
12. THE PLA AND THE TELECOMMUNICATIONS INDUSTRY IN CHINA

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INTRODUCTION

The PLA has long suffered from an inadequate telecommunications infrastructure, characterized by outdated technology, limited capacity, and lack of secure communications. In the past, these weaknesses have severely limited the military's ability to transmit and process large amounts of information or coordinate activities between the various military regions, thereby reducing military effectiveness. For example, a number of observers believe inadequate communications were a major factor in the high level of losses suffered by the PLA during China's invasion of Vietnam in 1979.² In stark contrast, the PLA is very much aware of the critical role played by information-based C4I (command, control, communications, computers, and intelligence) technologies in the 1991 Gulf War, and the importance of these technologies in securing the eventual Allied victory against a force made up of largely Soviet and Chinese equipment.³

To overcome these deficits, the PLA has embarked on a well-financed effort to modernize its C4I infrastructure. An important goal of this modernization has been the acquisition of advanced telecommunications equipment from abroad, on the premise that the technologies of the information revolution provide China with the opportunity to "leapfrog" and vastly improve capabilities in areas related to C3I. The transfer of these technologies to China in general and the PLA in particular has been facilitated by two mutually supporting trends. First, there is enormous competition among Western telecommunications firms to get a share of the relatively backward but rapidly expanding Chinese telecommunications market, which is the largest market in the world. Naturally, the lure of potential billions has attracted every major player, including Lucent, Nokia, Ericsson, AT&T and countless others. From these

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²See James Mulvenon, "The Limits of Coercive Diplomacy: The 1979 Sino-Vietnamese Border War," *Journal of Northeast Asian Studies*, Fall 1995.

³For an example of PLA writings on this point, see Li Qingshan (ed.), *Xin junshi geming yu gaoshuji zhangzheng* (The New Military Revolution and High-Tech Warfare), Beijing: Military Science Press, 1995, especially pp. 122-125.

companies, China is buying between fifteen and twenty billion dollars worth of telecom equipment a year. Indeed, the statistics are staggering. China is reported to account for about 25% of the world's market for telecommunications equipment and is expanding rapidly. China's mobile phone network and paging market have averaged 100 percent annual growth for the last few years and show no signs of stopping. In real terms, the Chinese mobile market is growing by 25,000 new subscribers and 33,000 new handsets a day,⁴ and the paging market is already the biggest in the world.⁵ According to a report in the *South China Morning Post*, the PRC is installing about 15 million new fixed telephone lines a year,⁶ a number that is exceeded only by sales in the United States.⁷

Much of this growth is achieved through sales by foreign telecommunications companies and by joint ventures with Chinese partners, which brings us to the second important trend. It is no exaggeration to say that the PLA is one of the key players in China's telecommunications modernization. For historical reasons, the PLA controls large sections of commercially exploitable broadcast bandwidth in China, most notably the 800-MHz spectrum that is well-suited for cellular communications. Since 1978, the Chinese military's commercial enterprises have been free to marketize this infrastructure privilege, generating profits for military units at all levels of the system. More important, the commercial joint-venture relationships between the PLA and foreign companies have provided the military with access to advanced technology necessary for its C4I modernization. For example, PLA units provided the labor for the laying of most of China's fiber-optic networks. In return, the PLA received a percentage of the laid fiber for their own purposes, and was able to purchase additional equipment to lay dedicated landline networks between military region headquarters and other essential command and control nodes. While recent announcements regarding the divestiture of the military's business empire suggest that these types of commercial arrangements might be reduced or ended altogether, signals from Beijing suggest that the PLA's role in telecommunications, while perhaps forced to assume a much lower profile, will continue to be to actively acquire equipment from abroad for both military and civilian uses.

The purpose of this paper is to examine the relationship between the PLA's enterprises and the telecommunications market in China. The first section examines the historical reasons for the PLA's involvement in the economy in general, and the telecommunications sector in particular. The second outlines the types of cooperation and joint ventures that exist between PLA companies and foreign telecommunications companies, and assesses what degree of technology transfer might occur. The third section evaluates the long-term implications of these transfers

⁴Ibid. A different story by the *Financial Times* put the figure at 16,000 new subscribers a day, which would still mean that China currently accounts for more than 10% of all new subscribers for mobile phones. See Tim Burt, "Phones: Mobile Manufacturers Go With the Flow," *Financial Times*, July 31, 1998.

