China

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Overview

China is a vast country stretching from the western fringes of Asia to the shores of the Pacific Ocean. The country experiences a range of climates and possesses a diversity of landforms. It has a surface area of 9,596,960 square kilometres, of which 97.2 percent is land and 2.8 percent is water. China is also well known as the most populous country in the world with a population of 1.3 billion[1] (within the mainland in 2000), of which 91.6 percent are Han and the remaining 8.4 percent are from 55 minority groups.[2] These minority groups speak 72 languages, of which 54 have written forms and 25 are still in use. For the Chinese language, there exists 7 dialect regions and over 100 dialect communities.[3] Mandarin is the official language in the country, and Chinese is one of the working languages in the United Nations. Chinese speakers represent the largest linguistic group in the world.

There is a sharp difference in economic development between different regions in the country. The coastal areas, the special zones and the central cities in the hinterland have prosperous business communities and have access to advanced science and technology. The western and middle parts of the country are underdeveloped, but they possess tremendous potential for development. Agriculture plays a significant role in the national economy. According to statistics (which exclude Hong Kong, Macau and Taiwan), China's GDP was RMB 10,200 billion in 2002, enjoying an increase of 8 percent over the previous year based on comparable prices.[4] Preliminary statistics from the Customs Office show that the total value of imports and exports was US$174.5 billion (US$1 is about RMB 8.27) for the period January to April 2002. There was an increase of 10.5 percent to US$91.4 billion in exports and an increase of 12 percent to US$83.1 billion in imports.[5] Foreign currency reserves amounted to US$274.6 billion by the end of November 2002.[6]
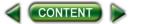
There are 9 network operators and about 200 ISPs in China that have the licence to provide services to all the provinces. The network operators enjoy independent rights of international exports, and the total value of their international bandwidth exports reached 9,380 Mbps by the end of 2002, up 1,782.5 Mbps from December 2001 but down 1,196.5 Mbps from June 2002.[7]

Among families living in urban areas, 38 percent own computers, compared to a national ownership rate of 11 percent.[8] A survey conducted by the China Internet Network Information Centre (CNNIC) in January 2003 showed that the number of computers logging on to the Internet was about 20.8 million. Of this total, 14.8 million used dial-up connections, while the remaining 6.0 million used other forms of dedicated connections.[9]

The number of telephone subscribers, by December 2002, amounted to 214.4 million with a penetration rate of 33.7 telephones per 100 people. The number of mobile phone subscribers amounted to 206.6 million with a penetration rate of 16.2 telephones per 100 people. The proportion of villages that had telephones was 85.3 percent.[10]

The CNNIC survey in January 2003 revealed that the current number of Chinese netizens[11] was 59.1 million or 3.5 times that for the same period in 2000 and 95.4 times that for 1997. Male netizens accounted for 59.3 percent and female 40.7 percent. The largest group was the 18–24 years age group (37.3 percent), while those under 18 years (17.6 percent) and those 25–30 years old (16.9 percent) took second and third places.[12] The netizens surfed the Internet mainly from home (62.1 percent) and the workplace (43.3 percent). Most of them paid for their own connections (77.1 percent), a much smaller group used connections at their workplace (10.1 percent), and a third group who used connections paid for by themselves as well as at their workplace accounted for 12.8 percent.[13] In terms of the cost of Internet access per month 39.5 percent spent less than RMB 50, 30.6 percent spent RMB 51–100, and 21.9 percent spent RMB 101–200. Netizens surfed the Internet for two main purposes: to find information (53.1 percent) and for entertainment (24.6 percent).[14]

There is a sharp digital divide between the eastern and the western parts of the country. This is obvious in indicators such as per-capita telecommunications services consumption. The divide is particularly clear in rural areas. For instance, in May 2001, the reach of the fixed-line telephone network in the rural areas of the more developed eastern parts was about 4.1 times that of the rural areas in the west of the country.[15]

However, it should be pointed out that the east-west digital divide is not as pronounced as the economic disparity between the two regions. In fact, heavy capital investments have been made in the western hinterland in response to the government's call to eliminate the digital divide. The development level of the telecommunications industry there now exceeds the level of local economic development. From 1996 to 2000, the average growth rates of the fixed-line telephone network and of the cellular phone network were about 4 and 13 times that of the local per-capita GDP, respectively.[16] In addition, the difference in the proportion of netizens between the eastern[17] and the western[18] regions has dropped from 54.1 percent[19] in 1997 to 26.6 percent[20] in 2002.

