring in 1998

	Before 1998	Since 1998
1	<p><u>Service Provision Approval Procedure</u></p> <p>China Unicom was required to obtain permission for service provision in each individual area, which normally took at least sixty days once all documents were ready.</p>	China Unicom can provide services in any area with its master license without requiring special permission for each individual area.
2	<p><u>International Service</u></p> <p>All of China Unicom's international traffic had to be routed through China Telecom's gateway and all revenues from international services were to be handed over to China Telecom.</p>	China Unicom has obtained permission to construct its own international gateway and is able to keep all of its international service revenues.
3	<p><u>Interconnection Accounting</u></p> <p>Interconnection charges were based on the old tariff which did not reflect the real cost, given the outstanding monopoly operation of China Telecom.</p>	Interconnection charges are to be based on cost once audited cost data is available.
4	<p><u>Interconnection Cost Allocation</u></p> <p>China Unicom should bear the full cost for interconnection including the installation of gateways on both the China Unicom and China Telecom side.</p>	China Unicom is only responsible for the installation cost of gateways installed on its own side plus the cost for trunk lines connecting the two gateways.
5	<p><u>Gateway Functions</u></p> <p>Gateways must possess independent switching functions and be installed separately from China Unicom's mobile system.</p>	The gateway's switching functions can be shared by other network facilities and can be shared by both parties involved in interconnection.
6	<p><u>Mobile Switching Centre (MSC) Coverage</u></p> <p>Each MSC should cover only one local fixed network area, regardless of MSC's capacity and the size of the area.</p>	MSCs can cover more than one local fixed network area depending on the capacity of the MSC and the size of the area.
7	<p><u>Interconnection Charges</u></p> <p>Interconnection charges for mobile to fixed calls was 0.08 Yuan per unit (three minutes), while the average calling time was 1.25 minutes per call.</p>	The interconnection charge has been reduced to 0.05 Yuan per unit but the unit remains three-minutes in length.
8	<p><u>Long Distance Call Routing</u></p> <p>All of China Unicom's long distance calls were routed via China Telecom's long distance circuits; China Unicom had to forward 92 per cent of its long distance service revenues to China Telecom.</p>	Subscribers have a choice as to which operator to use for their long-distance calls, either on a subscription basis or on a call-by-call basis. However the 92 per cent reallocation rate remains valid.
9	<p><u>Signalling System</u></p> <p>The original signalling system used by China Telecom was configured for monopoly operation and China Unicom could not receive the callers' numbers for long distance calls. Hence, it could not issue billing invoices properly. The old Signalling System 1 was sometimes used for interconnection.</p>	Signalling Systems 7 has to be used for network interconnection, and gateways on each side should have detailed billing capacity.

10	<u>Emergency Services</u> China Unicom had to install direct connections to each individual emergency service provider, while China Telecom was obliged to provide interconnection for basic phone services only.	China Telecom is now obliged to provide interconnection for all services it is currently providing for its own subscribers, including emergency services.
11	<u>Quality of Interconnection</u> No quality indicators were defined for network interconnection and no deadline was set for implementing interconnection.	A time limit for completing interconnection is imposed: seven months from the time of request. Quality indicators are as follows: The same transmission quality for inter-network communications and intra-network communications; The call failure rate between the MSC and the Toll Switch (TS) should be less than 1 per cent, and the average traffic between them should be less than 0.70E in peak time; The call failure rate between the MSC and the Tandem (TM) should be less than 0.5 per cent and the average traffic between them should be less than 0.70E in peak time.
12	<u>Network Externalities</u> For areas not covered by China Unicom's mobile network, subscribers could not benefit from a roaming service.	China Telecom is obliged to provide roaming services for China Unicom's subscribers in areas that have not yet been covered by China Unicom's mobile network.

