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China's 'New Economy': Development, Constraints, and Government Policies

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China's 'New Economy': Development, Constraints and Government Policies

Summary

In the late 1990s, "new economy" has become a topical term around the world, due mainly to the IT-based economic achievements obtained in the United States during this period. Though it is argued that the so called new economy is not "new", we may, say the least, share the common view that the IT-based or knowledge-based new economy driven by technology innovation is reshaping the existing economic development paradigm and the growth momentum in the new century. China, which was repeatedly cast away by the mainstream in the past, strongly aspires to embrace this revolutionary trend to catch up with advanced economies.

1. Development of China’s New Economy

China has now edged into the world's top 10 information industry powers thanks to 10 years of rapid expansion. In 2000, China's IT industry accomplished the total industrial output of RMB 778.2 billion, 7.8 times that of 1991; realizing sales revenue of RMB 430 billion, 7.4 times that of 1991; realizing RMB 33 billion in taxes and profits, increasing by 7.1 times. (Zhang Qi, 2001)

Meanwhile, the information infrastructure close to the international level has been built to lay a solid foundation for the development of the information economy. An optical-cable based, microwave and satellite communications supplemented public fundamental transmission network of huge-capacity, high-speed and high reliability has been constructed to connect the world. By July 2001, China’s fixed-line telephone network has been the second largest and mobile phone users rank the top in the world. Furthermore, China’s Internet and data multimedia communications network have been developing by leaps and bounds.

Now IT industry is playing a more and more important role in China’s economy. As the data from MII (Ministry of Information Industry) shows, the contribution of the value-added of IT industry to GDP increased from 1.98% during 1991-95 to 3.4% by the end of 2000.

It is difficult to cover all the aspects of China’s new economy in this section. Here we just touch on the following parts as software & chip industry, telecom infrastructure, Internet & e-commerce, which will provide a general picture of China’s new economy.

1.1 Software and Chip Industry

China’s software industry started its development in 1960s, and accelerated its pace after the 1990s. According to statistics from MII (Ministry of Information Industry), sales in the software market reached about RMB 55 billion (US$6.65 billion) in 2000 and there are more than 10,000 software companies in China with 200,000 employees. In the period of 1996 -2000, the annual average growth of the sector was 27%. Despite the rapid growth of the software market, China's share in the world software market is just 1%.

Just like the fledging software industry in China, chip production is another disadvantage of China's IT industry. In 2000, China produced 5 billion chips, accounting for less than 20% of domestic demand. Hence, most high-end products used in computers and mobile phones had to be imported. In 2001, the chip industry entered into a new phase, since Shanghai-based Huahong NEC Electronics Co. produced a 0.35-micron, an 8-inch CPU (central processing unit), which was designed by the China Integrated Circuit Design Center. Before that, all CPU products were imported or produced using foreign patents. According to the MII's latest forecasts, by 2005 Chinese-produced semiconductors will meet 30% of domestic demand, manufacturing 20 billion chips. However, they would only have a 2% share of the world market. By 2010, chips made in China will meet half the domestic demand and account for 5% of the world market.

Despite the recent development in chip production sector, it is still three generations behind the international level. Therefore, the software and chip industry has to make a rapid improvement to meet the requirements of China's IT development.

1.2 Telecom Infrastructure

The development of telecommunication infrastructure has achieved a relatively high level during 1996-2000 (see table 1). By the end of 2000, the total length of China's fiber optic cable reached l.25 million km, in which the long-distance main line topped 286 thousand km. The capacity of long-distance automatic switch and CO (Commutator Office) exchange reached 5.49 million and l79 million lines. Fixed-line and the mobile phone subscriber base reached l44 million and 85.3 million, respectively. The national penetration rate of telephones amounted to l8%, with main line penetration ratio rising from 3.36% to l1% and the mobile phone penetration rate rising from 0.3% to 5.7% during 1995-2000. Telephone access reached 85% of administrative villages. During the same period, data multimedia services have been developing at an extraordinary rate, while the IP network has taken shape. By 2000, the number of data communications ports was close to 920 thousand, while data communication users reached 500 thousand (Dai Shuang, 2001).

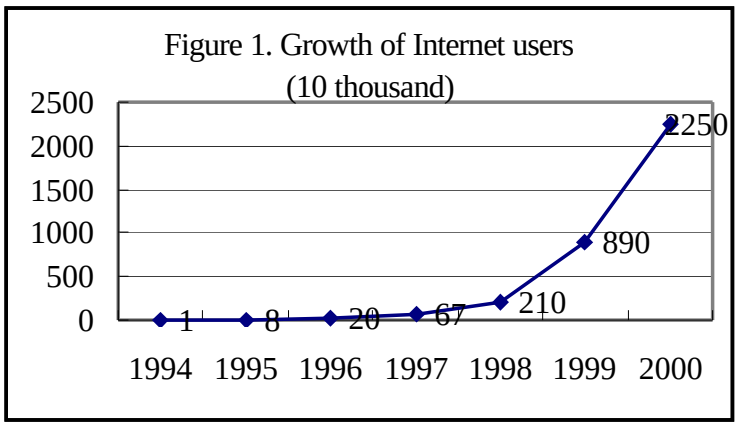
Table 1. Telecom Infrastructure in 2000

Item	*Scale*
Total length of fiber optic cable main line	1.25 million km
In which: length of long-distance main line	286 thousand km
Capacity of long-distance automatic switch	5.49 million lines
Capacity of CO exchange	179 million lines
Data communications ports	920 thousand
Fixed-line subscriber	144 million
Mobile subscriber	85.3 million

Source: MII (2001).

1.3 Internet & e-commerce

By the end of 2000, the number of Internet users amounted to approximately 22.5 million (see Figure 1), and the number of domain names registered under .cn exceeded 120 thousand (see Table 2).



Source: CNNIC (2001)

Table 2. Growth of Domain Names under .cn

	Oct-97	*Jun-98*	*Dec-98*	*Jun-99*	*Dec-99*	*Jul-00*	*Dec-00*

Domain names	4066	9415	18396	29045	48695	99734	120000

Source: CNNIC (2001).

With the extensive use of DWDM (Dense Wavelength Division Multiplexing) technology in optic communications construction, the bandwidth of Internet backbones can reach 2.5G-40G(giga) bytes per second. With very rapid growth, the total bandwidth of China's Internet international gateway lines reached 23M (mega) bytes per second in l997, 35lM by the end of l999, l234M in July 2000, and over l.5G by the end of 2000 (see table 3); while the total bandwidth of IP phone international gateway lines reached 56M by July 2000.