The increasingly sophisticated operations of IT companies in recent years have led to a corresponding demand for IT workers with more sophisticated skills. The preference now is for people who have a range of IT skills and ideally possess work and professional experience from other fields in addition to IT.

Content

Chinese websites account for 81.4 percent[21] of all websites visited by Chinese netizens. The total number of domain names registered under ".cn" is 179,544.[22]

Agriculture and rural development

At present, there are 1,600 Chinese agricultural websites,[23] including those of agricultural enterprises (37 percent) and the government (17.4 percent) as well as educational and technological websites (16.4 percent).[24] Most of them provide market information, science education, policies and management (61 percent),[25] as well as some e-commerce.

Industry and business

About 50 percent of large and medium enterprises publish their product information on the Internet[26] (as of end of 2000), and company websites account for 77.8 percent[27] of all Chinese websites (as of June 2001).

Health and nutrition

Chinese health and medical websites fall into three categories: medical knowledge, medical e-commerce, and industrial and research information.

China facts

Total population: 1,295,330,000 (2001)[a]

Rural population as a percentage of total population: 63.91% (2000)[a]

Key economic sectors: Energy, mining, manufacturing, construction, transport, storage, post and telecommunications, wholesale and retail trade, catering services, tourism, finance and insurance, real estate

Literacy in the national language(s)*: 93.3% (2000)[a]

Literacy in English: 12.7% (2001 estimated)[b]

Computer ownership per 100 inhabitants: Approximately 11 (2002)[c]

Telephone lines per 100 inhabitants: Approximately 32 (2002)[d]

Internet hosts per 10,000 inhabitants: Approximately 2.2 (2002)[e]

Cell phone subscribers per 100 inhabitants: Approximately 15 (2002)[d]

Number of webpages in the national language(s): 92.45%

Number of webpages in English and other languages: 7.6% (2001)[f]

National bandwidth to and from the country: 10,576.5 Mbps (2002)[e]

Sources:

(a) National Bureau of Statistics (2001). *The main Data Communiqué of the Fifth Census of China (2000)* (No. 1).

(b) This refers to the proportion of English learners, numbering 65 million, in the total population. Lingo Media <http://www.lingomedia.com/products/markets.html>.

(c) Liu , Xiaofeng (2002). Jiajia: Talk about the advantages of Jiajia-e.

(d) Ministry of Information Industry (2002). *Accomplishments of the Main Indicators of the Communication Industry in September*.

(e) CNNIC. *Statistical Report on China's Internet Development 2002/7*, p. 6.

(f) CNNIC (2001) .*Survey Report on the Quantity of China's Internet Information Resources.*

* Illiteracy refers to people aged above 15 years who are unable to read and write.

Technology

Chinese technological websites fall under three categories: central and local governments technology, industrial technology, and technological associations, covering the areas of steel, architecture, water conservancy, aerospace, metallurgy, light industry, electric power, etc.

Government

By the end of June 2002, 81.1 percent of all provincial government and ministerial departments had established homepages and 57.5 percent of provincial and municipal government departments had established websites.[28] The content and services provided by these websites include function/service introduction (87 percent), government announcements/law and regulations (79.2 percent), government news (77.6 percent), industrial/regional information (76 percent), statistics query (21.9 percent), and online consultation/complaints (5.7 percent).[29]

Political groupings

Major Chinese political groups, such as the All-China Trade Union and China Communist Youth's League, have set up websites to provide basic information about the groups.