⁵Andrew Chetham and Mark O'Neill, "The Future Begins to Take Shape," *South China Morning Post Internet Edition*, China Business Review Special Report on Telecommunications, June 11, 1998.

⁶Ibid.

⁷"Silicon Valley, PRC," *The Economist*, June 27, 1998, pp. 64-65.

for the C4I modernization of the PLA and the export control policies of the United States Government.

THE PLA ENTERPRISE SYSTEM AND MILITARY TELECOMMUNICATIONS

For most of the history of the PRC, responsibility for telecommunications has been split between three organizations: the Ministry of Posts and Telecommunications, the defense industries (in particular, the Ministry of Electronics Industry), and the PLA. The responsibilities of these three institutions varied considerably, providing a nominal division of labor but also fostering significant bureaucratic friction.

Ministry of Posts and Telecommunications. The Ministry of Posts and Telecommunications (MPT) and its institutional predecessors oversaw the civilian telephone network and most other aspects of civilian communication (though responsibility for news and other information services was under the Radio Ministry). In the reform era, the MPT's primary commercial arm, China Telecom, has been a major actor in the development of telecommunications services in the Chinese economy. The MPT was generally believed to favor a more monopolistic approach to China's telecommunications modernization, in sharp contrast to the desire of other actors, primarily the consortium of the Ministry of Electronics Industry, Ministry of Railways and the PLA, who sought to offer a competitive alternative.

Ministry of Electronics Industry. During the Mao era, elements of the defense industry were responsible for the manufacture of telecommunications equipment and the construction of internal networks for the government and the military. Originally, the Fourth Ministry under the State Council was charged with these tasks, but eventually the relevant state-owned companies were reorganized under the Ministry of Electronic Industry (MEI). In the 1990s, the MEI was closely associated with China Unicom, which is currently the country's second largest telecommunications enterprise. The MEI was the largest shareholder in Unicom, though other ministries (Railways, Power) and some foreign partners held shares.

In March 1998, following the major reorganization of China's government after the 9th NPC, the MPT, MEI, and parts of the Ministry of Radio, Film and Television were combined into a new organization: the Ministry of Information Industry (MII). At least initially, however, it seems that the former MPT is the winner in this reorganization as the head of the new ministry, Wu Jichuan, is the same person who led the former MPT and many of the new MII's senior staff also appear to be former MPT people. Some reports at the time of this writing indicate that former MPT personnel may be put in charge of Unicom.⁸ At the very least there appears to be a balance of power in favor of the old MPT within the MII leadership.⁹ Some reports indicate that these former MPT officials plan to turn MII into a government

⁸Andrew Chetham, "Foreigners Await Outcome of Post-Merger Restructuring," *South China Morning Post Internet Edition*, China Business Review Special Report on Telecommunications, June 11, 1998.

⁹Kristie Lu Stout, "Liu Shuffle Shifts MII Power Balance," *South China Morning Post Internet Edition*, July 14, 1998.

regulatory organization, not unlike the FCC in the United States. Under this structure, the commercial elements of the telecommunications infrastructure would first be centralized, then consolidated, and finally privatized under MII regulation. China Telecom itself will likely be divided along functional rather than geographic lines, splitting into separate mobile, long-distance, and paging companies. Unicom, which has already been restricted to mobile communications, will likely be retained to provide an element of competition, but few believe that it will ever be allowed to challenge for supremacy in the market.

The Chinese People's Liberation Army. The third organization that traditionally has been a key player in telecommunications is the PLA. The role of the military in telecommunications stems from a combination of structural factors. The first factor in the PLA's connection with telecommunications services was the structure of the Chinese Leninist state. The military had its own dedicated infrastructure, including railway lines, ports, and airfields, as well as priority access to the civilian infrastructure. Rather than piggyback on the civilian telecommunications backbone, however, the PLA had its own separate telephone system, built by the predecessors of the Ministry of Electronics Industry.¹⁰ In addition, the PLA was given control over large sections of the broadcast spectrum for reasons of national security.

The second structural factor is the PLA enterprise system, which provided the vehicle for exploitation of this telecommunications access. Before Liberation, the Chinese military developed an extensive system of farms and factories, with the goal of making the military self-sufficient. After the CCP came to power in 1949, the PLA was permitted to retain these enterprises, which were considered separate from both the state civilian sector and the national defense-industrial complex.¹¹ Over time, this enterprise system continued to grow in scale and importance, adding unit-level farms and factories for the dependents of officers. By 1978, the enterprise system was an indivisible feature of the Chinese military.

