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A Summary of Telecommunications Reform in China

By Liang Xiongjian and Zhang Jing, China

Starting in 1993, the Chinese government began telecommunications reform, with the objective to introduce competition into the telecommunications service market. There were several obvious steps to take.

The first step, started in 1993, was to open for competition nine non-basic telecommunication services, including: radio paging; the 800 MHz trunk telephone service; the 450 MHz radio mobile communications service; domestic VSAT (very small aperture terminal) service; telephone information service; computer information service; electronic mail (e-mail); electronic data interchange (EDI); and videotext and any other telecommunication service approved by the regulator. Many small companies entered these service markets, and accelerated their development greatly. Radio paging service was a typical case among them.

Establishing China Unicom in 1994 was the second step in the reform process, and created a duopoly competition in basic service areas. China Unicom was a joint venture with stockholders from the Ministries of Electronic Industry, Railways, and Electrical Power, and 13 other large state-owned corporations. In the same year, according to the plan authorized by the State Council, the MPT reformed its organizational structure. The function of the MPT would move from the routine operation of posts and telecommunication systems to the regulation of the national posts and telecommunication industry. The MPT was thus designated as the state regulator and was committed to defend the interests of the state and the public. Simultaneously, as a first step toward separation from the MPT, the Directorate General of Telecommunications officially registered as a company called China P&T Directorate General of Telecommunications, which became known as China Telecom. It was committed to head-to-head competition with China Unicom. In reality, however, China Telecom was still just an administrative agency and did not own any telecommunication assets or provide any services itself. The national long distance network, including the three international gateways, was actually operated by provincial and municipal Posts and Telecommunications Administrations (PTAs) that reported directly to the MPT. In other words, the MPT enjoyed dual status as both a regulator and an operator. This controversial regulatory framework left China Unicom in a handicapped position to compete with China Telecom or, in fact, the MPT.

To solve this problem, the third important reform step was taken to realize the actual divergence between China Telecom and MPT. Additionally, the increasingly explosive development of individual private networks, especially the cable network of the Ministry of Radio, Film and Television, raised the government's concern over duplicative construction. To coordinate development, a governmental agency was needed to take the responsibility. A new ministry, the Ministry of Information Industry (MII), was formally established in April 1998. It resulted from a merger of the Ministry of Posts and Telecommunications, the Ministry of Electronic Industry, and the Network Division of the Ministry of Radio, Film and Television. According to the State Council, the major responsibilities of the MII include development strategy stipulation, policy making, and overall planning of the information industry; revitalization of telecommunications; the administration of IT product manufacturing and the software industry; and promotion of the informatization of the national economy and society. Thus, MII should not interfere with the operational activities of telecommunications operating companies. MII decided to adopt different policies in different domains. The basic principles are:

- Full competition in the domain of value-added telecommunication and information services.
- Ordered competition in the domain of satellite and wireless mobile telecommunication services.
- Limited competition in the domain of basic telephony services.

The foundation of MII was a significant step in the establishment of a normal market environment for the telecommunications industry. But another problem was revealed. Compared with China Telecom, China Unicom was too weak to compete with it fully, so even after the entrance of China Unicom, China Telecom still enjoyed actual monopoly profits. Then in 1999, another reform step was taken, which was to restructure China Telecom. On 14 February 1999, the State Council formally announced a reorganizing plan that has fundamentally changed the landscape of China's telecommunications industry. China Telecom was divided into four companies, each separately responsible for the operations of fixed telephony, mobile communications, wireless paging, and satellite communications. They are respectively called China Telecom, China Mobile, Guoxin, and China Satellite.

Through these several important steps, a polynary market environment has been created. There was no doubt that the trend toward full competition in the telecommunication service market is unavoidable, which also helped to attract more players. Then the MII aimed to encourage or maintain normal competition in the market through the licensing system, and unsymmetrical regulation that aims to support the weak and restrict the strong. From then till now, two more important network operators entered the telecommunication service provider market: China Netcom Corporation (CNC), and China Railway Communications Corporation (CRC). The MII continues to give more assistance to the oper-

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Costa Rican Telecoms at the Crossroads

By Ricardo Trujillo, Costa Rica

Many wonder why Costa Rica's Telecom market has not yet been deregulated in spite of the government's efforts. Well, it is not so easy to understand, even for Costa Ricans. Here follows a probable explanation. For the last 40 years, telecom activities have been a state monopoly, and all public telephony services were provided by ICE, leaving to RACSA some corporate data services (telex, fax, packet switching, Internet, private leased circuits, etc). Under such a scheme, Costa Rica reached a teledensity of 23 percent, but recently was faced with slow deployment of leased line and broadband services, and a limited availability of cellular lines (the penetration rate is still at 5 percent).