Table 3. Bandwidth Growth of Internet International Gateway

	Oct-97	*Jun-98*	*Dec-98*	*Jun-99*	*Dec-99*	*Jul-00*
Bandwidth of Internet international gateway	23	85	143	241	351	1234

Source: CNNIC (2001)

With the improvement of Internet infrastructure, adoption of new user-access technology, diversification of access modes, and enhancement of operators' service capacity, the problem of slow Internet access will be solved to realize higher-speed Internet access for more applications over the Internet.

E-commerce in China is just at the introductory stage. Though China tries to provide ideal environments for the establishment of B2B exchanges, existing platforms offer merely a superficial connection between buyer and seller. Very little focus is devoted to back-end integration that could subsequently reduce back-end costs or improve supply chain management. The exchanges simply match buyers and sellers and deliver messages.

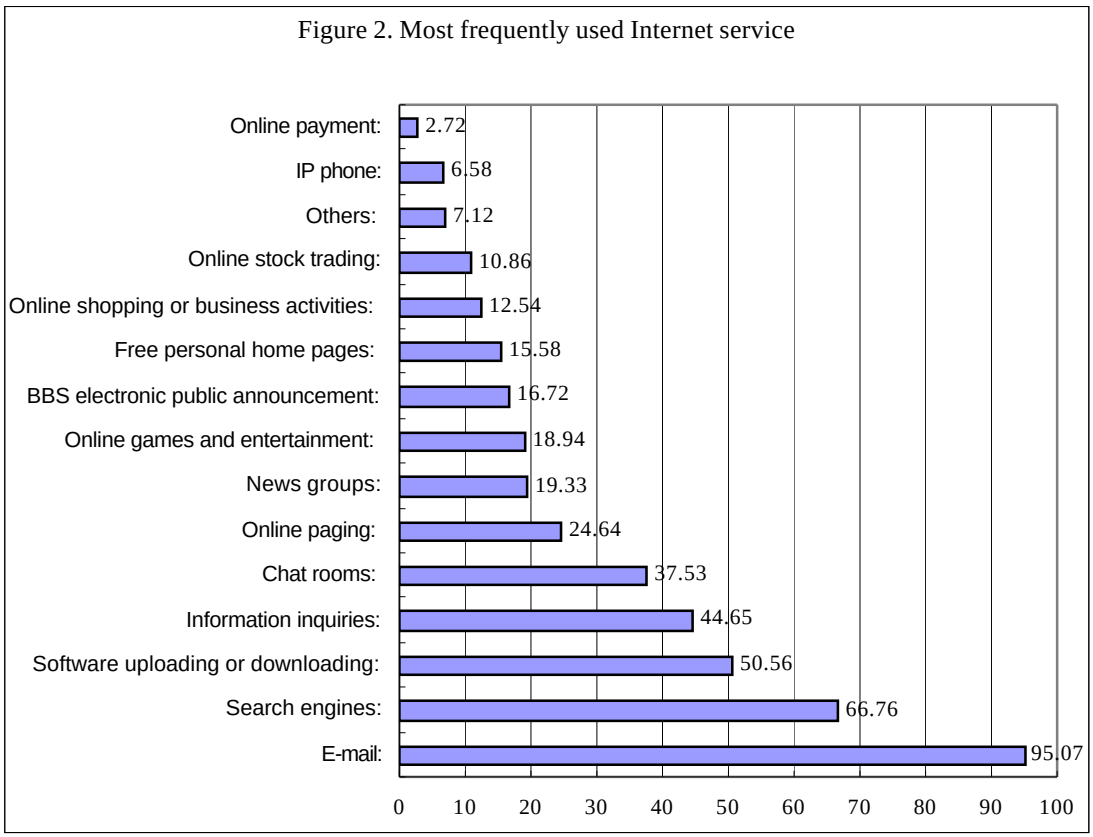
Regarding B2C exchanges, the size of China’s consumer e-commerce market is small. According to BNP, the market amounted to about US$27 million in 2000, just 0.1% of the US’s online retail sales of US$25.8 billion. To put this in other perspective, retail sales in China amount to roughly 13% of the US total. Although China’s online

retail market is expected to reach US$4.8 billion in 2004, this remains minuscule in relative terms (BNP Paribas, 2001).

By the end of March 2000, China had 1,100 Web sites involved in consumer-related e-commerce. Of these, 800 are online shopping sites, 100 are auction sites, 180 are remote educational sites and 20 are remote medical sites. Of these shopping sites, one-third carry out traditional retail operations, while two-thirds offer only online services. This is in sharp contrast to the growth of e-commerce abroad. In Europe, for example, two-thirds of online shops operate traditional retail businesses, which indicates that China's traditional retailers are not enthusiastically involved in online operations. Currently, most of the country's e-commerce players are new companies (CCIDnet, 2000).

If we look at the behavior of Internet users (see Figure 2), we find evidently that people use Internet mainly for e-mail (95.07%), search engine service is the second frequently used choice (66.76%), yet online shopping or businesses activities rank close to the bottom (12.54%). This also implies that e-commerce has not yet attracted consumers' attention.

Figure 2. Most frequently used Internet service



Source: CNNIC (2001).

2. Constraints on Development of the New Economy

China's new economy, though it has achieved high growth rates in the past several years, is still facing many constraints. The main constraints can be generalized as unfinished industrialization and unfinished market-oriented reform. For instance, the telecom monopoly owing to unfinished market-oriented reform, restrains the

development of the telecom industry; the underdevelopment of telecom infrastructure and logistics system, due mainly to unfinished industrialization, and the low number of credit cards for online payments impede the growth of Internet and e-commerce. Besides these constraints, the high-tech gap and high license fee as well as digital divide also restrains the development of China's new economy.

2.1 Telecom Monopoly

In the past, China Telecom Group was a fully integrated telecom company monopolizing the country's fixed-line, mobile, data, and satellite markets. Its break-up in 1999 based on these markets created China Telecom (fixed-line), China Mobile, China Satellite, and Guoxin (paging was transferred to China Unicom). Now with the ongoing reform, more and more participants are involved in the telecom industry and provide different kinds of services. China Telecom, China Railcom, and China Unicom are involved in the fixed line market while China Mobile and China Unicom are in the mobile market.