After 1978, however, Deng Xiaoping and the leadership sought to reduce the budgets of the Chinese military, in order to generate investment for economic reforms. The military's budget was slashed by almost 25% between 1978 and 1980. To make up for these lost funds, the PLA was given permission to gradually marketize its internal economy. Initially, these commercial forays were limited to agriculture, but eventually the PLA began to diversify its business interests, developing market positions in hotels, transportation services, and light industrial production.

One of the most logical sources of income was the PLA's aforementioned access to critical infrastructure. Just as the military was able to commercially exploit its transportation network, it also sought to marketize the unused portions of its

¹⁰Matthew Miller, "Early Starter Becomes a Late Developer," *South China Morning Post Internet Edition*, China Business Review Special Report on Telecommunications, June 11, 1998. According to the same source, Beijing had only 80,716 lines in 1978 and the crossbar exchange system adopted by the MPT in the 1970s actually represented a step backward in technology from the pre-1949 system. The source did not indicate if the numbers cited included the military telephone system or just the civilian apparatus.

¹¹For more on the differences between national defense industry and PLA enterprises, see the chapter by John Frankenstein in this volume.

communications system. For example, the PLA's phone system had excess capacity that could be leased to provincial authorities.¹² Additionally, many of the bandwidths reserved for the military had been left unused. Rather than surrender control of these bandwidths to civilian authorities, the PLA made commercial use of them. Of the frequencies under PLA control, perhaps the one with the most potential is the 800-MHz band, which is well-suited for mobile cellular communications.

Soon, a variety of PLA telecommunications companies began appearing in China. Perhaps the most important is China Electric Systems Engineering Company (CESEC), which is operated by the Communications Subdepartment (4th Department) of the General Staff Department. CESEC is the key to PLA telecommunications, with interests ranging from mobile communications to encryption, microwaves, computer applications, and dedicated military C4I systems. The organizational chart for CESEC and its regional branches, "daughter" companies, affiliated research institutes, import-export companies, and wholly owned subsidiaries is displayed in Figure 1.

Other PLA enterprises that are involved in telecommunications are Poly Technologies, Kaili (Carrie) and others. In addition to these centrally based enterprises, there are many regionally based PLA enterprises at the military region and district levels that are involved in telecommunications, particularly in radio paging markets. One example is the Guangzhou Bayi Telecommunications Group, owned by the Guangzhou Military Region Air Force, which runs a commercial radio paging service that claimed 100,000 subscribers in 1994.¹³

THE PLA AND TELECOMMUNICATIONS: TWO CASE STUDIES AND A CAUTION

The structural advantages outlined above have given the PLA the necessary assets for potentially rapid and lucrative expansion in telecommunications services. On the whole, however, the PLA has been slow to take advantage of foreign investment and foreign joint ventures. This is true for most areas of PLA economic activity, not just telecommunications. While some deals were struck in the late 1980s and early 1990s (the PLA's first commercial venture in telecommunications was in 1988),¹⁴ most of the activity has taken place over the last few years in the form of joint ventures with foreign companies. Motorola, Lucent, and AT&T are just some of the companies involved in projects with PLA participation.¹⁵

¹²Information Office of the State Council of the People's Republic of China, "China's National Defense," *China Daily*, July 28, 1998, pp. 4-6.

¹³Kathy Chen, "Soldiers of Fortune: Chinese Army Fashions Major Role for Itself as a Business Empire," *Wall Street Journal*, May 24, 1994, pp. A1, A9.

¹⁴Andrew Chetham, "PLA Muscling into Sector with its Separate Network," *South China Morning Post Internet Edition*, China Business Review Special Report on Telecommunications, June 11, 1998.

¹⁵Tai Ming Cheung, "Can the PLA be Tamed?" p. 52.

