STRATEGY RESEARCH PROJECT

GOLDEN BRIDGE, GOLDEN GATE, OR GOLDEN WALL: CHINA MOVES INTO THE INFORMATION AGE

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ABSTRACT

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The People's Republic of China is a developing country poised at the edge of the Information Age frontier. China's progress towards the Information Age is measured by the modernity and pervasiveness of its information infrastructure--specifically, the telephone, computer, and network infrastructure is analyzed--and by the policies it uses to administer this infrastructure. China's current information sector policies epitomize the internal conflicts between reform and control with which the government struggles. China watches Singapore closely as a successful model of the type of 'closed, but open, information society' it wishes to achieve. China's pending entry into the World Trade Organization should have a dramatic effect on its information infrastructure, forcing it open to global competition—with the by-product of increased exposure to free market philosophies and, it is hoped by the U.S., liberalizing political influences. How China deals with information infrastructure provides an indicator of how ready it really is to move into the Information Age--China can choose to put up a Golden Wall to keep the Information Age out; can use it as a Golden Gate, much like Singapore has, to control what comes in and out; or can use it as a Golden Bridge to liberalize and reform their society. The option China pursues determines what U.S. national security strategy towards it should be.

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GOLDEN BRIDGE, GOLDEN GATE, OR GOLDEN WALL: CHINA MOVES INTO THE INFORMATION AGE

Information is the commodity of our age. There is almost constant speculation on the influences of technology on our health, our wealth, our national security, even the expectation of a world transformation as a result of the proliferation of information and its technologies. Many nations are entering into what Alvin and Heidi Toffler called "Third Wave" society-- knowledge-based, driven by and relying on information. In describing how Information Age societies are different from the industrial society we have lived in for the last 150 years, the Tofflers say that these societies "...need access to, or control of, world data banks and telecommunications networks. They need markets for intelligence-intensive products and services..."[1] Two signs of the readiness of a society to transition to the Information Age are the quality and pervasiveness of its telecommunications/network infrastructure and the policies put in place to administer that infrastructure. The term "infostructure" is used in this paper to refer to both the physical infrastructure and the policies administering it. Information Age societies invest heavily in building up and improving the structures that support the flow of information and administer this infostructure to enhance the evolution in social, economic, and political standards resulting from greater information access.

The People's Republic of China is a developing country poised at the edge of the Information Age frontier. It is clear that China wants to be a global economic power and realizes that the way to do that is with information. Improving the infostructure also permits more extensive internal supervision of its domestic economic progress. Since 1994, China has sponsored a series of information initiative projects, called the Golden Projects, designed to bring it closer to the Information Age. Many Information Age analysts postulate that free societies are the ones in the best position to exploit information and use it to promote their national interests. They also predict that increased access to information technology has a liberalizing and democratizing effect on societies. What is apparent in China, however, is that the Chinese Communist Party (CCP) intends to retain its autocratic power, even while it tries to move swiftly into the Information Age.

It is important for the United States to understand how China is assimilating information technologies, for its progress can affect the national objectives highlighted in U.S. national security strategy—enhancing security, bolstering economic prosperity, and promoting democracy and human rights abroad.[2] Globally, there appears strong indication of a positive correlation between infostructure development and economic growth. Thus, China's infostructure can definitely affect U.S. economic well being as the consistency and transparency of China's information policies affect the propensity for foreign investments in the country. China sorely needs this capital flow if it will continue its progress towards the Information Age. Additionally, China is expected to become the largest market in the world for electronics technology within the next five years. The expectation of fair trade practices must exist if U.S. businesses are to risk investing there.

China has also pointedly described an interest in employing these advanced information technologies in an "unrestricted warfare" strategy to potentially counter U.S. military strength. Infostructure maturation will support improved military command and control capability, thus making its status of great importance to U.S. defense preparedness. As the most populous nation in the region, China desires to be a presence to be reckoned with in the Asia-Pacific. Infostructure development can potentially bind China economically and diplomatically to the global community; which should encourage her to be a rational actor on the global stage, thus buttressing a favorable world order more likely to be conducive to the interests of U.S. security. The evolution of the Chinese infostructure also affects the U.S. national objective of promoting democratic values, as many predict that access to information will result in liberalization. Many analysts would agree with former-U.S. National Security Adviser Anthony Lake's assessment of the Information Age legacy: "I'm increasingly convinced that the future progress of democracy and human rights will depend at least as much on the Internet and on the communications revolution as it will on official American government policies in pushing other societies towards reform."[3]

This paper will analyze China's progress towards the Information Age by concentrating first on its approach to information technology infrastructure, specifically the growth of the telecommunications and network structure. Moving to the Information Age is happening at light speed—more computers, more infrastructure is being added almost daily, and the Chinese government is scrambling to deal with it. This paper will discuss China's current information-related policies and the conflicting policy goals the Chinese government seems to be struggling with. A brief description of Singapore's approach to infostructure is provided as an example of an autocratic state that has become an e-commerce center of the Pacific—a success that the Chinese desire to emulate. One of the international events that may push China swiftly into the unexplored territory of the Information Age frontier is its entry into the World Trade Organization (WTO). WTO admission is expected to have a dramatic affect on China's infostructure, and subsequently on its coming into the Information Age. Economically, militarily, and politically, China outwardly appears to want to enter the Information Age. How China deals with the infostructure provides an indicator of how ready it really is and thus what our national security strategy towards it should be. Will information technology be the Golden Bridge across the no-man's land between the agrarian/industrial China and the information-advanced, peer/competitor China? Or will the Chinese use it as a Golden Gate to control what comes in and out? Or will they attempt to reinforce internal stability by putting up a Golden Wall--impenetrable from outside or in?

COMING TO TERMS WITH THE INFORMATION AGE

China is a semi-industrialized, developing nation--in 1998, 50% of the population made its living from agriculture, 30% from industry, and 20% from services.[4] However, like many nations heading off into the Information Age frontier, China's telecommunications and information industries are growing rapidly. While China's information industries are adopting many economic and market characteristics found in

Western societies, it is evident that the Chinese government is trying to carefully control the information sector development.

The U.S. view of the influence of the Information Age generally presumes that economic reform and liberalization begets political liberalization, and some believe the openness of the Internet will inevitably foster democracy in China. But that is too simplistic a view of technology transformation and, more importantly, ignores the historic culture of the Chinese. As China moves from an agrarian, to an industrial, to an Information Age society, it must deal with the inherently contradictory trends of reform and control. Within China, there is a political struggle ongoing between those who want reform and those desiring a bolstering of the central control. For those in the government reluctant to support the reforms necessary to move into the Information Age, economic progress is not worth the trade-off in internal stability that may result. This struggle is especially visible in the information sector. For example, China's traditional sensitivity to foreign involvement in domestic affairs shows in its reluctance to give away any control by discouraging foreign investment in the information sector, although the expansion of a nation's telecommunications market with foreign capital investment has become the norm and an expected part of 'globalization'.