Since 1996 a law project for deregulation was proposed, but it was not until March 2000 that it was finally subject to a first vote in the Legislative Assembly. Shortly after the vote, ICE's trade unions organized a nationwide strike that almost paralyzed the country because of the unrest it unleashed, and police could not deal with it. As a result the Government stepped back and never pushed for approval of the law on its second and final vote. The arguments used by the strikers were that tariffs will increase due to the appearance of transnational ISPs and carriers. Those arguments convinced the public, and because of the press coverage given to the strike, the government had no option but to withdraw the law project from the legislative agenda.

Since April 2000, a new commission formed by politicians, government, industry, commerce chambers, and trade unions has tried to agree on a new restructuring model, but the only agreements reached as of today have been to restructure ICE and to modify the current laws that restrict its purchasing and investment duties. The National Assembly is also studying a law proposal to allow private Internet service providers.

In the meantime, and in anticipation of any political agreement, ICE has begun to prepare itself to consolidate and modernize its telecom platforms. Projects such as a nationwide SDH over DWDM platform are at the bidding stage. A pilot project for an IP-network has been initiated, as the alternative to provide convergent services. A merger between RACSA and ICE's Corporate Services Office, once fierce competitors, is also on the agenda. A new lease contract for 400,000 GSM cellular lines will be awarded soon to ALCATEL or ERICSSON, the only bidders. International links are being transferred from satellites to the submarine cables Maya I and Arcos.

All these projects, worth approximately a half billion dollars, are being contracted under financial and operational leases in order to keep under control the amount of national debt. Nonetheless, the terms for these contracts will have to fully comply with the complicated laws covering government contracts in order to receive final approval from the Controller's Department. On prior similar contracts, the approval process has taken several months and faced extremely long delays.

Whatever the outcome of such measures and projects turns out to be, current public polls still provide ICE with a vote of confidence, allowing it some extra time to demonstrate its capacity to modernize telecom platforms and to reach higher penetration rates for cellular and broadband services. If ICE fails to respond to public expectations, then deregulation might become an acceptable law.

Report on 3Gwireless '2001

Willie Lu, U.S.A.
General Chair, 3Gwireless '2001

The 3Gwireless'2001 conference was extremely successful, with approximately 600 people registered, and most global 3G/4G leaders joining the conference. This conference was supported by the International Telecommunications Union (ITU) and sponsored by major wireless industries including Nokia, Siemens, Nortel, Ericsson, Qualcomm, Lucent, NTT DoCoMo, Philips, Cadence, Ronin, etc. 3Gwireless'2001 was also encouraged by many government authorities, research institutes, and technical bodies in the world, and has become the world's most authoritative technical event on 3G wireless and beyond.

The honorable Mr. Fabio Leite, head of IMT-2000 of ITU, addressed the official opening of 3Gwireless'2001. He summarized the general picture of global IMT-2000 (3G) development and deployment and presented the ITU vision of the beyond-3G (4G mobile) initiatives. The convergence of future mobile and wireless access will also be a very powerful trend in wireless communications.

Following the ITU's keynote speech, there were 12 featured speeches by senior executives (CTOs or senior VPs) of major 3G wireless leaders in the world. They presented their leadership in the field and gave us excellent marketing and business analysis on 3G wireless and beyond. The featured speeches were moderated by Peggy Albright of *Wireless Week*.

The technical sessions started on the afternoon of May 30 with five parallel discussions. This year we received more than 500 submissions, and only 208 papers were accepted. Approximately 200 papers were presented in 23 sessions. 3Gwireless'2001 focused on 4G mobile initiatives, networking technology, receiving technology, mobility technology, modulation and coding, deployment and optimization, convergence of wireless mobile and access, and secured 3G wireless applications.

In addition to these great programs, we also had a very unique start-up business panel comprised of chief executives of emerging wireless start-ups and very high quality tutorials by industry leaders on the topics of 4G mobile (by Vodafone), wireless mobile Internet (by Cisco), smart antennas and MIMO (by Stanford Univ.), the evolution of GSM to EDGE (by RWTH, Germany), soft radio (by Siemens), etc.

3Gwireless'2001 received wide media coverage worldwide, and receives significant recognition in 3G wireless and beyond technologies. For details, please visit the Web site at 3gwireless.com/3gwireless01.