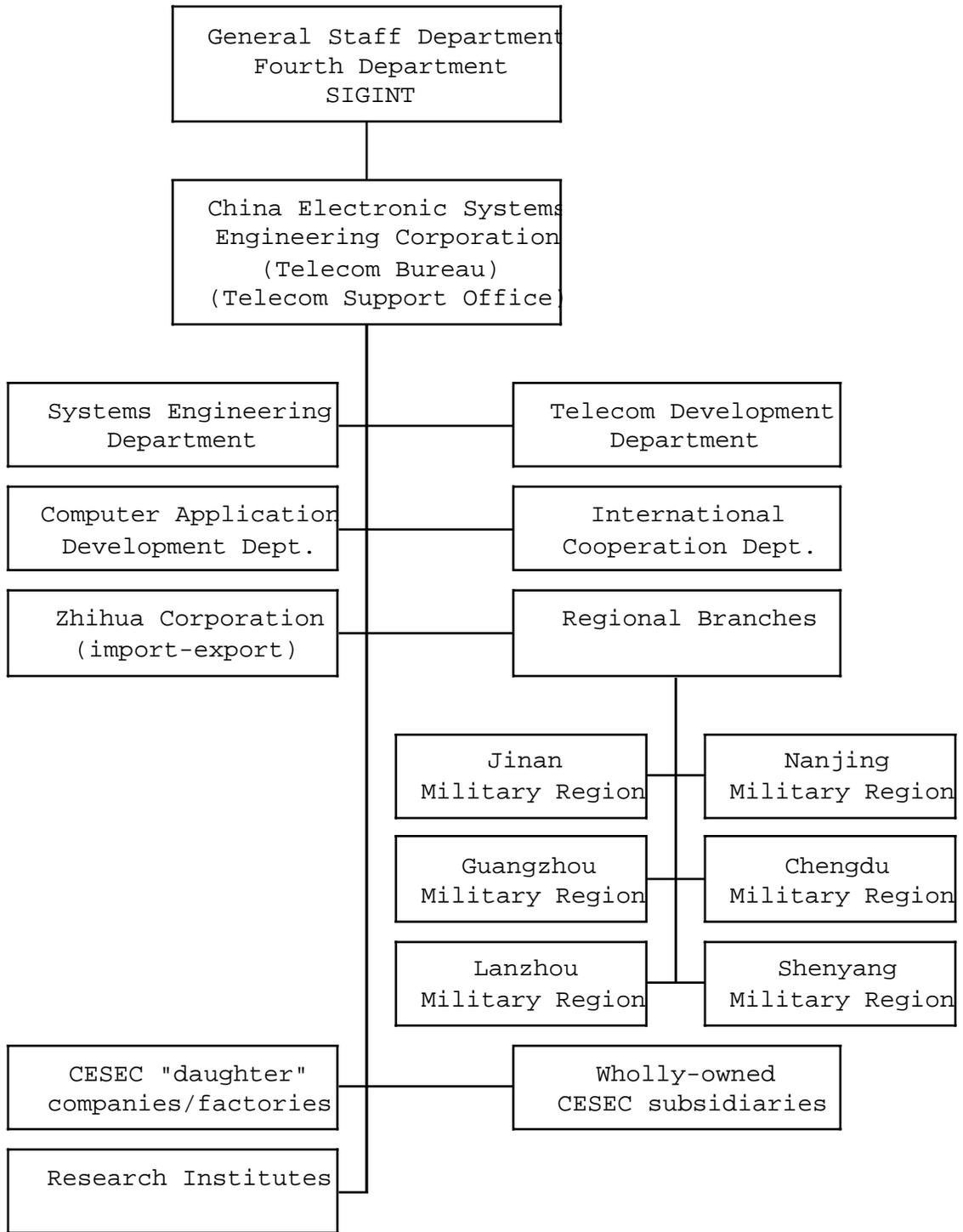


Figure 1—CESEC Organization Chart

These foreign investment and joint ventures are extremely important for the PLA, not just in terms of potential expansion of the PLA's commercial abilities, but also for what they may mean in terms of transfer of advanced telecommunications technologies for the military's C4I modernization. Joint ventures are a highly viable way to transfer technical skill and manufacturing capacity to China. The agreements with Motorola discussed below, for example, provide access to code division multiple access (CDMA) technology, which allows many users to use the same bandwidth without interfering with one another. Asynchronous Transfer Mode switching is another cutting edge technology that China now is able to produce itself and which, like CDMA, is useful for military communications.¹⁶ Indeed, most aspects of civilian telecommunications technology have potential spin-offs that could help the PLA. Exactly how much military potential might result from such technology transfer is debatable. At a minimum, it means more reliable communications facilities with much improved capacity and, in the case of fiber-optics, much more secure communications. At a maximum, it could mean significant transfer of technical know-how and equipment that could accelerate the development of C4I capabilities well beyond what China could do with her own resources.