The People's Republic of China, under the governmental control of the Chinese Communist Party (CCP), has defined itself as a "socialist market economy", permitting market forces to flourish while restraining privatization and political change. Unlike the USSR, China's economic reforms were not preceded by any political and ideological liberalization. Instead, China's leaders staked their future on economic reforms beginning in late 1978 and early 1979, largely to turn the nation around after the devastating economic and social effects of the Great Leap Forward (1958-1960) and the Cultural Revolution (1966-1976). In 1993, the Communist party constitution was amended to read that "economic construction" was the CCP's main task.[5] While actively endorsing a "socialist market economy", the CCP drew the line at political reform. Their intention is to have a vibrant and modernized economy benefiting from market forces, albeit market forces controlled by the central government within an authoritarian political structure—an Asian autocratic state. This has significant implications for information technology and China's movement towards the Information Age.

Tentative openings to western markets and diplomatic interaction throughout the 1980's stimulated the initial budding of technology proliferation. The first e-mail message was sent from Beijing University in 1988 over the Chinese Academy of Sciences Network. Information technologies, particularly e-mail, phone, and fax, quickly became popular among university students keeping in touch with fellow Chinese students overseas. The China News Digest, founded in 1989 by Chinese students in North America to provide a forum to coordinate support activities for students overseas and provide news from home, evolved into a daily news release and information-retrieval service on the Internet with over 35,000 subscribers.[6] These connections proved vital in keeping the world posted on the growing student unrest and the subsequent military crackdown on the reform movement in Tiananmen Square on June 4, 1989. While the CCP immediately cracked down on all external communication connections, democracy

activists managed to hook up VCRs to hotel CNN satellite feeds and taped images to send around the country. Fax machines provided updates and communications despite the government's attempt to squelch them.[7] The resulting global outrage—and the fact that information was released independently and despite CCP attempts to control it—demonstrated to the Chinese leadership that it was time to come to terms with how the country would posture itself for the Information Age.

CHINA'S TELECOMMUNICATIONS AND NETWORK INFRASTRUCTURE

An Information Age state connects to the Global Information Infrastructure and has a well-developed national information infrastructure to support it. Information Age technologies, for the most part, have been initiated, developed, and capitalized by the U.S. and other free market nations. In this environment information technology has the momentum—and the economic incentive--to mature and propagate into the next generation of faster, bigger processing and more effective and efficient uses. Because of the widespread availability and relatively low cost of many information technologies, the standard straight-line growth model no longer applies to show how far along a nation is towards reaching the Information Age. Non-industrial developing countries can now 'leap frog' ahead and exploit technologies that took the developed world years to master. By installing cost-efficient and readily accessible fiber optic, digital microwave, or satellite networks as their first telecommunications infrastructure, they avoid the costly and time-consuming upgrading more "developed" countries must go through to move from webs of copper cabling to cutting edge technology. The modernity and pervasiveness of a nation's telecommunications infrastructure indicates readiness for Information Age operations. Some of the key infrastructure indicators are the proliferation of telephones, computers, networks, Internet Service Providers (ISP), and users.

TELEPHONE SERVICES

China's Ministry of Information Industry (MII) reported on the status of telephone services in a December 1999 report. Local telephone service continues to improve, particularly to the rural areas. Two companies in China provide local landline telephone service—China Telecom and China Unicom. As of July 1999, there were over 100 million telephone subscribers throughout China and a switching system capacity rated at 130.2 million lines.[8] With a population of 1.3 billion, a 10% saturation is not a significant density. Although better than some other developing nations in Asia where telephone density figures generally run 4-5%, China clearly has a way to go before it can compete with Singapore who aspires to be the Information Age leader in Asia and claims over 50% telephone density.[9] In fact, there are more televisions in China—300 million estimated in 1998—than there are telephones.[10] While 'bootleg' satellite TV systems are becoming more prevalent, the greater number of televisions seems to coincide with the state's desire for a level of control—what's on TV can be determined by the government, but what's said on the telephone cannot be as easily controlled. The penetration of local telephone service is important as it indicates the ease, and relative freedom, with which information can pass between people,

businesses, and government. As a second order effect, the telephone line can connect to a network through a modem, thus permitting an even greater exchange of information.

One of the shortfalls in nationwide information connectivity has been extending the long-lines cables to the far reaches of rural areas—an expensive and resource intensive project that usually does not provide a positive financial return. This is the primary reason why most countries viewed telephone service as a centrally controlled national security asset. This ensured that service was fairly distributed throughout the country instead of only clustering in cities where it was profitable. In the U.S., long-distance service was provided by a commercial carrier monopoly (AT&T) heavily regulated by the government; in other nations, the government ran the telephone system outright. In developed countries, telephone service is now so pervasive that most nations have turned their services over to global free market competition with little government regulation. China resists this trend. Although some internal service provider competition exists, the installation, operation, and maintenance of the telephone system is a function of the national government. China puts great priority on extending landline telephone service to the far-flung provinces. They anticipate this will help stabilize the poorer western regions of the country by alleviating the growing dissatisfaction of the less developed western provinces against the very prosperous—and information-connected--eastern areas.

In one of those technology leap frogs that developing countries can do, China recently installed over 225,000 kilometers of fiber optic cables creating high-speed, high-capacity networks to link all provincial capitals and the Southeast China coastal cities. Reporting over one million kilometers of fiber optic networks, China's telecommunications network ranked second largest in the world in 1997.[11] Fiber optic technology supports significantly more bandwidth, speed, diversity, and reliability of signal than older-style copper cables. In addition, China invested in satellite architecture that eliminates the need for physical cables at all. A major project, the "Network in Tens of Thousand [sic] Towns" is nearing completion and provides a rural satellite network, network center, 2500 Very-Small-Aperture-Terminals (VSAT) stations, and 50,000 rural reception stations. With an investment exceeding US$483 million, this network will facilitate the exchange of commodity transaction information between financial centers and towns and rural areas to support online trading.[12]

Augmenting landline telephone connectivity, mobile communications--specifically cellular telephones and wireless paging services--is another area of significant growth. As of June 1999, the two mobile service providers, China Unicom and China Mobile Communications Group, reported subscriber accounts exceeding 33 million.[13] Wireless paging—Personal Communications Service (PCS)--seems to have been adapted as a poor man's telephone. Reporting over 72 million subscribers and the fastest growing telecommunications service,[14] paging has become an affordable substitute for more expensive telephone service. Users' devise numeric codebooks to interpret sent messages and some paging systems can also send short bursts of Chinese characters.[15]

NETWORKS

Once the connectivity is available to tie people and businesses together--whether by cable, satellite, or radio--the next indicator for readiness to move into the Information Age is a nation's networks. As in the U.S., Chinese academic centers were the first to use network connectivity to link their research efforts. Networks generally provide a faster, more private way of exchanging information. Because only those who were computer savvy understood the mechanics of networking—and the intellectual power that it could bring—networks usually developed from the bottom up and initially relied on user control and investment for their growth. Since networks were not initially defined and did not clearly fall under the auspices of a specific ministry, network growth was more haphazard and uncontrolled than with most other projects. The network infrastructure developed by rapid expansion, competition, and spontaneous privatization—a growth pattern very uncharacteristic for China. Beginning in 1996, the Chinese government clamped down and tried to establish some control to the growth and use of the Internet by initiating several directives for management of computer networks, which will be discussed in more detail later in this paper.