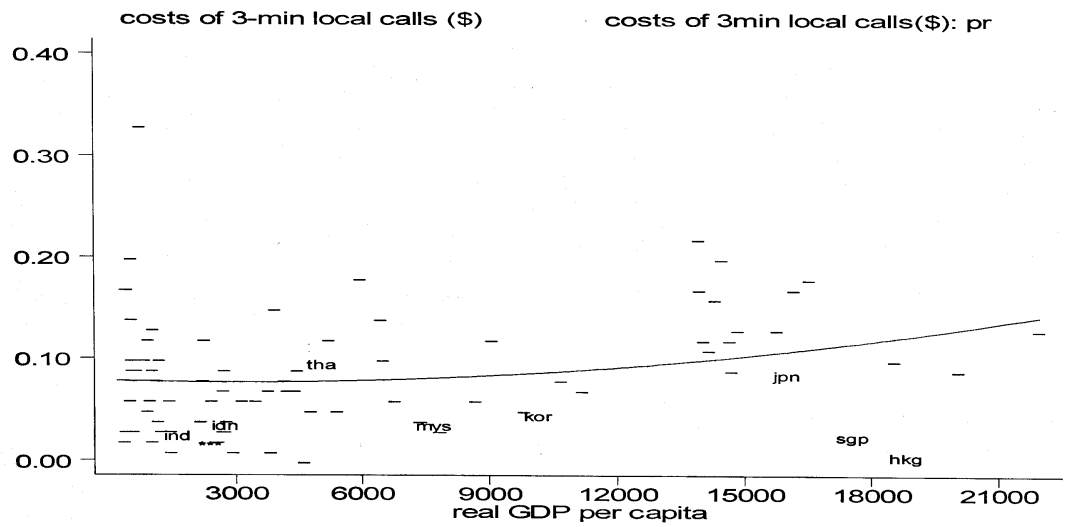
Despite a series of reforms and break-ups, China Telecom has so far been able to maintain the monopolist position in the fixed-line market. Therefore, a new restructuring reform will be launched on February 12, 2002, to split China Telecom into two parts. In that split, China Telecom will inherit the former monopoly's 21 southern provinces, while wholesaler China Netcom will absorb the northern provinces, plus rival Jitong Communications.

Undoubtedly, the government's efforts will promote competition in the telecom industry. But it is impossible to entirely change the situation of telecom monopoly in a very short time. The simple evidence of this monopoly situation is still the high telecom tariff, which now ranks at the top of the customers' list of complaints.

Then, how high is China's telecom tariff compared to other countries? Figure 3 and Figure 4 suggest that a cost of a 3-minute local call was among the lowest in EAP and other large countries, while a cost of 3-minute call to US, in contrast, is among the highest in EAP countries. This large distortion in relative price structure is likely to make it necessary to re-balance tariffs to introduce competition; otherwise, competitive

operators could just enter the high price segment and make large profits, leaving cross-subsidization unsustainable in the long run.

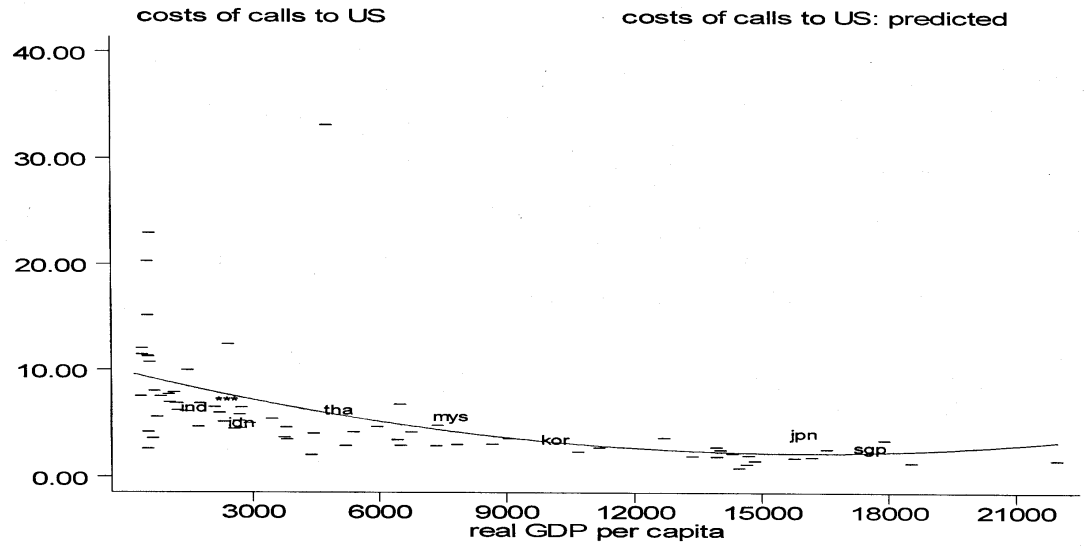
Figure 3. Costs of a 3-minutes local calls, in US dollars, 1990-98



Note: *** represents China. phi = Philippine, ind = India, idn = Indonesia, mys = Malaysia, kor = South Korea, hkg = Hong Kong, jpn = Japan, sgp = Singapore, twn = Taiwan, China.

Source: Christine Zhen-Wei Qiang and Lixin Colin Xu (2000)

Figure 4. Costs of 3-minutes international calls to the U.S., in US dollars, 1990-1998



Note: *** represents China. phi = Philippine, ind = India, idn = Indonesia, mys = Malaysia, kor = South Korea, hkg = Hong Kong, jpn = Japan,sgp = Singapore, twn = Taiwan, China.

Source: Christine Zhen-Wei Qiang and Lixin Colin Xu (2000)

After several tariff adjustments, the increase in the cost of a local call and the decrease in the cost of an international call improved the tariff structure, but in essence, it did not lower the overall tariff spending. Instead, the middle-and-low income consumers even feel the increase of their tariff spending since they mostly use local calls.

The high telecom tariff was changed a lot as the installation fee for fixed-line phones has been eliminated since July 1, 2001. In the past 20 years, the installation fee had been as high as RMB 1000-5000, which represented a great burden on consumers. Now people just spend about RMB 200 (RMB 235 in Beijing) on the basic cost of installation.