CESEC and China Great Wall CDMA

To generate profits from a 10-MHz section of the military's 800-MHz bandwidth that otherwise would have been left in unproductive static, a joint venture was forged in late 1995 between the MPT's China Telecom and the General Staff Department Communications Subdepartment's China Electronic System and Engineering Company. In less than three years, the resulting company, China Telecom-Great Wall Communications, assumed a dominant position in the rapidly expanding Chinese cellular market. The primary goal for Great Wall is to build a nationwide cellular network, based on CDMA (Code Division Multiplexing Access) technology. Foreign participation has been invited to bid for contracts at the provincial and local levels. All the big global equipment suppliers—Motorola, Northern Telecom, Ericsson, and Lucent—are competing to supply dozens of new provincial operators when the Great Wall system gets up and running.¹⁷ Qualcomm of San Diego, CA—won the contract to supply US\$350 million worth of handsets to Great Wall Telecom.¹⁸ Motorola has the contract to supply ground stations to Great Wall Telecom in the Beijing market.¹⁹ Samsung has established a network with Great Wall in Shanghai.²⁰

One of the largest participants in this project is San Mateo, CA-based International Wireless Communications, which is involved in 11 cities of the network through a

¹⁶"Silicon Valley, PLA," *The Economist*, p. 65.

¹⁷Karl Schoenberger, "Joining Forces with China's PLA," *Fortune International*, February 3, 1997, pp. 49-53.

¹⁸David Welker, "The Chinese Military-Industrial Complex Goes Global," *Multinational Monitor*, June 1997, pp. 9-13.

¹⁹Ibid.

²⁰Chetham, "PLA Muscling In."

joint venture with Hong Kong Star Telecom.²¹ Nelson Wong, the patent-laden engineer who founded Star Telecom, got his first contract in 1990 to provide paging services to the Guangzhou Military Region.²² Since then, he has expanded his technology-sharing partnership with the PLA to 13 local cell phone systems in seven provinces. Wong is a strong competitor for the Great Wall contracts, which allow outsiders to share revenues with Great Wall's provincial operating companies in exchange for supplying technology and capital. Wong's partner, IWC, invested US\$20 million and committed another US\$28 million for a 40% stake in a subsidiary of Hong Kong's Star Telecom called Star Digital that plans to help the PLA build the Great Wall cellular networks. They hope to raise an additional US\$150–200 million in financing. A large portion of that will probably come from Indonesian tycoon Oei Hong Leong, who in December 1996 agreed to buy half of Star Telecom.

Another related joint venture involving CESEC is a deal approved in February 1998 with Dutch telecommunications concern KPN (PTT Nederland). Under the terms of the deal, which was signed during the visit of the Dutch Minister of Economic Affairs, a holding company will be set up in Nanjing. KPN will have an 80% stake in the holding company with the PLA having the remaining 20%. The holding company will invest in a range of activities related to the telecommunications sector, including satellites, mobile phones, paging, and Internet services among others. All of these activities will be operated by separate economic entities under the holding company. Under Chinese law, KPN will have less than 50% of the stake in these individual companies. The first project of the new holding company is most likely to be in the area of satellite technology.²³ Initial capitalization of the venture is quite small, a reported US\$5 million, but the Dutch partners at least expect the venture to expand quickly once specific projects are finalized.²⁴ KPN hopes that this initial venture will be “a stepping stone to set up local, regional and national telecommunications projects with mainland partners.”²⁵

The PLA and Radio Paging

A second and equally profitable spin-off from the PLA bandwidth monopoly has been mobile radio paging. In Guangzhou, for example, three of the ten largest pager companies are owned by the PLA Air Force (PLAAF), the Guangzhou Military District, and a COSTIND subsidiary.²⁶ Similarly, the Guangzhou Bayi Telecommunications

²¹Andrew Tanzer, “The People’s Liberation Army, Inc.,” *Forbes*, March 24, 1997, pp. 44–46.

²²Schoenberger, pp. 49–53.

²³Foo Choy Peng, “KPN Forges Partnership with PLA Unit,” *South China Morning Post Internet Edition*, February 27, 1998.