The China Academic Network (CAnet), established in 1987, is regarded as the first computer network in China. In 1988, the first e-mail message was sent with a dial-in connection through Karlsruhe University in Germany. In April 1994, the National Computer Networking Facilities of China (NCFC), a state-sponsored academic triad, established the first full-time connection between the campus network and the Internet via a 64Kbps Sprint satellite link.[16] More importantly, CAnet registered the top-level domain name of ".cn" with the International U.S.-based Network Information Center (NIC).[17] Domain names and Internet Protocol (IP) addresses are really the only sources of administrative control over an externally connected network. This became a source of frustration to the government as the "China domain" was not registered to or controlled by them.

China closely controls network development, currently authorizing two public and four commercial networks. The two public networks, China Education and Research Network (CERNET) and China Science and Technology Network (CSTNET), both serve primarily an academic base. Each connects over 300 subordinate local or campus networks. The four commercial networks are:

- China Public Computer Interconnection Network (CHINANET) run by China Telecom,
- China Golden Bridge Information Network (CHINAGBNET) operated by Ji Tong Communications,
- China Unicom Public Computer Interconnection Network (UNINET) administered by China Unicom, and
- China Network Communications Public Interconnection Network (CNCNET), a joint investment from Chinese Academy of Science (CAS), State Administration of Radio Film &TV, the Ministry of Railways and others.[18]

THE INTERNET

The growth in Internet connections in China actually exceeds the explosive growth rate of the global infrastructure. In the 1980's, worldwide Internet growth averaged 50% annually. As technological developments made network use more accessible, Internet growth rates reached 81% in 1993 and 87% in 1994.[19] Based on information gathered by the China Internet Network Information Center (CNNIC), growth rates for the 27 month period between October 1997 and December 1999,[20] indicate a ten-fold increase in the number of computers and registered ".cn" domain names, a thirteen-fold increase in number of Internet subscribers, and 900% increase in the number of China-based web sites (see Figures 1 and 2). The number of Internet subscribers more than doubled over the last six-months, from 4 million in the June 1999 survey to 8.9 million in the most recent survey, released in January 2000. Internet growth in China, based on the number of registered subscribers, is three times that of the 1994 worldwide Internet growth rate.

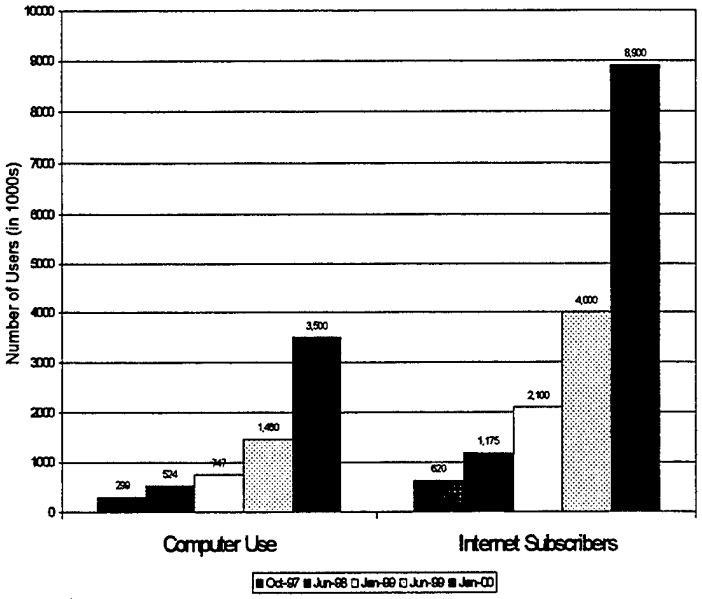

FIGURE 1: CNNIC SURVEY OF COMPUTER AND INTERNET USE IN CHINA

The June 1999 CNNIC survey[21] shows that Internet use in China is clearly focused on the urban areas, although every province and region has some Internet users. Beijing has 21% of the registered subscribers and 36.7% of the domain names, with Guangdong Province in second place with 12% and 14.97%, respectively. Sixty-eight percent of all users are young—between 21 and 30 years of age. Of the Internet users, students predominate in the occupation profile (19.3% of all users), followed by computer industry workers (14.9%), professional technicians (9.9%), and foreign enterprise employees (8.9%). Government and Party cadres comprise only 3.4% of all Internet users. Over fifty-six percent said their main objective for using the Internet is to "acquire various information," with

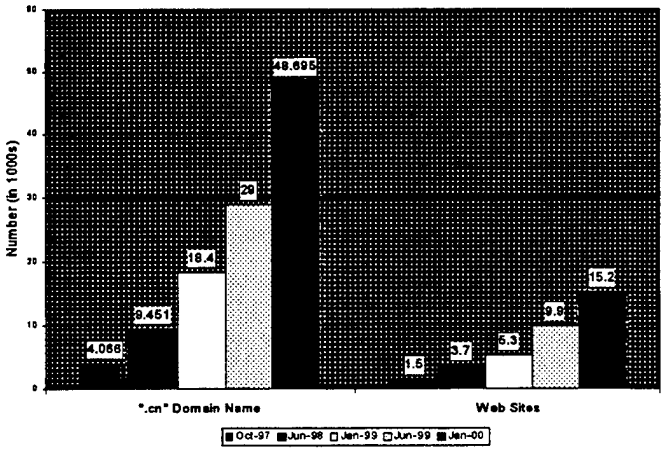

FIGURE 2. CNNIC SURVEY OF DOMAIN NAMES AND WEB SITES IN CHINA

news stories, computer software, and electronic books as the top three most desired e-information.

E-commerce, one of the essential stepping-stones on the way to full membership in the global economy, is not yet popular in China. The most frequently used network service was e-mail with almost 91% of respondents; online shopping received only a 3.2% usage rate.[22] There are several improvements necessary before China can develop a viable domestic e-commerce market, much less expect to compete in the global economy. China still lacks a robust transportation infrastructure to support e-commerce—while electronic orders move at the speed of light through fiber optic cable connected networks, the actual goods are bound to an antiquated road and rail network. Credit card use is not widespread in China, although the "Golden Card" project when complete will support a national credit card program. Lack of merchandise guarantees and return polices are two additional areas requiring attention.

COMPARISON WITH OTHER INFORMATION AGE COUNTRIES

Annual growth rates for China's information sector averaged 30-50% over the last 10 years. The amount of investment in state of the art technology surpasses most developing countries. But these impressive statistics belie how far China must really come in infrastructure progress if it is to move into the Information Age. The chart at figure 3shows China's communications infrastructure status on telephone, cell phone, and computer density relative to the U.S. and several other Asian countries.

Country	# cell phones per million(a)	% population using cell phones(a)	% population using landline telephones (a)	# telephones per 1000 people (b)	# personal computers per 1000 people (b)
India	.08	.01	1.53	19	2.1
China	**6.95**	**0.57**	**4.49**	**56**	**6.0**
Thailand	1.67	2.79	7.00	80	19.8
South Korea	3.18	6.98	43.04	444	150.7
Singapore	0.31	10.25	51.34	543	399.5
Japan	26.91	21.39	48.87	479	202.4
U.S.	44.04	16.52	63.98	644	406.7

FIGURE 3. INFORMATION INFRASTRUCTURE FOR SOME ASIA-PACIFIC NATIONS[23]

Compared to the Information Age nations of Japan, Singapore, and the United States, China has 1/8 of the telephone saturation, lags behind an average of 15% in cell phone use, and has less than 2% of the computer density of these three countries. Even compared to the new industrial economies of Thailand and South Korea, China's density of cell phones, landline telephone, and computers are lackluster. China's population rival, India, is the only major nation with less infrastructure vigor, although India claims a formidable reputation in the area of software development.