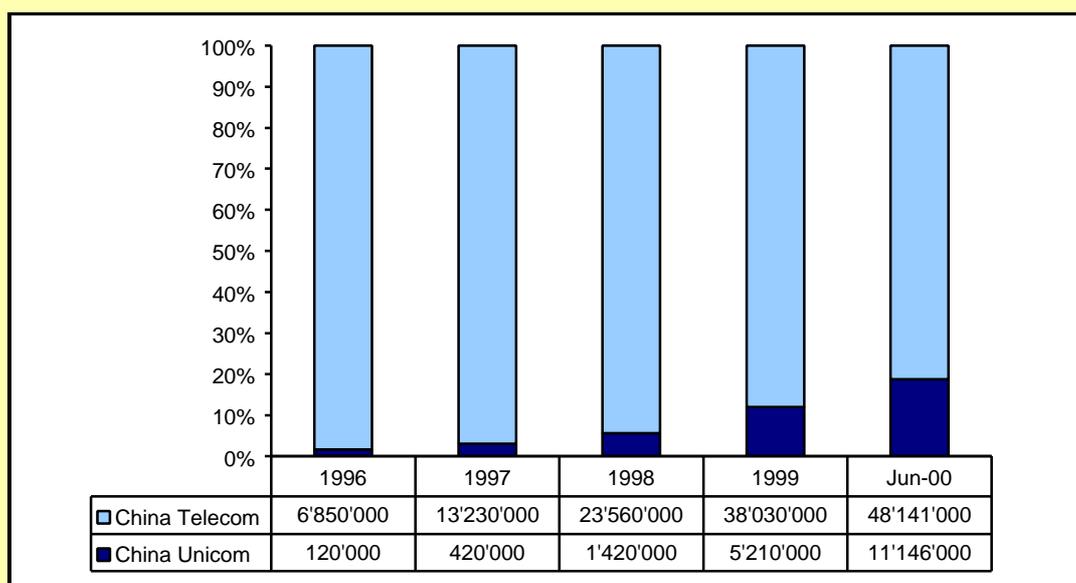
Source: Ministry of Information Industry, China Telecom, China Unicom, China Communications Info <<http://www.cci.cn.net>>

4.3 1998: A Critical Turning Point

The separation of the regulatory and operational functions in the newly restructured regulatory framework greatly enhanced the regulator's pro-competitive stance, despite the fact that the Ministry of Information Industry is still caught in conflicts of interest between the public and the operator due to the state ownership of operating companies. Table 4.1 highlights the progress that has been made thus far, by contrasting the framework for fixed-mobile interconnection before and after the 1998 regulatory framework restructuring.

Table 4.1 summarises the improvements made to the existing network interconnection regime by the newly established regulator. It is as a result of these changes that China Unicom has achieved rapid network expansion in 1999. Figure 4.1 shows the evolution of China Unicom's market share since it formally launched its mobile service in 1995. China Unicom's market share jumped from less than 6 per cent in 1998 to more than 13 per cent in 1999.

China's experience in network interconnection in the past few years clearly indicates that the regulatory framework is extremely critical to fair competition and to the healthy development of new entrants. The affiliation between the incumbent operator and the regulator has put new entrants in a vulnerable position. The separation of regulatory functions from operational functions, on the contrary, has led to the revival of a new entrant such as China Unicom. Although the Ministry of Information Industry is still not an independent regulator in a real sense, its quasi-independent status has brought dramatic changes to the telecommunications industry. An ineffective regulatory framework has been costly for China. In contrast, the Hong Kong SAR case (which will be discussed in the next chapter) has been less problematic, due to the initial establishment of a fully-independent regulatory agency and the embrace of market principles.

Figure 4.1: Market share of China Unicom

Source: Ministry of Information Industry

5 Interconnection: The Case Of Hong Kong SAR

5.1 Differences in China and Hong Kong SAR Regulatory Framework

Section 2.2 has provided a general overview of the telecommunications policy of Hong Kong SAR. Compared to China, the Hong Kong SAR telecommunications regulatory framework differs in the following aspects:

1) *Ownership of Operators*

In Hong Kong, all operators have been privately owned since 1981 when Cable & Wireless was privatised in the UK. In China, however, both China Telecom and China Unicom remain state-owned. Competition without privatisation has been a path adopted by the Chinese government within the constraints of its traditional centrally-planned economic system and Marxist ideological origins.

In Hong Kong, the Government is able to distance itself from the interests of telecommunications operators, especially those of the incumbent operator, due to the absence of public ownership in the telecommunications sector. Thus, government serves the broad public interest in favour of efficiency and effectiveness, best served by deregulation.

In China, however, state ownership of China Telecom and China Unicom lends ambiguity to the status of the central government, which is caught between the interests of two rival coalitions of interests. On the one hand, the government would like to achieve the benefits of competition by incorporating deregulatory mechanisms in the telecommunications sector. On the other hand, it has limited ambition to invest in the construction of extra networks. Unsurprisingly, in comparison with Hong Kong, the Chinese Government has shown little perseverance in implementing a deregulatory policy in the telecommunications sector.