²⁴*Ibid.*

²⁵Andrew Chetham, “Dutch Giant Links up with PLA Arm,” *South China Morning Post Internet Edition*, February 25, 1998. Also see *South China Morning Post Internet Edition*, June 11, 1998.

²⁶Guangzhou Enterprise Evaluation Association, *Zhongguo Guangzhou daxing qiye paixu* (Ranking of China Guangzhou's Large-Sized Enterprises), Guangzhou: Zhongshan University Publishing House, 1994, pp. 115–117.

Group, owned by the Guangzhou Military Region Air Force, runs a commercial radio paging service that claimed 100,000 subscribers in 1994.²⁷

Foreign participation has been critical to this sector. First, Hong Kong businessman Paul Kan and his company Champion Technology have partnered with PLA companies in Guangdong to develop radio paging.²⁸ Now these businesses have expanded to include paging franchises in dozens of Chinese cities, mainly through partnerships with firms controlled by local PLA units. Kan estimates that PLA units are involved in about 25% of China's 36 million paging subscribers, though the market is expanding by one million new customers a month, so the PLA's proportion of the market is likely to change considerably. Second, the PLA has laid at least 20,000 kilometers of fiber optic cable across China.²⁹ In one specific case, PLA units are laying an optic cable line supplied by AT&T and Lucent from Guangzhou to Wuhan.³⁰ Third, a US\$30 million joint venture has been established between National Semiconductor Corp. (USA) and China Electronic Systems Engineering Company to produce mobile PBX systems.³¹ How much profit the PLA has made through its telecommunications activities is far from clear. Available Chinese figures do not allow for a breakdown of PLA enterprises by sector nor do they give an accurate reflection of the amount of money generated. Recent estimates of total profits for PLA enterprises have run anywhere from 1–10 billion U.S. dollars.³² The PLA's auditing system is at best minimal and underreporting of profits and transfers of money to offshore havens are rampant and major reasons contributing to the recent decision to shut down, or at least curb, PLA business activities. One aspect of PLA telecommunications enterprises is, however, quite clear. As this discussion shows, the PLA's telecommunications enterprises have been slow to move out of areas such as paging, where the PLA has the primary advantage. It remains to be seen whether conditions under the new MII will allow the PLA to continue to expand its telecommunications services or whether it will be largely limited to exploitation of its control over bandwidths. Current efforts to reduce the PLA's business activities should also strengthen the control of the old MPT over the telecommunications sector in coming months.

Some Cautions

In discussing present and future developments, however, it is important to keep in mind four potential problems for the PLA. One is the possible negative publicity that foreign companies might face in conducting business deals with PLA enterprises. Recent events in the United States (such as the investigations of the Cox Committee) underscore this fact. On the other hand, the lure of potential profits and the fear that

²⁷Kathy Chen, "Soldiers of Fortune: Chinese Army Fashions Major Role for Itself as a Business Empire," *Wall Street Journal*, May 24, 1994, pp. A1, A9.

²⁸Tanzer, pp. 44–46.

²⁹"China's National Defense" op. cit.

³⁰Cheung, "Can the PLA Inc. Be Tamed?" p. 52.

³¹Ibid.

³²Tai Ming Cheung, *Far Eastern Economic Review*, August 6, 1997.

competitors might gain an edge provides considerable motivation for many companies to seek commercial agreements despite financial and political risks. One-tenth of Motorola's global sales are in China and other international telecom corporations are equally dependent on the China market.³³

Second, the business environment in China and the global telecommunications market in general are unpredictable, to say the least. Despite the flurry of activity in the last few years and the obvious advantages of the PLA connection, for example, the Great Wall telecommunications project and related CESEC ventures remain high-risk propositions for two reasons. On the technological front, there are now serious doubts about the efficacy of the CDMA technology as a cellular standard, particularly given MII's clear commitment to the rival European GSM standard. Foreign financiers will have to invest money without being given an equity stake in the project, since China will not allow direct foreign ownership of telecommunication services or infrastructure. The KPN deal is a case in point. While it has a majority stake in the holding company, its ownership in all the entities under the holding company (and it is these entities that will be taking on the actual projects) is less than 50% and must remain so under current mainland law. Perhaps it is not surprising, therefore, that rumors have arisen that KPN has bought out the PLA's share of the deal.³⁴