China still requires significant investment and growth in its communications and network infrastructure if it is to reach a level comparable to current Information Age societies. There is some doubt that China can continue the expansive information sector growth rates it has sustained. The impacts of the Asian economic crisis, reform of China's State-Owned-Enterprises, and restrictive foreign investment policies inject instability in this vibrant sector of the economy. Assuming that China continues economic reform and can sustain at least a 30% annual growth rate in the information infrastructure sector—both very optimistic assumptions--it will not achieve sufficient information infrastructure density to rank with the current Information Age nations until at least 2013. By that time, those societies will have moved light years ahead in the Information Age.

STATE RESPONSIBILITY FOR INFOSTRUCTURE IN CHINA

Like most nations, China's infostructure began with a national telephone system regulated by the state. A major characteristic of an Information Age nation is the globalization and commercialization of its communications infrastructure. While developed countries found that the way to the Information Age required open telecommunications competition and thus turned this function over to the private sector and market forces, China has not. Several state ministries and agencies are fully or partially involved in the administration of telecommunications and network services in China. Up until 1998, the Ministry of Posts and Telecommunications (MPT) was responsible for all postal and telecommunications services, equipment, and policy. Structured as a monopolistic, state-owned postal, telephone, and telegraph (PTT) enterprise, the MPT faced huge challenges as the lynchpin upon which China's economic development depended. Between 1984 and 1994, China's Gross Domestic Product increased an average of 9% per year—a phenomenal growth rate—but its telecommunications sector growth has averaged over four times that rate.[24] Although demand continued to exceed supply, the MPT controlled the burgeoning infrastructure through system reforms. Specifically, MPT advocated 'contractual responsibility,' permitting a high level of autonomy for its subordinate regional and local PTT offices to develop infrastructure plans and purchase telecommunications equipment. While this was very effective in stimulating communications growth, it also established an unusual tradition of autonomous decision-making in the information sector.

Policymaking authority remained centralized at the MPT, which forbade foreign investment in its telecommunications industry. This severely restricted the amount of capital accessible for the necessary infrastructure growth to allow supply to keep up with demand. Retaining control of the state-owned network as a function of the state's security and surveillance 'responsibilities' is one of the primary reasons for this restriction. The state then accrues for itself the financial benefits of an expanding telecommunications market. Additionally, there was a protectionist bent to this restriction—a concern that local business, relatively immature in competitive market management skills, would be "outclassed" by foreign businesses, with a potentially damaging affect on state interests. In 1994, MPT Directive 571 relaxed this ban slightly by permitting joint ventures with foreign firms, but continued to ban foreign

involvement with operations or management.[25] While the global trend has been towards privatization and competition in the telecommunications market, this is not the path that China has chosen, at least in the near term.

The Ministry of Electronics Industries (MEI) also figures prominently in China's movement towards the Information Age. MEI was responsible for all aspects of telecommunications and electronics equipment development and procurement. As MPT had a monopoly on the lucrative telecommunications services market yet could not keep up with the demand, MEI sponsored an initiative to develop a second telecommunications network to "compete" with MPT. In 1994, Lian Tong, ostensibly a commercial company, was instituted as a national corporation. Lian Tong had significant political clout due to its sponsorship from MEI and direct reporting authority to the powerful State Economic and Trade Commission. Ji Tong, another MEI-sponsored commercial telecom company, is tasked to produce the "Golden" projects—the Golden Bridge, Golden Customs, and Golden Card. These state-planned ventures provide macro-level control of the economic and infrastructure growth, forcing China to move down the road to the Information Age. The Golden Bridge creates a Chinese Internet backbone based on an ISDN satellite network that will support a state public economic information network. Golden Customs is a specialized data network for trade and tariffs. Golden Card is a public credit card system that will facilitate e-commerce. While considered 'state corporations', neither Lian Tong nor Ji Tong are directly funded by the state ministries. In order to finance their ambitious infrastructure projects, both corporations had to attract foreign partners to provide capitalization. The competition for user services between MPT's China Telecom and Lian Tong's China Unicom has improved the quantity and quality of telecommunications services, but should not be construed as the free and open telecommunications market indicative of Information Age societies.

On March 6, 1998, State Council Secretary-General Luo Gan announced a major restructuring of China's government at the National People's Congress, effectively reducing the overall number of ministries and commissions from 40 to 29.[26] This included consolidating several ministries dealing with information infrastructure--among them the MPT, the MEI, and the Ministry of Radio, Film, and Television Broadcasting--into the new Ministry of Information Industry (MII). Wu Jichuan, the head of MPT at the time, became the MII Director. The MII reports directly to the State Council and is responsible for policy, regulation, and standards setting, allocating frequencies, and granting licenses.[27] The operational function of running the various networks was separated from the policy and regulatory function, but still falls under the same ministry. The various networks of China Telecom, Unicom, Great Wall, and others are still currently state-sponsored agents of the MII, but can compete amongst each other as "independent" service operations. According to the MII Policy and Regulation Department, MII plans to fully sever its business and administrative relationships with all Chinese telecom companies in the year 2000.[28] MII will then concentrate solely on regulating the information sector.

As computer networks proliferate, the tendency has been to categorize them as just another telecommunications asset. Governments often imposed the same physical restraints and controls on

networks as they did on telephone systems as they searched for an optimal way to deal with this new technology. Traditional telecommunications infrastructure is physical and national and service is easily tracked, even across national boundaries, from point A to point B. Network infrastructure is, by contrast, virtual. Each network connection—and each packet on that connection--uses a different path, making it borderless and difficult to determine its route or limits. The user end connection is the only thing that can be practically tracked without extensive skill and equipment.

MPT, MEI, and the Ministry of Public Security were among the several state agencies regulating China's network operations. During the 1998 government restructuring, MII was given primary responsibility for determining information policy concerning networks. MII holds a daunting mandate—enhance the growth of China's network capability to support its economic expansion, while controlling adverse influences, whether that be foreign influence from capital, management, or ideas, or internal influence that runs counter to state prerogatives. The Ministry of Public Security and the State Secrets Bureau are also involved with controlling the content of information that is passed electronically. MII has responsibility for the administration and 'security' of the six authorized interconnecting networks and all Internet Service Providers.

The consolidation of all information services in MII should streamline the infostructure growth process. It appears, however, that MII is politically pulled between the reformists in the government and the traditionalists. The reformists, led by Prime Minister Zhu Rongji, realize that reform in the information sector is essential if China is to meet its economic goals. Facing off in the infostructure arena are the more hard-line traditionalists, most notably former Prime Minister and current head of the National People's Congress, Li Peng, who refuses to acquiesce to any change that would decrease the control exercised by the state. Information sector reform, historically characterized by commercialization and globalization, tends to lead to just the outcome that Li Peng wants to avoid.