2) *Foreign Direct Investment*

In Hong Kong, foreign or external investment has not been subject to any restrictions. For the incumbent, Cable & Wireless HKT (CWHKT), the major shareholders have been Cable and Wireless plc, a British company, with 54 per cent ownership, and China Telecom, with approximately 11 per cent ownership; local and international investors have held the remaining shares. After the ongoing merger between CWHKT and Pacific Century CyberWorks (PCCW), Cable and Wireless is going to hold 25 per cent shares of the new company for at least two years. Among the new entrants, Hutchison has 20 per cent of its shares owned by Telstra, the incumbent operator of Australia, while New World has 5 per cent of its shares owned by US

West, a US regional Bell holding company. Due to the recognition that foreign direct investment is one of the most important financial resources for network upgrading and expansion, the Hong Kong SAR government has taken a policy approach that is open, transparent, pro-competitive and non-discriminatory regarding foreign ownership.

In China, foreign direct investment in telecommunications operation has been strictly banned. The absence of pressures from foreign operators in the Chinese market enables the Chinese regulator to formulate the Chinese version of policy without the necessity to follow the approach that has been taken widely by early mover countries. However, this situation will change with China's efforts to become a member of the WTO. The revised technical specifications for network interconnection is a positive indication of progress.

3) *Codifying Regulation*

In Hong Kong, telecommunications policy has been formulated around the Telecommunications Ordinance. The regulator also issues statements covering specific aspects of telecommunications regulation. For example, Statement No. 7, issued on 10 June 1995, clearly outlined carrier-to-carrier charging principles. From this, operators understand which procedures they should follow. They can also defend their interests during the consultation stage of the policy-making process.

In China, no legal document such as Telecommunications Act exists. The operators mainly defend their interests by exploring their individual strengths without recourse to a transparent regulatory framework. A game without clear rules has seriously impeded the deregulation of the telecommunications market in China.

4) *Status of the Regulator*

The final, and also the most obvious, difference between Hong Kong SAR and China, is the status of the regulator.

In Hong Kong, the Telecommunications Branch of the Post Office was the regulator before the establishment of Office of Telecommunications Authority (OFTA) on 1 July 1993. Due to the private and foreign ownership of telecommunications operators, this government department was able to stipulate policies in a relatively neutral way, despite the fact that it might be subject to political intervention due to its status as a government department.

The establishment of OFTA meant the birth of a truly independent telecommunications regulatory agency. The Director-General of OFTA is directly appointed by the Chief Executive of Hong Kong SAR, which enables him or her to operate independently without intervention from other Government departments. Financially, OFTA is self-funded through license fees from operators, which shields it from political intervention in the form of budget controls. Also, OFTA staffs are banned from holding shares of any telecommunications companies (this includes mutual funds consisting of such shares). This guarantees that regulation can be implemented in a fair and unbiased manner.

In China, however, the incumbent operator was closely affiliated with the regulator before 1999. In the absence of a legal framework and clear policy guidelines, new entrants have been treated unfavourably and there has been a form of 'regulation discrimination'. The case over network interconnection is a good illustration of this phenomenon.

5.2 OFTA Policy Stance over Interconnection

In line with the differences outlined above between the regulatory framework of Hong Kong SAR and China, OFTA's policy stance over network interconnection has differed greatly from that of the Chinese regulator, notably the former Ministry of Posts and Telecommunications. The main elements of OFTA's policy for network interconnection are as follows:

1) *Cost Orientation*

In Hong Kong, Cable & Wireless HKT (CWHKT) has been categorised as the dominant operator due to its 98 per cent market share of the local fixed network. For this reason, interconnection with CWHKT's fixed network has been subject to OFTA's regulation. According to OFTA, the interconnection fee should be based on the real cost that has been incurred in the process of interconnection. Each time, upon the request of the Telecommunications Authority (TA), CWHKT is to provide all accounting information regarding costs in accordance with OFTA's Accounting Manual. These costs are then divided by the total volume of traffic.

Normally, it is CWHKT that suggests the rate of charge for interconnection. These proposed charges would be accepted by the TA only if they are in line with the TA's own cost analysis.