The third potential problem is bureaucratic. While the PLA is in a position to exploit its assets, the Ministry of Information Industry, which is dominated by former MPT personnel, is in a strong position to block both the PLA and the former MEI from undermining China Telecom's market dominance. The MPT and now the MII have certainly been successful in terms of limiting Unicom's success, limiting their participation to mobile communications. In addition, the MII have openly questioned the legality of the CCF (Chinese-Chinese-Foreign) business model, which has been the primary source of Unicom's funding.³⁵ There have even been reports that PLA telecommunications deals are being blocked by the MPT/MI.³⁶

Four, as of the summer of 1998, there was a very strong probability that PLA enterprises would be shut down entirely, or at least the PLA would lose equity in most if not all its business operations. Since Jiang Zemin's announcement of PLA divestiture at an anti-smuggling conference in July, significant progress has been made in curtailing the commercial activities of the military. Between August and October, investigation and work teams were sent down to the units to compile lists of companies and assets. By 15 December, these companies were formally transferred to nonmilitary holding companies, though their exact fate and the precise amount of compensation have yet to be finalized. The fate of the PLA's telecommunications are less clear, however, as there are consistent reports that CESEC and other companies,

³³"Telecom Aims to Go Global," *China Daily*, July 10, 1998, p. 1.

³⁴Communication with informed source, December 1998.

³⁵See, for example, Andrew Chetham, "China Telecom, Bureaucracy Stonewall Unicom," *South China Morning Post Internet Edition*, China Business Review Special Report on telecommunications, June 11, 1998.

³⁶Chetham, "PLA Muscling In."

by virtue of their critical importance to the PLA's C4I modernization, have received "get-out-of-jail-free" cards from the military leadership. At best, they may be required to cut their ties with high profile projects or foreign partners, and perhaps even formally sever their ties to the PLA, but there is no evidence to suggest that they will not maintain close informal links to the military.

IMPLICATIONS PAST AND FUTURE

There are several implications deriving from the PLA's past and future role in the telecommunications sector. Before the divestiture, the lucrative potential of China's rapidly growing telecommunications market offered considerable opportunity (though no guarantees) for the PLA to significantly improve its earning capacity. This certainly helped individual units to supplement wages, food subsidies, and barracks subsidies. Far more important, however, was the potential of these telecommunications deals for dual-use technology transfer. Despite the fact that China has placed considerable effort into developing its own telecommunications technology, such as PLA investment in research facilities at Xidian and other universities, China continues to rely on foreign sources for equipment, parts and expertise.³⁷ Indeed, many of the telecommunications technologies involved in these deals can be used to improve the military's C4I infrastructure. For example, it is widely assumed that the B-ISDN (broadband integrated services digital network) and ATM (asynchronous transfer mode) technology involved in the controversial deal between SCM/Brooks (US) and Galaxy New Technology (PRC), whose primary shareholder is COSTIND, was presumably shared with the PLA.³⁸ Another example is the China Telecom-Great Wall CDMA project with Qualcomm. CDMA technology was originally developed for the U.S. military, which sought a system that could sustain a high volume of communications traffic in a small area.

An area of dual-use technology that is especially significant is fiber-optics. Units of the PLA have laid most of China's fiber, and in return the military reportedly receives a percentage of the fibers for their own use. In addition, the PLA has reportedly laid its own dedicated fiber-optic landline networks, connecting Beijing to military region headquarters and Second Artillery brigades. The advantage of fiber-optic cables is that they can carry considerably more communications traffic than older technologies that were available to the PLA in the past and they are far faster. The cables are able to transmit data at rates of 565 megabytes a second and higher. This represents an enormous jump over older copper-wire-based systems, thereby significantly improving the PLA's ability to transmit, receive, and process large amounts of information (including visual images) from the central government and the various military regions. Apart from speed, fiber optic cables are also less prone

³⁷See *Jane's Defense Weekly*, April 23, 1998, p. 16; "PRC: High-Speed Optical Fiber Transmission System Developed," *Xinhua*, in FBIS-CHI-96-076, March 26, 1996; and "China: Mobile Telecommunications Industry Viewed," *Jingji ribao*, in FBIS-CHI-98-208, July 27, 1998.