In the meantime, the network utilization fee has also been reduced a lot. In 1999, for customers accessing the Internet by modem dialing, monthly network utilization fees (basic fees) were as follows: 1 hour~60 hours: RMB 4.00/hour; Over 60 hours: RMB 8.00/hour. Now the monthly network utilization fee is about RMB 3.00/hour with RMB 1.80/hour for an Internet accessing fee and RMB1.20/hour for a telephone dialing fee. In comparison to other countries, this adjusted fee is still very high (see table 4).

Table 4. Monthly Network Utilization Fee (cent/hour)

	China *	*Hong Kong*	*Singapore*	*Australia*	*Japan*
Network utilization fee	36	18	26	32	71

Source: * own calculation; other data from Wang Baolai (2001).

In 1999, ITU (International Telecommunication Union) statistics showed that among 206 economic entities in a population of more than 40 thousand, China's GDP per capita ranks 135, monthly fee for home use ranks 164, and monthly fee for business use ranks 160. Most other telecom indicators in the ranking are further behind. The world's average telecom spending in 1998 amounted to $125.9, while in China it amounted to $16.4 only, 13% of the world's average level (ITU). All that seems to imply that telecom spending on average in China is not high. But it does not mean that the telecom tariff is not high. Instead, they just show that there are still many people who have no access to some telecom services.

The change in the telecom tariff illustrates the evolution of the gradual reform in telecom industry. However, the complaints of the high telecom tariff still strongly indicate that the telecom industry needs further competition. A good example of the benefits of competition is China Telecom's response to the lowering of installation fees charged by Railcom in the fixed-line market - it responded very quickly by eliminating its installation fee. Obviously, should there had not been such competition, the high installation fee would still have remained.

2.2 Barriers for the Growth of e-commerce

Due to China's low overall level of information technology, the country's web sites have to communicate with their suppliers and distributors in the traditional, inefficient manner. This means that these web sites cannot provide completely computerized supply channels, which decreases the efficiency of e-commerce.

Payment security is a global problem. It also concerns Chinese consumers. This means that there is much room for China's technological improvement in this area. Legal issues, such as the legal validity of electronic media (e-signature, for instance) are the primary obstacles to development of online payments in China. This issue requires further government attention. Payment on delivery will remain an expedient solution for a while, because it helps guarantee payment security to a certain degree. But, this particular method of payment harms the efficient use of funds, increases operational risks, and therefore increases costs to consumers.

The rapid growth of e-commerce, although from a very low level, requires that China develop a higher-quality logistic system. China's traditional logistic system (the postal service, for example) is making efforts to improve its service in a bid to adapt to challenges of e-commerce. Socialized logistics firms like third party logistics are growing rapidly. With increasing online sales and subsequent growth in economies of scale, costs of logistics are expected to fall. Therefore, China's logistic system is expected to improve substantially in the near term.

The Chinese system for establishing buyers' reliability is incomplete, and online anonymity has aggravated this problem. This challenges the security of e-commerce and is the primary bottleneck restraining the growth of C2C online auction services. The problem of buyers' reliability is unlikely to improve substantially in the near term.

From the perspective of an industrial life cycle, China's consumer e-commerce is still in the introductory stage. Although it is growing fast, it is very small. It is far from becoming significantly larger in the near future, too.

2.3 High-tech Gap & High License Fee

Due to the large high-tech gap between China and advanced nations, China has to pay a very high license fee for promoting its IT industry. In that sense, high license fees becomes the barrier for China's information economy and this factor will increase the digital divide from an international perspective.

So far China has imported many technologies from abroad. Table 5 points out that from 1950 to 1998, a value of imported technology contracts exceeded $100 billion, with about $90 billion deficit in technology trade. The technology trade includes license, consultation, service, co-production, and equipment, which suggest that China has paid a lot not only for the machines and equipment but also for licenses.

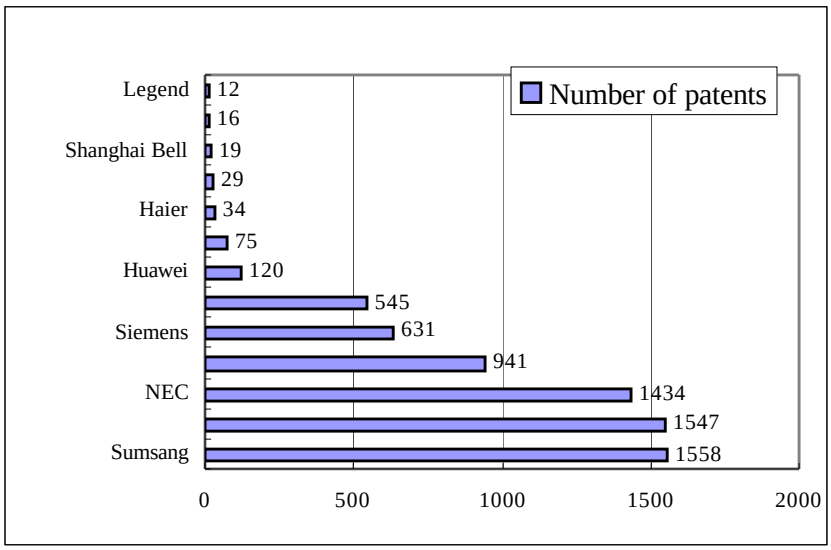
Table 5. Technology Trade Deficit (1950-1998) in US$ billion

Technology Contract	Total
Import	116.94
Export	28.22
Deficit	88.72

Source: Data from 2002-06-25

Data of patent applications further implies that advanced economies dominate the high-tech or IT arena. During recent three years (1998-2000), most IT patent applications in China belonged to foreign companies. As Figure 5 shows, three foreign companies -- Samsung, National and NEC – registered about 4500 IT patent applications as compared to only about 300 IT patent applications registered by all Chinese firms. Furthermore, Japan, USA, South Korea, and Germany is responsible for over 80% of IT patent applications, while only 10% are from domestic Chinese firms.

Figure 5. IT patent applications in China (1998-2000)



Source: Shu Hongfu and Lu Yun (2001).

Such a high ratio of foreign ownership of IT patents means that developing countries, China included, have to pay a very high license fee for using the IT patents. Two relevant examples are cited here: one is a Microsoft software license, and the other is a CDMA (Code Division Multiple Access) license.