Table 5.1: Interconnection rates between mobile networks and the fixed network of CWHKT

Period	Mobile/Fixed Interconnection Rate	
	Trunk Line (per month)	Usage Charge (per minute)
Before 1/6/96	HK\$69.00 (US\$8.93)	HK\$0.09 (US\$0.0116)
1/6/96-1/6/98	HK\$78.00 (US\$10.06)	HK\$0.067 (US\$0.0087)
1/6/98-1/10/99	HK\$82.00 (US\$10.58)	HK\$0.064 (US\$0.0083)
10/99- present	HK\$79.00 (US\$10.19)	HK\$0.059 (US\$0.0076)

Source: OFTA

According to Table 5.1, mobile operators should pay CWHKT monthly rent for trunk lines connecting their mobile networks and the CWHKT's fixed network. The bandwidth of the trunk line is 64kbps per line. For traffic between mobile networks and the CWHKT's fixed network, the interconnection rate is symmetric, or, in other words, the interconnection rate for mobile to fixed calls is equal to that for fixed to mobile calls.

As mentioned earlier, the interconnection rate is based on the actual cost. However, there was a different argument against this principle when mobile service was first made available. Mobile telephony was then considered a luxury service in Hong Kong, mainly due to the high handset prices and connection fees. In this case, it was suggested that interconnection charges for calls from the mobile to the fixed network should be arranged in such a way that the mobile service should contribute to the universal service obligation of CWHKT²⁷. However, due to concerns over market distortion, the regulator decided to follow the principle of cost orientation. According to Mr. M. H. Au, Senior Assistant Director (Regulatory) of OFTA, the experience in past decades has shown that this policy stance was the correct one and that cost-based interconnection rates were critical in turning mobile services from a rare luxury to a popular commodity in Hong Kong.

2) *Market-driven*

Whichever market sector becomes competitive, OFTA will adopt a light-handed policy approach immediately and let market forces dominate. For interconnection between mobile networks and fixed networks owned by non-CWHKT operators, OFTA has adopted a hands-off approach, although it reserves the right to intervene if necessary in accordance with the Telecommunications Ordinance.

However, for IDD services, OFTA has set up a special arrangement between mobile operators and the former Hong Kong Telecom International (HKTI, which is currently part of CWHKT), given the latter's exclusive monopoly over IDD services. According to this arrangement, mobile operators were not required to pay any interconnection charges to HKTI, but only HKTI's retail tariff rate in the case of outgoing calls. For both incoming and outgoing calls, HKTI would pay mobile operators a "delivery fee" as compensation for originating and terminating calls. However, this delivery fee was not based on cost due to OFTA's intention of sharing HKTI's monopoly profits with other operators. These artificially above-cost delivery fees actually played an important role in reducing mobile retail tariffs, since mobile operators tended to use these delivery fees to subsidize the fees they would charge their subscribers²⁸.

Soon after HKTI lost its monopoly over IDD service at the beginning of 1999, the market became immediately competitive and, since then, more than one hundred licensees have started offering IDD services either on a resale or facility basis. In this case, OFTA has withdrawn from regulating delivery fees, allowing the operators to negotiate commercially.

3) *Fair and Transparent Guideline*

²⁷ Interview with Mr. M. H. Au of OFTA on 14 March 2000.

²⁸ See Wong, M.H. (1997), *Information Age*. Hong Kong Economic Daily Press: Hong Kong

In order to provide a smooth platform to facilitate network interconnection, OFTA has set out certain guidelines. The ‘Industrial Code of Practice for the Interconnection’²⁹ clearly defines the principles of interconnection and the obligations of each party. Issues such as co-location, submission of information, service level agreements, dispute procedures and charging arrangements are specified in the Code. Due to OFTA’s independent status, the terms of the Code are fairly neutral and there is no undue discrimination against any party.

4) *Regulatory Innovation*

Given the rapid development of technological innovation and the fast pace of regulatory reform, interconnection regulation cannot be a one-step solution. For instance, Hong Kong SAR began to implement number portability for mobile communications in March 1999 and new financial arrangements were required. As each telephone call to a mobile number means an initial consultation of the database for portable numbers, a financial burden is imposed on the operator responsible for maintaining this database. To solve this problem, OFTA applies its cost-oriented principles, even though the incumbent operator, CWHKT, is currently maintaining the database. The rate is HK\$0.0119 (ca. US\$0.0015) for each number verification. At the same time, each individual operator is free to install its own database if it thinks the arrangement is not favourable. Market forces are once again allowed to prevail.