The evolution of the telecom/network structure was very different from the growth of most other industries in China. The 'competition' between the two state-sponsored telecom corporations was unprecedented. More significantly, the history of autonomous decision-making regarding infrastructure growth at the regional and provincial level makes it increasingly difficult for the central ministry, MII, to establish absolute control. From an investment standpoint, it raises the question of whether the Chinese government can enforce its information sector financial agreements. This is definitely of concern to both the many foreign firms that have made deals with local offices over the past years and to those hoping to invest in the information sector once it opens up under the World Trade Organization agreements.

THE SINGAPORE MODEL–A CLOSED, BUT OPEN, INFORMATION SOCIETY

While China recognizes that it needs to be a strong player in the e-world if it hopes to achieve its economic goals, the government is reluctant to release any control or authority over information. Many Information Age advocates believe that the power of information cannot be controlled, thus the Internet leads to a more free and open society because it makes the information available to a broad base of people. As China moves its "socialist market economy" into the e-commerce world, it looks not to the

Western way of freedom of information as its model, but to the tiny city-state of Singapore. Chinese leaders often cite the practices of Lee Kuan Yew in Singapore as the model of the economically robust 'closed, but open' information society they hope to achieve.

Singapore, a financial and business powerhouse in Asia with a population of 2.3 million, has pursued information technology progress since 1981. With one of the most comprehensive plans for economic growth anywhere in the world, the Singapore government's strategy relies fully on cutting edge information technology. But Singapore is also a one-party, authoritarian state that intends to control what Singaporeans can and can't access on the network. Internet penetration is the highest in Asia and the computer-to-household saturation is at least 45%,[29] along with a telephone density of 50%, again the highest in Asia. Like China, Singapore has traditionally limited foreign investment in its telecommunication industries, but on 21 January 2000, the Minister for Communications and Information Technology announced the first initiative under the government's Information and Communications Technology 21 (ICT 21) Masterplan.[30] The ICT 21 program removes the foreign equity restriction of 49% in the telecommunications sector, with full market competition beginning in April of 2000.

Singapore's attractiveness to multinational corporations is of extreme interest to China. Singapore actively entices international companies to base operations there, particularly seeking those manufacturing high technology products. While the product is usually designed in the U.S., the first-generation product manufacturing would be installed in Singapore because of its friendly business environment and adherence to high standards. Once the market is established, production is then transferred to a low-wage country, such as Malaysia or Indonesia, to keep market prices down while Singapore works on setting up the next generation of technology production.[31] This cycle keeps new technology flowing into Singapore all the time. In this way, for example, Singapore is now the largest producer of hard drives in the world. Most corporations appear to accept the state's infostructure controls as a minor inconvenience outweighed by Singapore's first-class business environment.

Responsibility for the cooperative planning, development, and control of Singapore's information infrastructure falls to several state agencies—the National Computer Board, the Ministry of Information and the Arts, and the Singapore Broadcasting Authority. Singapore earned its reputation as the regional information leader through the government's active promotion of information technology in the public and private sectors. The government 's Singapore ONE (One Network for Everyone) multimedia broadband service project, for example, will connect every school, office, library, government agency, business and household to the state-installed and operated network by the year 2000. New housing is built with network access already installed and existing public housing will eventually be renovated to make it network-ready. The national school computer saturation program is funded at the comparable equivalent of $100 billion U.S. dollars. The government combines this with free computer training classes open to any Singaporean. This assures the high tech skills are available to support the high tech business it intends to attract.

Singapore's efforts to make every resident a "netizen" does not include unrestricted access to the Internet. Direct Internet access is controlled for most of the population. All Internet operators--from Internet Service Providers (ISPs) to cyber café owners--must register with the Singapore Broadcasting Authority and are responsible for the self-police of their operations against anything that "tends to bring the government into hatred or contempt, or which excites disaffection from the government."[32] Posturing the rules to benevolently protect Singaporeans from influences that may adversely affect their values and loyalty to family and state, the government's censorship primarily focuses on anti-government and pornographic material. All commercial ISPs are required to connect through proxy servers, and the premise of universal access under the Singapore ONE plan really means access to the Singapore Internet backbone. All connections to the Internet for the general population funnel through government proxy servers that restrict access to objectionable materials. The 'category' a resident falls in will determine what level of access to information they are allowed. For example, a server at the university designated only for professors will contain less heavily censored material than the information available on the server accessed by the students.[33]

The government has demonstrated the capability to monitor and track adverse information using commonly available software, such as Surf Watch, Cyber Patrol, and Cyber Sentry, to block inappropriate materials. In 1994, a government official authorized a search of "GIF" files on the ISP Technet intending to monitor pornographic access. Of the 80,000 files reviewed, five sites contained pornography and were given warnings.[34] At government direction, some of the UNIX shell functions in the Singapore Telecom telephone network are disabled[35] in order to restrict external connections to the Internet through a dial-up connection. All Singaporeans use their state identification card when registering for a network account. George Yeo, Minister of Information and the Arts, accedes that information networks have become so pervasive that, "Censorship can no longer be 100 percent effective, but even if it is only 20% effective, we should not stop censoring."[36] The well-known fact that the Singapore government has monitoring capability exerts some self-imposed censorship among most network users. The SBA generally limits chatroom discussion on religious and political topics to buttress the domination of the People's Action Party (PAP)—the ruling and only official party in Singapore politics. In an apparent softening of this restriction, Premier Gob Chok Tong indicated that some general election campaigning might be permitted on the Internet during the 2000 elections, subject to the same self-censor and anti-defamation rules as other media.[37]

Singapore's example is one that China watches carefully and hopes to emulate. The selective restriction of Internet sites and reliance on the threat posed by the possibility of monitoring are two techniques China has adopted. Singapore's success as an economic powerhouse and an information technology pacesetter, while still retaining positive controls over information access, counters the widespread assumption that the Internet is a necessarily democratizing force that empowers individuals and erodes the central control of authoritarian states. Singapore has shown that the government can capitalize on advanced technology to actually increase, rather than diffuse, the influence of the state's

information element of power. Whether China, with its huge territory, diverse population, and economic immaturity and instability, can attain the same measure of achievement is uncertain.

INFORMATION POLICY--AND PRACTICE--IN CHINA

China's infostructure policies reflect its two divergent goals—the need for reform to achieve economic growth and the need to maintain stability through centralized control. Frederick S. Tipson, in his article "China and the Information Revolution," accurately summarizes the Chinese conundrum:

> The Chinese leadership has repeatedly emphasized the central role of telecommunications and information technologies in building its modern economy. Yet the policies pursued by those same leaders contain an inherent contradiction: on the one hand, actively promoting a modern communications infrastructure of lightning speed, scope, and flexibility, while, on the other hand, repeatedly trying to control the content and uses of the information that pulses through it.[38]

Beijing has been suspicious of the proliferation of information technology since the global dissemination of the brutal scenes from the Tiananmen Square crackdown in 1989. As of 1999, China continues to block Internet access to the CNN web site (cnn.com) in retribution for CNN's broadcasting of the 1989 events, even though foreign visitors can view the CNN television station from their hotels.[39] As previously discussed, networks in China, by default, grew largely unregulated by the state. In 1996, the government instituted some controlled structure to the growth and use of the Internet by ordering the licensing of all networks and requiring all out-of-country network connections to be carried through MPT lines.