Since almost every personal computer (PC) has to operate with Microsoft Windows and Microsoft Office, Microsoft software has virtually monopolized the PC software market Thus every buyer of PC has to pay a software license fee. According to the recent data from China's PC market, Legend, the largest PC manufacturer in China, will pay around RMB200~300 for a license fee for each computer, while other smaller PC

manufacturers, for their lack of economies of scale, will pay an even higher license fee. It means that the software license fee represents around 3% or more of each RMB7000-computer.

The CDMA license is another example. CDMA is a new technology applied to mobile phones. As mobile telecom has become the most rapidly growing industry in China, many companies want to get their foot in the door of the mobile phone market. Recently, the MII has issued 19 licenses for CDMA phone makers. Though most of the licensed companies are Chinese firms (Motorola China is the only foreign firm), it does not mean the domestic firms dominate the local market - all these CDMA phone makers have to pay high license fees to Qualcomm, who owns almost all CDMA patents.

Take ZTE as an example. ZTE.Corp., one of China's largest telecom equipment manufacturers, has signed the first commercial CDMA license agreement in China with Qualcomm. The license lets ZTE use Qualcomm's technology and integrated circuits to make and sell CDMAOne and CDMA2000 equipment in China and worldwide. At the same time, ZTE has to pay the license fee to Qualcomm of 2.65% of the price of each domestically sold CDMA phone and 7% of the price of each exported CDMA phone. In addition, it has to pay a large amount ‘threshold fee’ of about one million US dollars. Other CDMA phone makers will follow the same path in order to get the CDMA license from Qualcomm.

The more patents there are owned by advanced economies, the more license fees will have to be paid by developing economies. Though using patents from advanced economies is not so costly when compared to the costs of repeating the innovation process by one’s own means (i.e., the so-called ‘backward advantage’), China and other developing countries have to face the challenge of a too high license fee. The high license fee has become the barrier for developing countries for using the high technology. In this sense, the higher license fee will cause less investment in high-tech industry, which will inevitably increase the digital divide.

2.4 Digital Divide

The size of digital divide in China is quite remarkable. It impedes a healthy

development of the new economy.

Income Level & Consumption Structure Gap

China's digital divide is represented first of all by a large income gap among different groups of people, which constrains an ability of the low-income groups to consume IT and IT-related products and services. Table 6 shows that there are two kinds of income gaps in China: *West-East Gap*, and *Rural-Urban Gap*. If we consider the *West-East Gap*, we find that in urban areas, most provinces of East China (i.e., 8 out of 11), have larger per capita annual disposable income than the national average, while in West China only 2 out of 12 provinces have larger income than the national average. Considering the *Rural-Urban Gap*, on national average, the annual disposable income of urban households is about three times the annual net income of rural households.

Table 6. Comparison of Annual Income Level (2000)

	Per Capital Annual disposable Income of Urban Households (yuan)	*Per Capital Annual Net Income of Rural Households (yuan)*
National Average	6279.98	2254.30
East China		
Beijing	10349.69	4604.60
Tianjin	8140.50	3622.40
Hebei	5661.16	2478.90
Liaoning	5357.79	2355.60
Shanghai	11718.01	5590.40
Jiangsu	6800.23	3595.10
Zhejiang	9279.16	4253.70
Fujian	7432.26	3230.50
Shandong	6489.97	2654.40
Guangdong	9761.57	3654.50
Hainan	5358.32	2182.30
Central China		
Shanxi	4724.11	1905.60

Jilin	4810.00	2022.50
Heilongjiang	4912.88	2148.20
Anhui	5293.55	1934.60
Jianxi	5103.58	2135.30
Henan	4766.26	1985.80
Hubei	5524.54	2268.50
Hunan	6218.73	2197.20
West China		
Chongqing	6275.98	1892.40
Sichuan	5894.27	1903.60
Guizhou	5122.21	1374.20
Yunnan	6324.64	1478.60
Tibet	7426.32	1330.80
Shaanxi	5124.24	1442.30
Gansu	4916.25	1428.70
Qinghai	5169.96	1490.50
Ningxia	4912.40	1724.30
Xinjiang	5644.86	1618.10
Inner Mongolia	5129.05	2038.20
Guangxi	5834.43	1864.50

Source: West China Development (2001)

As can be seen from Table 7, a consumption structure relevant to the digital divide demonstrates that the ratio of expenditures on education, communication, and cultural and recreational services of East China to West China in urban areas amounts to 1.4:1, though their percentage of total consumption remains almost the same (i.e., East China (12.9%) and West China (12.7%)).

Table 7. Consumption Expenditures of Urban Households Relevant to Digital Divide (1999), yuan/person

	Total consumption	*Education*	*Cultural & Recreational Service*	*Communication*	*Education + Cultural & Recreational Service + Communication*
East China	5847.38	383.06 (6.55%)	144.49 (2.47%)	228.06 (3.9%)	755.61 (12.9%)
West	4288.74	285.22	101.74	158.17	545.13

China		(6.65%)	(2.37%)	(3.69%)	(12.7%)

Source: West China Development (2001)

Note: % refers to the percentage of total consumption.

If we take the computer price and network utilization fee into account, we will easily find that West China has to pay a relatively higher ratio of its GDP per capita for using computers and the Internet than East China. Table 8 shows that only the GDP per capita of East China can cover the cost of a computer worth RMB7000. The network utilization fee, as a percentage of GDP per capita, also displays the regional gap: East China (8.2%) and West China (19.4%).

Table 8. Computer Price and Network Utilization Fee as % of GDP Per Capita

	East China	*West China*
GDP per capita[1]	9522	4031
Computer price as % of GDP per capita[2]	73%	174%
Network utilization fee as % of GDP per capita[3]	8.2%	19.4%

Note: 1. Data is for 1998. 2. Assuming average computer price of RMB7000. 3. Assuming five hours a week and RMB3.00/hour for average Internet user, then an annual network utilization fee is about RMB780.

Source: West China Development (2001).

Educationial Level Gap

As the new economy is also called the knowledge-based economy, the educational level gap among different groups of people is quite relevant to the digital divide. If we take the illiterate and semi-literate population ratio as the indicator of general educational level, the gap between East China and West China is fairly large. Table 9 shows that the ratio of illiterate and semi-literate population aged 15 and over in East China is mostly smaller than this ratio in West China.