3Gwireless'2002 will be much bigger and more authoritative. With the convergence of wireless mobile and access, we will put this great 3Gwireless'2002 together with the 2002 Broadband Wireless Access Systems (WAS'2002) to deliver the historic 2002 World Wireless Congress in San Francisco. The Web site is at WirelessCongress.com.

Thanks to those involved in making this effort a great success.

A Comparison of Network Operators in China

Liang Xiongjian and Zhang Jing, China

In March 2001 a new network operator, China Railway Communications Ltd (CRC), entered China's telecommunications service market, bringing the total of telecommunications network operators in China to seven: China Telecom, China Unicom, China Mobile, China Satellite, China Jitong, China Netcom (CNC), and CRC. They hold different network resources and focus on different service areas, as shown in Fig. 1. Some services are free for competition, such as data communications, IP phone, and Internet services; and some are under limited regulation, such as fixed phone and mobile phone. Through the reform that began in 1993 the competitive situation in China's telecommunications service market has been primarily set up.

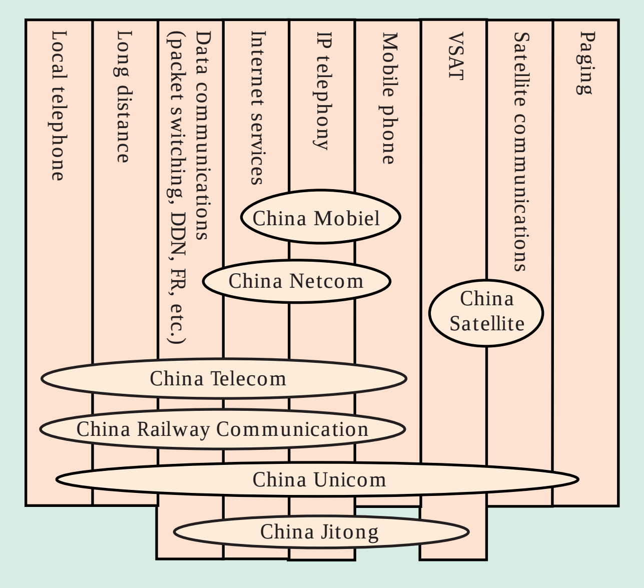

Figure 1. *Service area distribution of the seven operators.*

But the strength of the seven operators is not balanced. First, we compare the telecommunications turnover and revenue of the seven network operators (shown in Table 1). Currently, data communications services, including Internet services, have not resulted in any significant profit for any of the operators, and to a large extent they are supported by voice services. Therefore, the operators focusing on voice services, including China Telecom, China Unicom, and China Mobile, gained much more revenue than those who rely mainly on data services. Particularly, mobile phone service is commonly recignized as the most profitable service.

In different service areas we can find a similar unbalanced competitive situation. For fixed telephony, the network resources of the three related operators — China Telecom, China Unicom, and CRC — are listed in Table 2. Because there are great gaps in the companies' network resources and greater efforts are made in mobile phone service, China Unicom has progressed very slowly in fixed telephone services. Compared with China Unicom, CRC seems to have more advantages. With the private network for railway communications, which comprises 1184 telephone exchange offices and 200 local telephone networks and covers 500 cities domestically, CRC has given priority to the fixed telephone market and represents a great threat to China Telecom.

Operator	China Telecom	China Unicom	China Mobile	China Netcom	China Jitong	China Satellite
Telecommunications turnover	174,300	64,100	209,670	-	700	300
Telecommunications revenue	171,000	25,600	113,870	-	-	280

Table 1. *Chinese operators' telecommunications turnover and revenue in 2000 (unit: million RMB).*

Items	Unit	China Telecom	China Unicom	CRC
Central office exchanges	Million	179	0.15	2
Long distance automatic exchanges	Million	5.33	0.16	-
Long distance telephone circuit	Million	3.37	0.33	-
Optical trunk	Thousand	230	56	58

Table 2. *Fixed telephone network resources of China Telecom, China Unicom, and CRC. (Note: The figures for CRC show the situation in April 2001; the rest of the figures show the situation at the end of 2000.)*

For mobile phone service, competition is becoming profitable. From Table 3 we can see that the market share of China Unicom is growing quickly. Due to the effective competition, the price of mobile telephone service has been

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ators, except China Telecom, and helps them develop into strong companies as quickly as possible. To that end, in May 1999 Guoxin was merged into China Unicom. In contrast, China Telecom is being restricted in some respects, for example in its price decisions and range of services.