In January 1996, the State Council issued a directive controlling access to international financial information. Essentially, Chinese-based businesses were not permitted to connect directly to sources like Reuters or Dow-Jones. Previously, financial data was exempted from the normal state information controls, but now the Xinhua News Agency, a state-owned enterprise, would screen and re-release all financial information. With the globalization of the world economy, the Chinese government believed that too much news was passing into the country via the uncensored economic data. [40]

The "Provisional Directive on the Management of International Connections by Computer Information Networks in the PRC" became law on February 1, 1996.[41] It stipulated that the government would do the central planning and standard setting for international computer connections and that all international network traffic must go through state telecommunications provided by (at that time) MPT. The directive specifically prohibits Internet activities damaging to the state or national security, although this point is not clearly defined. All networks were registered through one of four organizations (MPT, MEI, State Education Commission, or the Chinese Academy of Science); all networks in existence at the time had to liquidate and reregister. Before a network operation can be considered a business, stringent operations criteria must be met. Additionally, the Ministry of Public Security directed all Internet users register with local police by filling out a form containing their education level, among other personal information.

On 25 April 1999, the power of the Internet took the Chinese government by surprise. Over 10,000 supporters of the spiritual group, Falun Gong (or Falun Dafa as it is also known), organized a demonstration near the Zhong Nanhai CCP compound in Beijing. This sent a shock wave through the party leadership, as the entire movement was coordinated via the Internet and e-mail, unbeknownst to government leaders who generally closely control any type of gathering. Beijing outlawed the movement and apprehended its supporters but the Falun Gong continues electronically, if no longer physically. The leader of the group, Li Hongzhi, perpetuates his teachings from New York via e-mail and the Internet, while many of the coordinators within China remain in detention. China's government classifies the Falun Gong as a "state security threat," monitoring and shutting down any sites, and tracking down any persons, discussing it electronically. Some Chinese Internet users have figured out how to circumvent the state cyber-police by logging on to proxy servers that can provide anonymous access to all kinds of banned information. These computers act as an alternative gateway protecting, at least temporarily, the identity of the user and are very difficult to track if users rotate between several server sites.

China is using Information Age techniques, such as spamming, viruses, and computer hacking, in reprisal for any impingement on their ability to exert control. For example, a "war without smoke" is ongoing between the PRC and Taiwan, both of whom are trading cyber-blows by hacking and defacing each other's web sites and attempting to inject each other's systems with debilitating viruses.[42] Falun Gong supporters throughout the world were subject to e-bomb attacks in the months after the Beijing rally; receiving so many e-mails to a site that it effectively blocked communications. Hackers broke into a Falun Gong site in Britain and posted a false biography of founder Li Hongzhi. By tracking the IP addresses, several of the victim sites traced their attacks back to the IP for the Xin An Information Service Center in Beijing.[43] Although the Beijing government denies sponsoring any hacking activities, Xin An is most likely affiliated with the Computer Surveillance Division in the Ministry of Public Security.

In 1998, Chinese criminal law was amended to include a whole spectrum of computer crimes, including contact with pro-democracy activists' abroad. The U.S. State Department reports that Chinese "authorities often monitor telephone conversations, fax transmissions, electronic mail, and Internet connections of foreign diplomats and journalists, as well as Chinese dissidents, activists and others...the government has created special Internet police units to increase control over Internet content and access."[44] Beijing has taken action against several Internet users accused of 'attempting to subvert the government.' In March of 1998, Lin Hai was arrested for 'incitement to undermine the government' for collecting 30,000 e-mail addresses for the company, VIP References, an offshore pro-democracy activist business. Sentenced in January 1999 to two years in prison, Lin Hai was a computer shop owner paid by VIP References to collect the public addresses.[45] In September 1999, Qi Yanchen, an economist allegedly working on publishing a political book on the Internet, was arrested for communicating with 'foreign individuals or organizations' through an e-magazine from a banned organization in Hong Kong.[46] On 9 November 1999, four leaders of the China Democracy Party were convicted—one to an 11 year

sentence—for publishing pro-democracy articles on the Internet and contacting pro-democracy groups overseas via e-mail.[47]

The CCP's official paper, The People's Daily, sponsors—and monitors—a chat room.[48] Cyber 'editors' watch content as users chat on-line and delete anything that is inappropriate, which can include anything critical of the party, referring to democracy, Tiananmen Square, Tibet, and the Falun Gong. The government finds it useful at times to let certain emotions and opinions fly on the net. After the May 1999 NATO bombing of the Chinese Embassy in Belgrade, chat rooms were abuzz with anti-American sentiment, which the government let brew, although it blocked all access and reference to the immediate apology and explanation from the American side. The government usually tolerates mild criticism in cyberspace as it allows users to vent their anger and, theoretically, provides officials a way to stay in touch with what is going on at the e-grass roots level.

Another way China controls the infostructure is through restrictions on investments in the information sector. On September 15, 1999, in referring to foreign investment in the Chinese Internet, MII Director, Wu Jichuan, announced, "no foreign investor is allowed to operate telecommunications networks or services...foreign firms are restricted to the manufacturing of telecommunications products."[49] This was a significant change in what had been an unregulated area--the Chinese had just placed the Internet under the broad category of 'telecommunications'; foreign investment in the telecommunications industry had been prohibited for many years. Many of China's Internet Service Providers (ISP) and Internet Content Providers (ICP)—suddenly considered 'value-added services' of telecommunications—are significantly capitalized by foreign investment. U.S. firms Dell Computer and Goldman-Sachs finance the most popular Chinese portal, *Sina.com*, which is also the only top ISP that is an independent, non-state sponsored company. AOL is a major investor in *China.com*, the ISP of the state-run XinHua News Agency. Dow Jones, Inc., Yahoo! and other top U.S. firms finance other providers. Many of the providers operate from outside of China and so the government may have difficulty truly enforcing the rules. With the count of China ISPs at 40 in late 1999, and ICPs numbering in the thousands, governing the Internet is a "very complicated issue," as Wu Jichuan has recognized. There is an estimated US$100 million in foreign investment at stake in the Chinese ISP/ICP business, and at least half of the ICPs are majority funded from foreign sources. In a 4 January 2000 interview, Wu Jichuan stated that "in the [ISP] sector, foreign ownership is not allowed to exceed 50%."[50] This is an adjustment of the "no foreigners" policy that had been put out in September and seems to be preparing the information industry for the opening to foreign investment required by the WTO.

The licensing, regulation, and administration of the ISPs fall directly under MII responsibility. Anyone wishing to put up a web site as an Internet Content Provider (ICP) must also gain approval through the appropriate responsible agency for his/her product before applying to the MII for connection through an approved ISP. In addition, forthcoming rules require any Internet company--whether local, registered overseas, or backed with foreign capital—to get approval from three different state agencies before listing on any stock exchange. All Initial Public Offerings must be approved by the MII, the China Securities

Regulatory Commission, and the State Council.[51] This has confounded those companies who registered abroad hoping to avoid getting entangled in China's murky and ever-changing bureaucracy, as well as seriously impeding the raising of capital to spur more expansion in the exploding Internet market.