Table 9. Illiterate and Semi-Literate Population as % of Total Population Aged 15 and Over by Region (1999)

Region	*% of Total Aged 15 and Over*
National Total	**15.14**
East China	
Beijing	6.45
Tianjin	8.03
Hebei	11.42
Liaoning	7.18
Shanghai	8.68
Jiangsu	16.79
Zhejiang	15.70
Fujian	18.46
Shandong	20.15
Guangdong	9.23
Hainan	14.58
Central China	
Shanxi	9.17
Jilin	6.81
Heilongjiang	9.77
Anhui	20.28
Jianxi	13.15
Henan	16.31
Hubei	14.98
Hunan	11.13
West China	
Chongqing	14.75
Sichuan	16.77
Guizhou	24.46
Yunnan	24.34
Tibet	66.18
Shaanxi	18.29
Gansu	25.64
Qinghai	30.52
Ningxia	23.32
Xinjiang	9.77
Inner Mongolia	16.44
Guangxi	12.35

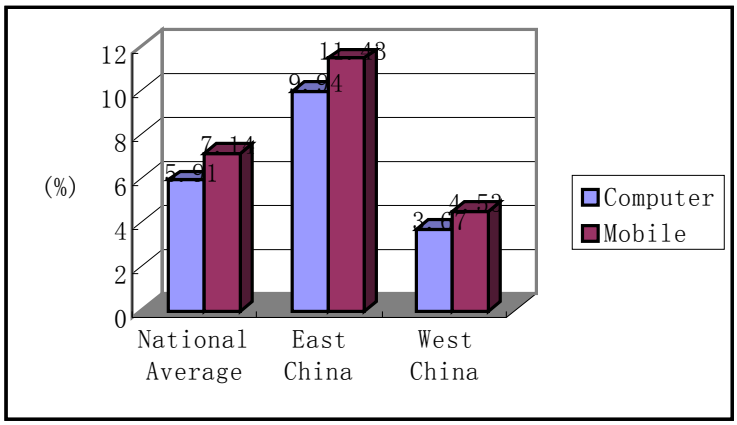
Source: *China Statistical Yearbook 2000*.

Information Infrastructure Gap

The comparison between the level of development of the information infrastructure in the West and the East could be another direct indicator of the digital divide. Figure 6 illustrates a big difference in the number of computers and mobiles subscribers per 100

urban households in the West and the East. Both computer and mobile penetration in the West is only about 1/3 of that in the East. Table 10 points out that the penetration rate of telephony in West China is only half of the national average, with some West provinces like Gansu and Tibet are even below the West China Average.

Figure 6. Number of Computers and Mobiles Owned by Per 100 Urban Households (1999)



Source: Editorial Department of *West China Development* (2001, No.4)

Table 10. Telephone Penetration by Region (2000)

Region	National Average	West China					
		Average	Gansu	Sichuan	Ningxia	Yunnan	Tibet
Penetration Rate of Telephones (%)	16	8	8.2	7.18	11	12	4.7

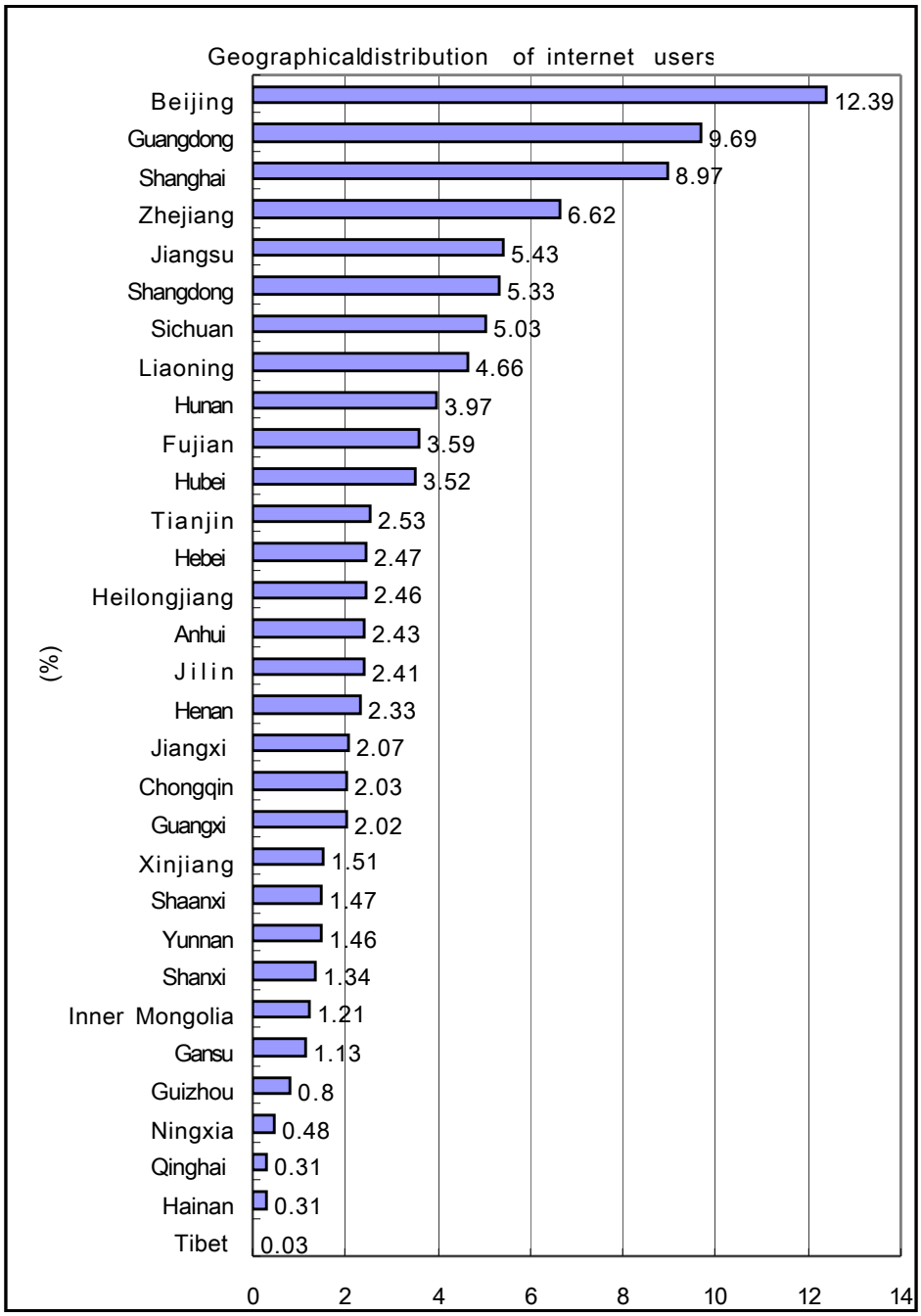
Source: own calculations; data from 2002-06-25

Geographical Distribution of Internet Users and Domain names

Figure 7 and Figure 8 show the geographical distribution of Internet users and domain names, respectively. Both figures clearly picture a big difference in numbers of Internet users and domain names among different regions.