Currently, OFTA is conducting a study on interconnection schemes for GPRS and 3G, as these new services are based on packet switching rather than circuit switching. The current time-based interconnection arrangements may be unsuitable for these new services.

The Hong Kong experience has shown that OFTA’s interconnection policy has been very successful. No new entrants have been unfavourably treated and the market is highly competitive. Consequently, the benefits to the public have been enormous both in terms of choice and in overall price. Table 5.2 provides the latest retail tariffs of each mobile operator (March 2000). It is to be noted that these tariffs are almost 75 per cent cheaper than those offered by CWHKT’s One2Free Brand in January 1997.

The diversified choices and the continually declining tariffs have strongly stimulated the diffusion of mobile service. According to the latest statistics of the International Telecommunication Union, Hong Kong SAR has one the world’s highest mobile phone penetration rates and the highest percentage of mobile phone subscribers out of total telephone subscribers (Figure 5.1).

Table 5.2: Tariffs for mobile services in Hong Kong SAR (January 1997 / March 2000)

Operator	Monthly Service Charge (HK\$*)	Free Air Time (minutes)	Additional Airtime Charge (HK\$/per minute)
CWHKT One2Free (1/1997)	388	123	2.38/0.8 (peak/off-peak**)
<i>Following data is for March 2000</i>			
CWHKT One2Free (GSM)	178	220	1.2/1.0 (peak/off-peak)
New World (PCS)	98	100+60(intra***)	1.0
Orange (GSM)	138	200+100(intra)	1.0/0.2(Inter****/intra)
Peoples (PCS)	75	100	1.0
SmarTone (GSM)	168	100+200 (intra)	1.2
SmarTone Extra (PCS)	88	120	1.0
Sunday (PCS)	88	100	1.0

* Current exchange rate is US\$1.00 = HK\$7.75

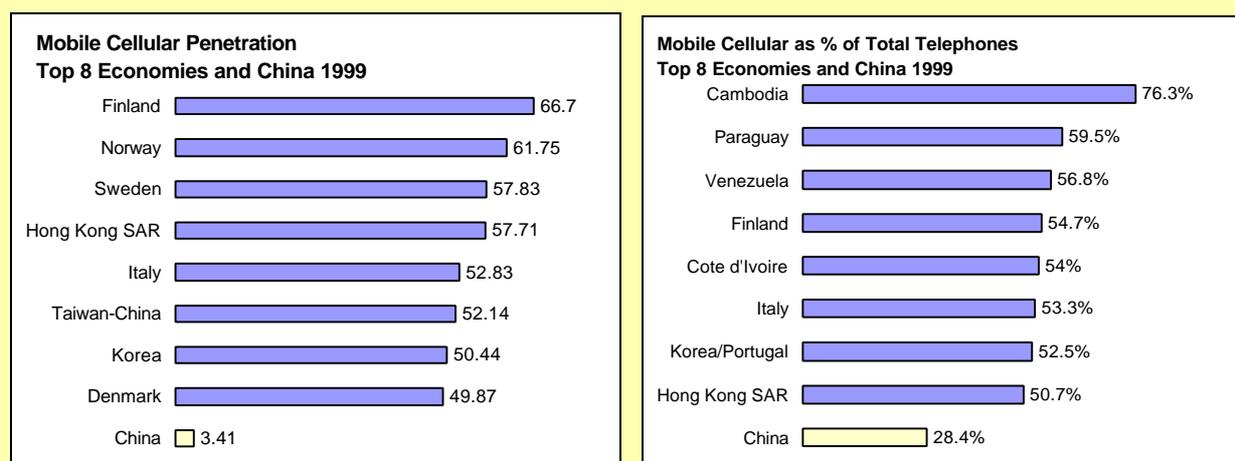
** Peak time refers to 9:AM – 5:00 PM in weekdays except public holidays, while off-peak time refers to the rest

*** Intra refers to communications between users subscribing to the same mobile network

**** Inter refers to communications between users subscribing to different mobile or fixed networks

Source: Leaflets of each operator

²⁹ For details of the Code, see <<http://www.ofta.gov.hk>>

Figure 5.1: Mobile phone penetration versus mobile phone share - top 8 economies and China 1999

Source: International Telecommunication Union Indicators Database

6 Conclusion

This case study has provided an in-depth comparative review of policy approaches to network interconnection in China and Hong Kong SAR, both vertically and horizontally. These have been in sharp contrast, due to differences in the regulatory frameworks.