As the competition was being intensified, the MII and related departments made great efforts to develop legislation and rules as a framework for the telecommunications market. In September 2000 the Telecommunications Regulations of PRC was put into force, marking the beginning of the standardized management of China's telecommunications industry.

With all the efforts summarized above, the environment for the telecommunication service market has been greatly changed to encourage competition, but it is not satisfactory yet. At least the customers are not totally satisfied. It is believed that the principal problem lies in the unbalanced strength of the operators. Thus, splitting China Telecom again will probably be the next step, and this action is under debate now. At the same time, more legislation and rules are being developed as needed.

Reviewing the history of reform, we can see that the reform effort has solved different problems. In brief, reform has followed the global trend toward deregulation in the telecommunications market. To establish a competitive and prosperous market environment is always the focus and object of China's telecommunications regulators. The reform in China will not stop until that goal is achieved. China's telecommunications market is becoming more like that of the rest of the world.

CHINA TELECOM OPERATORS/*(Cont'd from page 3)*

reduced quickly, and the number of subscribers has increased sharply in the last several years. Additionally, more new services have been developed, which is also attributed to competition.

Finally we look at IP networks and services. Internet services and VoIP (IP phone) services are all developing quickly. Among the operators, China Netcom since its formation has given the highest priority to wideband IP network services, and has rapidly become the second largest provider in this market. But the most worrisome problem is how to earn back its enormous investment while the prices of data services are still falling. After all, we still believe that IP network services will undoubtedly have an impressive future as the main channel over which China will communicate with the rest of the world.

For China's telecommunications industry, the benefits to be gained from competition have been shown. To encourage fair competition, policies have been implemented to support the weaker, restrict the stronger, and introduce more qualified competitors. Whether to restructure China's telecom market again and how to accomplish that is also under dramatic debate now. We can expect a more prosperous telecommunications market in China in the future.

Operator	Year Unit	1997		2000	
		China Mobile	China Unicom	China Mobile	China Unicom
Subscriber count	Million	13.22	0.42	66.52	18.74
Market share		97%	3%	78%	22%
Call duration	Million minutes			110,920	14,610

■ **Table 3.** *The development of mobile phone services.*

Operator	Unit	China Telecom	China Mobile	China Unicom	China Netcom	China Jitong	CRC
International bandwidth	Mb/s	1953	90	55	377	148	
Domestic bandwidth	Gb/s	800			40		
Internet subscribers	Million	15.65		0.259		0.367	
Usage time of IP phone	Thousand minutes	1,613,262		471,430		183,991	

■ **Table 4.** *IP network resources and services.*

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Report on ISPACS 2000

Ichuo Kurod, Japan

The IEEE International Workshop on Intelligent Signal Processing and Communication Systems originated in 1992. The first workshop was held at the Taipei International Convention Center, with approximately 50 papers being presented. Last year the workshop was changed to be a symposium because of the large number of presented papers and attendees.

The 2000 IEEE International Symposium on Intelligent Signal Processing and Communication Systems (ISPACS) was held November 5–8, 2000 at the Sheraton Waikiki Hotel, Honolulu, Hawaii, USA in conjunction with the 2000 International Symposium on Information Theory and its Applications (ISITA 2000). ISPACS 2000 includes many regular sessions on these topics and some special sessions on emerging intelligent signal processing and communication systems. The actual topics for the regular sessions include: Circuits and Systems; Communication Systems; Multimedia and Systems; Signal Processing; VLSI; and Emerging Technologies in Signal Processing

The Technical Program Committee (TPC) received 277 papers from 28 countries. Among them, 248 papers were submitted as regular papers and others were submitted to the special sessions. Finally, 214 papers were accepted and printed in these two proceedings.

The three special sessions, entitled "Noise Cancellation and Reduction Techniques," "Wavelet-Based Image Coding," and "Analog Integrated Circuits and Signal Processing for the 21st Century," were scheduled with the regular sessions. In addition to these sessions, the TPC also asked three distinguished researchers to deliver keynote speeches: "Intelligent Processing of Communications Signals: Issues in Making it a Reality," by Dr. Panos Papamichalis (Tsukuba R&D Center, Texas Instruments, Japan); "Adaptive Learning Methods for CDMA Systems," by Prof. Anthony Kuh (Department of Electrical Engineering, University of Hawaii, USA); and "Intelligent VLSI Systems Based on a Psychological Brain Model," by Prof. Tadashi Shibata (Department of Frontier Informatics, University of Tokyo, Japan).