As for Internet users, the bottom 11 provinces where Internet penetration is lower than 2%, together account for only 10% of the total number of Internet users, while Beijing, Guangdong and Shanghai are responsible for about 1/3 of the total number of Internet users. The geographical distribution of domain names highlights the same phenomenon, but differences are still much larger. The top three regions (Beijing, Shanghai, and Guangzhou) account for 60.17% of the total number of domain names, while the bottom-ranked 15 provinces (each region individually counts for less than 1%) are responsible for only 8.43% of the total.

Figure 7 Geographical Distribution of Internet Users (2000)



Source: CNNIC (2001).

Figure 8. Geographical Distribution of Domain Names

3. Government Policies for the Development of IT Industry

In China's central government plan, IT industry is expected to become one of the leading industries for growth and structural upgrading of the economy. But how will it be possible to fulfill this target while China is challenged by unfinished industrialization and its WTO entry? The following part covers the central government policies that will dominate China's development of the IT industry in the near future.

3.1 The Principle of Comparative Advantage

Before touching on the detailed government policies for the development of China's new economy, a general principle of comparative advantage should be insisted on. First, China's existing industries, including traditional labor-intensive industries representing China's current comparative advantage, should vigorously use new IT to reduce costs, and improve their competitiveness and profitability.

Second, traditional industries still have a great future in China. Actually, many so-called "old" industries are still "new" in China, such as automobile industries. More than a half of China's population has not yet been involved in the consumption of electronics. Housing development has just opened as an industry. Various services have just been discovered as viable businesses. The incoming massive urbanization will keep the construction industry further booming. It is easy to predict that over 90% of income growth of Chinese households in the next 50 years will be spent on the products of the so-called "old industries". China may just take over many of the so-called "sunset" industries in developed countries to fully utilize its comparative advantages and to create non-farm jobs for more than 500 million present farmers in the next few decades**. In short, the growth of the Chinese economy and its process of catching up will mainly rely on the "old industries" rather than the IT industry, though we have**

acknowledged the importance of the development of IT industry.

3.2 Challenge of WTO Entry

China finally entered the WTO at the end of 2001. What challenges does it pose for the development of Chinese IT industry? Here we take the telecom sector, a sector playing a key role in IT industry, as an example of challenges to the WTO entry.

Table 11 presents a timetable for liberalization of China's telecom sector after the WTO entry.

Table 11. WTO timetable for telecom sector liberalization

Sector	Phase	Permitted level of foreign investment	Date	Geographic Limit
VAS, paging, Closed user group	I	30%	1/1/2000	Beijing, Shanghai, Guangzhou
	II	49%	1/1/2001	Extended to 14 other cities
	III	50%	1/1/2003	Nationwide
Mobile	0	0%	1/1/2000	N/A
	I	25%	1/1/2001	Beijing, Shanghai, Guangzhou
	II	35%	1/1/2003	Extended to 14 other cities
	III	49%	1/1/2005	Nationwide
Fixed service (Including long distance)	0	0%	1/1/2000	N/A
	I	25%	1/1/2003	Beijing, Shanghai, Guangzhou
	II	35%	1/1/2005	Extended to 14 other cities
	III	49%	1/1/2006	Nationwide

Source: The Yankee Group (1999).

Beside the above requirements and timetable for the telecom sector, China has also agreed to adopt regulatory reforms consistent with WTO's Basic Telecommunication Agreement (BTA). It includes an establishment of an independent regulatory authority, introduction of cost-based pricing principles, technology-neutral scheduling, and rights of interconnection for different carriers. Furthermore, China has also agreed to participate in the Information Technology Agreement (ITA) and will eliminate all import tariffs on information technology products (including telecom equipment, computers, microprocessors, and Internet-related equipment) by 2005. Tariffs on IT products will fall from an average of 13.3% to 0% by 2005. Under the agreement, China has also agreed to remove quotas and other quantitative restrictions on the supply of telecom equipment.

China's WTO entry will undoubtedly cause much fiercer competition in IT industry. Therefore, the government has to further push forward the regulatory reform not only to meet the requirements of WTO but to speed up the development of China's IT industry.

3.3 Convergence among Networks of Telecom, Cable TV and Computers

Nowadays, merging of telecom networks with computer networks has become a reality in China in terms of technology, networking, markets and operations. The key issue now is how to combine the telecomn network with that of cable TV. The integration of the three networks will be a dominant trend in the IT industry in the near term. This can allow Chinese households faster access to the Internet and multi-media services in voice, data and video.

To embrace this trend, MII recently urged opening-up of the lucrative telecom market for cable TV companies and wide access for telecom firms to broadcasting and TV transmission market. It should pave the way for smooth convergence among telecom, cable TV, and computer networks. No doubt open access in the telecom and cable TV markets may help lay out a fair game in the booming markets in China, and upgrade interactive services for consumers.

3.4 Integration of Digitalized 3C Industries

Mobile computing and ordinary computing have become an important orientation for IT development. The computer has entered a network-based computing technology age. On one hand, PCs will continue their development course towards high-performance, multi-media, low cost and networking. On the other hand, portable computers, varieties of mobile multimedia information terminals, and various kinds of handset information terminals will converge with mobile computing and digital communication. The computer-communication integrated products have been rolled out and demonstrated huge market potential.