Vertically, the interconnection policy in China has experienced a revolutionary leap forward before and after the establishment of the quasi-independent regulator – the Ministry of Information Industry (MII). The affiliation of China Telecom with the former Ministry of Posts and Telecommunications (MPT) had led to above-cost interconnection fees, protracted negotiations and unfair technical arrangements. As a result, political intervention over interconnection has been frequently requested. The different market position of China Unicom before and after the establishment of the MII has shown that an ineffective regulatory framework is perhaps the largest competitive barrier for new entrants.

Horizontally, the controversial status of the former MPT in China and the completely independent status of OFTA in Hong Kong SAR have led to differing levels of regulatory perseverance in liberalising the telecommunications sector, and, in consequence, different approaches in dealing with network interconnections. The less-problematic experience in Hong Kong SAR demonstrates how important an independent regulatory agency is for a secure and healthy competitive market. OFTA's cost-oriented and market-driven principles on network interconnection pricing have, to a certain extent, prevented the occurrence of market distortion, while its transparent guidelines on interconnection have guaranteed the fairness and effectiveness in implementing network interconnection. If OFTA had in close affiliation to any of the operators, it would likely not have been possible for it to have taken this regulatory approach in the past few years.

Clearly, an effective regulatory framework is one of the most critical factors in facilitating network interconnection, and in creating a truly competitive market. One of the lessons to be learned from this case study is that the affiliation of the incumbent operator with the regulator can place new entrants on a path to financial loss and frustration. Therefore, it seems timely for international organisations such as the ITU and the WTO to strengthen their stance in encouraging member states to ensure the independent status of their national regulators. Moreover, in countries where an independent regulator is still to be established, certain international standards over technical aspects of network interconnection, such as points of interconnection, traffic routing, signalling and quality of interconnection, might prove to be helpful.

Annex: Links to Related Websites

Government Sites

[Ministry of Information Industry \(MII\)](http://www.mii.gov.cn) at <http://www.mii.gov.cn> (Chinese only)

[Information Institute of the MII](http://www.cci.cn.net) at <http://www.cci.cn.net> (Chinese only)

[China Internet Network Information Centre](http://www.cnnic.net.cn) at <http://www.cnnic.net.cn>

[Office of Telecommunications Authority \(OFTA\)](http://www.ofta.gov.hk) at <http://www.ofta.gov.hk>

[Information Technology and Broadcasting Bureau \(Hong Kong\)](http://www.info.gov.hk/itbb) at <http://www.info.gov.hk/itbb>

[Hong Kong SAR Government Information Centre](http://www.info.gov.hk) at <http://www.info.gov.hk>

Operators in China

[China Telecom](http://www.chinatelecom.com.cn) at <http://www.chinatelecom.com.cn> (Chinese Only)

[China Unicom](http://www.chinaunicom.com.cn) at <http://www.chinaunicom.com.cn> (Chinese only)

[China Mobile](http://www.chinamobile.com) at <http://www.chinamobile.com>

Operators in Hong Kong SAR

[Cable & Wireless HKT Telephone Limited](http://www.cwhkt.com) at <http://www.cwhkt.com>

[Hutchison Global Crossing Limited](http://www.hutchnet.com.hk) at <http://www.hutchnet.com.hk>

[New T&T Hong Kong Limited](http://www.newtt.com) at <http://www.newtt.com>

[New World Telephone Limited](http://www.newworldtel.com) at <http://www.newworldtel.com>

[People's Telephone Company Limited](http://www.peoplesphone.com.hk) at <http://www.peoplesphone.com.hk>

[SmarTone Mobile Communications Limited](http://www.smartone.com.hk) at <http://www.smartone.com.hk>

[SUNDAY o/b Mandarin Communications Limited](http://www.sunday.com) at <http://www.sunday.com>

Other Relevant Websites:

[ITU Case Study on IP Telephony](http://www.itu.int/iptel) at <http://www.itu.int/iptel>

[China Communications Professional Website](http://www.c114.net) at <http://www.c114.net> (Chinese Only)