³⁸For more details on this point, see James Mulvenon, *Chinese Military Commerce and U.S. National Security*, p. 30. For more information, see Bruce Gilley, "Peace Dividend," *Far Eastern Economic Review*, January 11, 1996, pp. 14-16; and Bruce Gilley, "Not Over Yet: U.S.-China Technology Deal Raises Congress's Hackles," *Far Eastern Economic Review*, January 18, 1996, p. 15.

to corrosion and electromagnetic interference, making them more reliable. Their light weight and small size make them ideal for mobile battlefield command as well as fixed military headquarters. Most important of all, it is extremely difficult for American and other intelligence services to monitor military communications conducted over fiber-optic cable, particularly landline connections between Beijing and strategic command and control centers throughout the country. In the 1980s, some U.S. government agencies were opposed to the sale of fiber optics to the Soviet Union and other countries, including China, for this very reason.³⁹

Moreover, the importance of fiber-optics is not limited to military communications. Fiber optics can be used as sensors in sonar arrays, as well as in perimeter defense systems and even biological weapons detection. Fiber optics can also be used for local area networks (LANs) in warships and in precision guided munitions.⁴⁰ Therefore, acquisition of fiber-optics means better weapons and C4I, in addition to the clear benefits to communications. For these reasons, some quarters in the U.S. government are opposed to sales of cable to China. However, not only does the U.S. sell fiber-optic cable to China, it is now manufactured in China through joint ventures. Shanghai Lucent Technologies Fiber Optics Co. is the largest fiber optics manufacturer in the PRC. Last year the company sold 680,000 kilometers of fiber optics, accounting for just under a quarter of the Chinese domestic market.⁴¹ The joint venture's production capacity is expected to expand 1.5 million kilometers of cable a year in 1998.⁴² How much of this goes to the PLA is unclear, but as already noted, Lucent is involved with China Telecom-Great Wall, which is half-owned by the PLA's CESEC. This should facilitate the PLA's progress towards its goal of connecting all of its military region, district, and group army headquarters with fiber-optics, as well as its application to battlefield communication and weapons systems.

To this point, we have skirted the ultimate question raised by this discussion of dual-use technology transfer; namely, will the PLA be able to acquire, integrate, and effectively employ these technologies in a combat environment? While the answer to this question is unknowable in advance, it can be reasonably asserted that this equipment will not allow the PLA to "leapfrog" the U.S. military, as some have asserted. Yes, the telecommunications industry occupies a special place in China's economic modernization as one of the few sectors unburdened by a bankrupt network of bloated "legacy" factories (aviation is a stellar example). As such, China can take advantage of Gershenkronian "late modernization" by laying fiber where copper wire or perhaps even nothing at all existed previously. In this respect, the Chinese have "leapfrogged," but bypassed only stages of development, not specific competitors. Thus, we conclude that while parts of China may gradually equal or even outpace elements of the U.S. telecom infrastructure, the Chinese military

³⁹See Mastanduno, *Economic Containment*.

⁴⁰For a good summary of the various new applications for fiber optics in the military, see Mark Hewish, "Penetrating the Fiber-Optic Fog: Embracing the Next Generation of Communications and Sensors," *Jane's International Defense Review*, April 1998, pp. 51-57.

⁴¹Zhang Yan, "Lucent Commits to China Market," *China Daily*, February 15, 1998, p. 2.

⁴²*Ibid.*

cannot hope to match, much less exceed, the current or future capabilities of its American counterpart.

POSTSCRIPT: PLA DIVESTITURE

As of December 1998, there are clear indications that the conduit for the PLA's acquisition of advanced telecommunications equipment may be coming to an end. The divestiture of PLA, Inc. has achieved some remarkable successes, and in the end will have fundamentally changed the character of the military's participation in the economy. Minor PLA telecom concerns, such as the small radio paging companies attached to individual units, will probably be taken away from their owning unit and folded into the civilian telecommunications infrastructure. By contrast, the national companies like CESEC will most probably continue to operate, though they may be forced to divest themselves from high-profile projects like China Telecom-Great Wall CDMA and may even be required to publicly disassociate themselves from their former units (the General Staff Department Fourth Subdepartment in the case of CESEC). Sources in Beijing suggest, however, that CESEC is far too valuable to the PLA's C4I modernization effort to be abolished entirely. Instead, the company will likely persist in its acquisitions of advanced telecommunications equipment, albeit with less fanfare and publicity. Thus, we expect PLA involvement in the telecommunications arena to continue for the foreseeable future, as will the military's acquisition of advanced technology for its C4I modernization, though the future use and effectiveness of this equipment in warfighting situations cannot be predicted in advance.