With the construction of broadband and high-speed networks, the network function will be enhanced and information services will be expanded. Pushing the development of optic fiber communication in a big way, especially the auxiliary equipment for high-speed broadband networks, high-end network servers, routers, all kinds of network access equipment, and a range of information terminals, will be the prime orientation for the development of the computer industry. The convergence of networking and digitalization will penetrate the consuming area as well and bring out more 3C (computer, communication and consumer-electronics) digital products. It will have tremendous market potential in China. It will represent the main orientation for the development of information industry and its products. It will also be the key area for state government investment. Digital cameras, network video cameras, and other new output peripherals of computers will become more intelligent and personalized. The on-going convergence of inter-disciplinary technologies, functions, and applications will result in new specialized computers and application systems designed for all kinds of industries. The new products will represent significant business opportunities. China's IT industry will move from the old age characterized by technology and products to a new age featured by applications and services.

3.5 Focus on Software and IC Development

Software and information service industry

During the l0th Five-year Plan period, China's information services industry is planning to develop application platforms comprising public application platforms and specialized products. It has also envisioned developing varieties of application software and application systems, basic software and tools, such as Chinese self-made operating systems and other products, with Chinese intellectual property rights. The plan also projects to organize software industrialization. The government will double its efforts to promote computer information services, especially electronic service systems based on Internet applications, and develop Chinese information processing, information retrieval, e-commerce, remote-education, e-medical care and other application software and systems. Moreover, the Chinese government will implement a government, enterprise, community and family going online project, and provide a public Chinese application software platform, as well as other information service support.

IC and new devices

In this regard, we will change our concepts and ideas to develop R&D by ourselves with chip designing as a breakthrough point to meet the needs of the growing market. The key equipment markets will include TV, digital audio-video products, handsets, telecom equipment, mobile multimedia information terminals, and digital 3C products. We will further optimize our favorable policy for production environment, adopt flexible mechanisms, and organize the construction of new IC production lines and self-renovation. We further plan to develop a batch of key chips and new devices, which are in great market demand, at an annual growth rate of 30%, and with our own intellectual property rights. Priorities will be given to various chips used in IC cards, DSPs (Digital Signal Processing), embedded-CPU, simulation circuits, industrial automatic control circuits, etc.

As for new devices, those will include display devices, large-screen flat color picture tubes, high-resolution display tubes, glass CRT, TFT-LCD, PDP, sensitive devices and sensors, green batteries, power electronic devices, optic electronic devices and so on. We will pay attention to specialized IC equipment, device production equipment and its delivery, research and commercialization of environmental protection equipment,

electronic instrument, and special materials.

3.6 Set-up of Information Security Industry

The soaring growth and wide application of computers and the Internet has brought along new problems in security. A lot of Internet crimes and Internet invasion events have occurred, causing considerable damage and plenty of other negative ramifications. Information security has now become a concern for many state governments, major industries, and leaders of companies and institutions.

The security of information systems, a high-tech area, is crucial to the safety and social stability of the country. It should be based on the development of domestic information technology and information industry. First, we must strengthen independent R&D and applications of key information technologies and products, which is the fundamental guarantee for information security. Second, we need to formulate relevant regulations and standards to improve the security of information communications. Third, surveillance and guidance on enterprise network security should be enhanced, while precautions should be taken for an international gateway bureau.

E-commerce, online banking, and many other Internet-based computer application systems will grow at an exponential rate. Development of China's e-commerce will be stepped up to facilitate free international trade, and enhance competitiveness after China's access to WTO, in particular. Hence, ensuring the secure and reliable operation of computer systems installed in all sectors of the national economy, finance and, foreign trade, constitutes another chal1enge for information security.

3.7 Bridging the Digital Divide

Generally, the digital divide is not an isolated phenomenon, but the extension or outcome of economic gaps, such as the rural-urban disparity, regional disparity and other types of differences. China’s economy features a dual structure of rural and urban areas. It thus worsens the issue of digital divide. So the fundamental strategy for bridging the digital divide is to reduce the disparity between rural and urban areas. Policy measures should be taken to remove the barriers for, for instance, the mobility of labor forces (e.g.,

registered residence system). The urbanization process should be promoted, too.

Another factor relevant to digital divide is regional disparity. Greater efforts should be put into development of central and western provinces to narrow the regional disparity. On the basis of a rapid information communications development, overall planning should be mapped out for systematic and focused development in western regions. In addition, international and domestic capital (government bonds, international and domestic low-interest loans) should be encouraged to invest in the development of the information communications industry in western and central China.

Furthermore, in order to bridge the digital divide, China and other developing countries, with help from international bodies, should have easier access to IT patents owned by advanced economies. Recently, a new U.N. report urged to forge strategic partnerships between the UN, private industries, foundations, donor governments, developing countries, and other relevant players on the international scene. The new body can play a key role by mobilizing, through voluntary contributions, technological resources (e.g., new technologies) for use in developing countries. For example, the new body may subsidize or promote preferential policies for developing countries to apply for patent licenses. If this new body (or some other international body) succeeded in lowering the cost (or barrier) of high-tech patent licensing, then it would turn out to be an alternative to bridging the digital divide.

References

[1] BNP Paribas (2001), *China TMT*, March.

[2] China Statistic Bureau (2000), *China Statistical Yearbook 2000*, China Statistics Press.

[3] China Statistic Bureau (2001), *China Statistical Yearbook 2001*, China Statistics Press.

[4] CCIDnet (2000), ***E-commerce In China: The CCIDnet Survey*** 2000, Beijing: China Center for Information Industry Development.

[5] Christine Zhen-Wei Qiang and Lixin Colin Xu (2000), Reforming China Telecom, forthcoming paper for World Bank.

[6] CINIC (2001), ***Survey on China's Internet Development***, Beijing: China Internet Network Information Center.

[7] Dai Shuang (2001), Prospects of China's Information Industry, *China Telecommunication Construction*, Jan/Feb.

[8] West China Development (2001), Data Window, *West China Development*, No. 4 & 5.

[9] 2002-06-25

[10] 2002-06-25

[11] MII (2001), Main Indicators for Telecommunication Development, *Ministry Bulletin*, Ministry of Information Industry.

[12] Shu Hongfu and Lu Yun (2001), Patent in IT Industry should not be Ignored, *Science & Technology Daily*, August 9th.

[13] Wang Baolai (2001), The Background, International Comparison and Reform Trend of China's Telecom Tariff Adjustment, *References for Economic Research*, 2001-38I-3.

[14] The Yankee Group (1999), *The Yankee Group Report: Wireless/Mobile Asia-Pacific*, Vol. 7 No. 18, December..

[15] Zhang Qi (2001), Building up a modern electronic information industry, *China Wireless Communications*, Jan/Feb.