On January 25, 2000, the State Bureau of Secrecy published regulations governing the dissemination of "state secrets" on the Internet, implying that the entire information flow will be controlled and censored.[52] The new "Secrecy Protection Regulations For Computer Information Systems and the Internet" stipulates that "any information concerning state secrets, including information that is approved for distribution to designated overseas recipients, shall not be stored, processed, or transmitted via computer systems with Internet access."[53] While not defined, "state secrets" generally can be interpreted as any information not approved by the government for publication. Similar to the liability requirement Singapore has set up to control Internet content, "whoever disseminates information is ultimately responsible for it. Therefore, information provided to web sites must go through security checks and an approval process." [54] Circumventing approval procedures will result in shut down of the site.

Regulations that took effect on 31 January 2000, require all foreign and Chinese companies using encryption technology to register with the government.[55] Encryption, popularly used to prevent 'eavesdropping' by scrambling a signal, is also embedded in most information technology products including cell phones, software, servers, and cable and satellite television decoders. This decree affects any company doing business in China in any form of information technology. The newly formed State Encryption Management Commission, which includes representatives from MII and the Ministry of State Security, is charged with administering compliance. Less than two months later, under extreme pressure from foreign trade interests, a new regulation reversed the 31 January ban on foreign encryption technologies.[56] While the new decree does not specifically rescind the registration requirement, it has not been actively enforced.

THE INFORMATION SECTOR AND THE WTO

Global standards and policy for telecommunications were customarily set by consensus through the International Telecommunication Union (ITU), a specialized agency of the United Nations. China has traditionally been a participant and supporter of ITU standards. The transition in most countries from a monopolistic telephone industry to a competitive market organization undercut much of the legitimacy of the ITU, as cross-border rerouting became the norm and undermined the standards and pricing principles of the ITU. In 1998, separate from the ITU, the General Agreement on Tariffs and Trade (GATT) of the World Trade Organization (WTO) established telecommunication standards designed to support an integrated global communications network. Designed to level the playing field between home advantage and external competition, these are now the de facto foundation requirements for any country desiring global information sector access. The WTO requires six commitments for any member country in relation to its telecommunications network market: safeguards to prevent anti-competitive practices by a dominant local supplier; interconnection allowing access to existing networks to facilitate traffic exchange; universal

service ensuring all sectors of a market are given equal access to the service; licensing criteria that must be publicly available; an impartial body of independent regulators to oversee telecommunications issues; and, objective and fair resource allocation of limited supplies, such as telephone numbers and frequencies.[57]

On 15 November 1999, the U.S. and China signed an agreement that will forge the way for China to become a formal member of the WTO. China has sought entry into the WTO since 1986, but political and economic issues prevented any substantial progress. Premier Zhu Rongji came to Washington D.C. in April 1999 prepared to offer the first true concessions. President Clinton rejected that offer, however, hoping that more pressure would extract additional concessions for U.S. industry. The WTO agreement signed in November was less favorable to the U.S. than the economic package offered by the Chinese earlier that year. Overall, the accord will reduce Chinese tariffs and open Chinese markets to foreign business. In the telecommunications sector, it requires the Chinese to institute the WTO requirements consistent with a global information structure. The November agreement limits foreign ownership of telecommunications and networks to 50%, whereas the April 1999 proposal would have permitted a 51% majority foreign ownership in China's coveted information infrastructure operations.

China must secure similar accords with other WTO nations before it can gain permanent entry into the WTO. Additionally, in order for the U.S. to gain full advantage of the US-China WTO deal so painfully worked out, the Congress must approve Permanent Normal Trade Relations (PNTR) status for China. Otherwise under WTO rules, China can elect not to deal with the U.S. and Chinese markets will remain closed to U.S. businesses.

In the short term, the WTO telecommunications rules will challenge China. Although its information sector is already one of the most competitive industries within the country, international firms entering the lucrative Chinese market have the advantage of global experience and proven products with which to stake their claim. Chinese firms will probably be at the disadvantage initially, despite the equalizing intentions of the WTO telecommunications sector requirements. Development of an adequate regulatory structure protecting domestic industry and ensuring fair competition will probably not be complete by the time China officially enters into world competition in the WTO. China's current telecom policies are purposely vague so that the state can interpret them and define them as it sees fit. The CCP wants the emerging regulatory structure to clearly address national security concerns and protect basic services and domestic economic development.

In the long term, foreign competition should boost the quality and efficiency of domestic products and services, as China will continue to be a large stakeholder in the domestic telecom field for national security reasons. This effect should also make Chinese products more competitive, desirable, and accessible on the global market. Although the information sector industries in China operate as independently and competitively as a corporation can in an autocratic, state-controlled political environment, exposure to foreign competitive market practices should significantly mature their enterprise management skill. This will provide the expertise needed to compete successfully in the global

marketplace. While it will be domestically painful in the short term for China to structure its information sector market to meet WTO standards, membership allows China to avail itself of the arbitration mechanisms inherent in the WTO to resolve international disputes. This should help China protect its market interests in the long term.

Given the fact that WTO membership is a coveted goal for China, the practices it has initiated in restricting telecommunications freedom in the six months from September 1999 through February 2000 give the U.S. and other nations looking to negotiate an agreement with China cause for concern. Since the fall of 1999, the Chinese announced the following policies for the information sector:

- a total prohibition on foreign investment in their network businesses,
- a moderation of the hard-line investment prohibition later that same year, permitting up to 50% foreign capitalization,
- a requirement for all companies, both domestic and foreign, to register their encryption technologies with the government,
- a reversal of the encryption registration requirement two months later,
- mandatory licensing for all participants in the Internet sector,
- a multi-agency approval process for ICPs and information sector IPO stock offerings, and,
- a prohibition on telecom networks from entering into media broadcasting, i.e., no bundled services, thus discouraging the global trend towards convergence of the voice, data, and multimedia industries.

In addition, the personal restrictions and consequences placed on Internet users continue to provoke heated discussion of the human rights record in that country. Many China watchers speculate that the "no foreign investment" policy announced in September 1999 was simply a negotiating ploy to exact more favorable concessions from the WTO agreement. This rash of restrictions is typical of the Chinese tendency to put up obstacles to delay doing something it really does not want to do. This is China's way of easing itself into the world economy--the more restrictions, the longer grace period it can claim it needs to fully comply with WTO requirements. The variety of policies instituted in such a short span of time amplifies the rapid changes taking place in the information sector, as well as the competition within the government between the increasingly divergent goals of reform and internal stability.

CONCLUSION

While investing a sizeable amount in upgrading the infostructure, China still lags far behind developed countries. The information sector has continued to grow at least 30% annually, despite the overall slowdown in the Chinese economy. Even with this impressive return, China still won't reach proliferation densities comparable to today's Information Age societies in basic information infrastructure such as telephones and computers until 2013, at the very earliest. The continued active involvement of the Chinese government in infostructure development is essential if China has any hope of continuing its rapid technological advance. This has proven to be the defining factor in the rise of information

technology powerhouses like Singapore, Ireland, and New Zealand. Moderate information sector growth occurs with laissez-faire government policies, but if a country wants to move rapidly into the information age then active government support is necessary.[58]

Even more important than the growth of the infostructure is the policy system China uses to harness this structure. Policies governing the infostructure in China are usually ambiguous, and often repressive, reflecting the deep-rooted internal struggles between the pursuit of economic development and reform and perpetuating internal stability and security. With China's entry into the WTO, how this struggle plays out will affect future foreign investment in its economy. Controlling, repressive policies will inhibit investment. Without the influx of foreign capital, the economic goals of the regime will not be met and the overall economic development of China's massive population will stagnate.

The progress in reforming the infostructure has particular significance for U.S. economic well being, especially upon approval of PNTR between China and the U.S. The level of predictability in its policies and advancement of its technology will lure or repel investors. China's ability to sustain information sector reform and thus open itself to global market forces through adherence to WTO requirements will determine its real commitment to becoming a global player. How the government allows progress to be made—whether centrally controlled or delegated to local authorities—also indicates what the world can expect from the Chinese economy. While international businesses often find it less cumbersome making deals with local authorities, there is some question of the nation's ability and desire to honor those commitments. Too many autonomous deals devalue the economic and political authority of the state.

Infostructure development has overwhelming economic implications, and may have secondary and tertiary effects on political and diplomatic reform, military capability, and expansion of human rights and self-determination. Many analysts believe that economic freedom and political freedom reinforce each other. If that is generally true, then bringing China into the international economic community can have a positive (from a U.S. view) affect politically. For that hope alone, it is important for the U.S. to pass the WTO accord through the Congress and approve the NPTR status. President Bill Clinton, in the January 2000 State of the Union Address, pointed out the importance of the WTO and NPTR to U.S. interests:

> No one...can know for sure what direction these great nations [China and Russia] will take. But we do know for sure that we can choose what we do. And we should do everything in our power to increase the chance that they will choose wisely, to be constructive members of the global community...When all is said and done, we need to know we did everything we possibly could to maximize the chance that China will choose the right future.[59]

This gives the U.S. and the international community powerful leverage to encourage the economic opening and possible reform of the society. China's economic involvement in global markets encourages stability at a time when tensions between Taiwan and the mainland are volatile. Once China is accepted into the WTO, then Taiwan can also be considered for entry, broadening the already robust trade between Taiwan and the mainland and making it more detrimental if they come to blows. Membership in

the WTO also strengthens ties between China and the U.S., thus furthering long term U.S. strategic interests.

But this is not to say that economics can cure all that ails U.S.-China relations. The U.S. and the international community should continue pressure on China to make human rights improvements. Indeed, many analysts hope that this will happen as a by-product of Chinese citizens operating in a business capacity and becoming more involved in international social and political standards. To squelch nascent revolutionary movements, it may be in the CCP's best interest to make those changes on its own. This would combine their proclivity for internal stability with the necessity of reform. The U.S. should also encourage China's full participation in the global activities in which it is a member. China normally eschews multilateral activities, but its desire for entry into the WTO indicates that it will tolerate such multifarious organizations when it is in its interest to do so. While the Chinese view will inevitably be different from the U.S. view, especially in the short term, participation in maintaining global peace and prosperity can only bind them to the 'status quo' that more tightly, mitigating the risk that they may try to act unilaterally. Finally, it is important that China is treated as any other nation in the WTO—they get no special privileges and receive all the benefits that the membership accrues. China is very quick to negotiate things to its own advantage, but this cannot be permitted under WTO. The reforms required by the WTO in the information sector are especially important, as therein lies the path to the Information Age.

If strategically our goal is to get China to be more democratic, then its information infrastructure is one of the main avenues to make this happen. First, the telecommunications industry is essential to China's economic development plans so a high precedence is put on activity there. As Singapore's example shows, attracting high technology is essential to economic growth. Second, the infrastructure is the 'means' and the information that passes over it is the 'ways' to get to the 'endstate' of a more open and tolerant society. Involvement in the global network infrastructure will inevitably have a positive outcome, as long as China stays economically engaged.

The Chinese government's view of the Information Age is two-sided—on the one hand embracing it for the economic progress it can bring, but on the other restricting access and use of its technologies for fear of the instability it may cause. Carl G. O'Berry, in an article on the convergence of information technology, comments that, "Technology is not the problem in gaining maximum value from the information age. The problem is characteristically human behavior—the tendency to preserve the status quo."[60] If the hard-liners have their way, a reversion to the powerful CCP status quo will halt economic reforms—and subsequent expansion of information availability--at the border. A Golden Wall will be erected and China will regress, for all practical purposes, back to an early industrial age society with all hope of skyrocketing into the Information Age snuffed out.

WTO entry virtually eliminates the Golden Wall option for China. To be a player in the global economy, China cannot shut itself off from information flow internationally or domestically. China wants to emulate Singapore and set up a system that would essentially be a Golden Gate--open for information

supporting the macro-economic goals of the state, but closed when it comes to open information flows among the citizenry. The magnitude of the problem facing China if it retains control over information is enormous compared to what Singapore can do with 2.3 million people in a 200 square mile area. Singapore's control over information largely concentrates on political and religious content, and there is some softening of these restraints to allow some political campaigning on the Internet in the upcoming election. This loosening, however, should not be construed as the inevitable equalizing force of information eroding the power of the state. By contrast, the state is simply adjusting its controls. Given successful economic growth, personal prosperity, and a respected nation-state, the bit of controlled political discussion allowed the citizenry may be just enough to satisfy an information-hungry population. Singapore seems to prove that active government promotion of both international and domestic growth, significant investment in infrastructure and training, coupled with a climate of fear and intimidation through regulation enforcement, can bolster the strength of an autocratic government even in light of the Information Age.[61]

The Golden Gate is the model that China will follow, at least for the foreseeable future and assuming the rational arguments of the economic reformists in the government prevail. It is a uniquely Chinese way of adapting to a state of society caused by technological growth. Right now, the infostructure is providing a gate that the Chinese government uses to exact a toll both coming and going—an ambiguous economic climate for those outside foreign investors who wish to get in and a dangerous, repressive environment for those inside who wish to get out virtually.

In the long term, economic growth stimulated by reforms in the vital information sector may be the force that equalizes the political underpinnings of Chinese society. Interconnection with the global economy forces the Chinese to deal with many new issues. Instead of their traditional method of clamping down a wall when they fear loss of control, their economic interconnectedness should compel them to develop more moderate ways of adjusting to the needs of their society. This aligns with the predominant expectation in Western ideology that information access naturally begets freedom and democracy. In the long term, this just might result in a "democracy with Chinese characteristics" –and then the Golden Bridge to the Information Age will be complete.

WORD COUNT: 10,789.

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[20]

Survey Date	**Computers**	**Internet Subscribers**	**.cn Domain Names**	**Web sites**
Oct 1997	299,000	620,000	4066	1500
Jun 1998	524,000	1,175,000	9451	3700
Jan 1999	747,000	2,1000,000	18,400	5300
Jun 1999	1,460,000	4,000,000	29,000	9906
Jan 2000	3,500,000	8,900,000	48,695	15,153

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