Culture and literature

Chinese cultural websites specialise in various themes. Television and movies, music and literature are the main interests of netizens.[30]

News and current affairs

News has become the main interest of Chinese netizens, with 75.8 percent of them making regular visits to news websites.[31] Chinese news websites fall into three categories: traditional media, commercial gateways, and local news sites.

Commerce

By 2001, 1,345 B2B websites had been set up (149 comprehensive and 1,196 professional)[32] and the electronics industry was the most active participant in e-commerce (35.1 percent).[33] A year later, there were 2,056 Chinese B2C websites (270 comprehensive and 1,786 professional).[34] These websites sell mainly cheap consumer items.

Tourism

There were more than 300 tourism e-commerce websites in 2000,[35] which were operated mainly by website companies and travel agents. Besides services such as tourist information and reservation, the sites have started to develop online reservation and online payment services. They are also the earliest content providers using WAP.

Important local sources of content

<http://www.sina.com.cn> This is the largest and most comprehensive Chinese website in the world. It is in Chinese.

<http://www.sohu.com> Founded in August 1996 and developed from the first Chinese search engine. It is in Chinese.

<http://www.163.com> This famous Chinese website is a two-time winner of the Best Ten Chinese Websites Award from CNNIC. It is in Chinese.

<http://www.ce.net.cn> This is the largest Chinese B2B e-commerce website. It uses Chinese and English.

<http://www.chinachamber.com.cn> Established by the All-China Industrial and Commercial Union, this site went into partnership with <http://www.ce.net.cn> in May 2000. This site is in Chinese and English.

<http://www.alibaba.com> This is the world's largest marketplace for global trade, offering information on 27 industry categories. It has initiated the fourth Internet commercial mode: e-market. As a supplier, it provides a special platform for Chinese exporters to display their products and information and it targets the global buying community. The site is in Chinese, English, Japanese and Korean.

<http://www.rongshu.com> This is the biggest Chinese cultural and artistic website with an average of 6,000 new articles submitted daily and about 750,000 articles in its archive. It uses Chinese.

<http://www.ctrip.com> This website introduces scenic spots all over China and provides online reservation services. It is in simplified and traditional Chinese as well as English.

<http://www.people.com.cn> Established by the newspaper *People's Daily,* this site disseminates information about China in seven languages: Chinese, English, Japanese, French, Russian, Spanish and Arabian.

<http://www.xinhuanet.com> Established by the national Xinhua News Agency, this site supplies international news 24 hours a day in seven languages: simplified and traditional Chinese, English, French, Spanish, Russian, Arabian and Japanese. About 5,000 news items are published daily.

CERNET <http://www.edu.cn> This is a national academic computer network established principally to serve educational and research institutions. It is in Chinese and English.

<http://ccidnet.com> This is the largest Internet and IT information service and commercial service provider. The number of daily visits to this website had reached three million, and the number of registered users, one million by October 2002. It uses Chinese and English.

<http://www.joyo.com> This is a comprehensive e-commerce website, with more than two million users.

<http://www.999.com.cn> This is the largest Chinese health website in the world. It provides health-care information.

Online services

E-government

The development of e-government in China covers 12 areas. They include central and local government macro economic adjustment and control, tax, customs, public security, social security and national flood control.[36] The tax service allows taxpayers to file taxes round the clock.

Distance education and e-learning

Since 1998, 67 Chinese colleges and universities have developed distance education.[37] By March 2001, distance education had been implemented in eight disciplines and 51 majors, and degree education had covered four levels: graduate retraining courses, junior college to undergraduate, high school to undergraduate, and common junior college.[38] Non-degree education includes refresher courses. At present, distance education in the western part of the country is relatively undeveloped and e-learning in primary and middle schools is weak as well.

E-commerce and e-business

E-commerce is still in its infancy. Although the release of CNNIC's *Survey Report 2003* confirmed that China's Internet population has become the world's second largest, two-thirds of Chinese Internet users have yet to make their first online purchase. Similarly, the United Nations Conference on Trade and Development's (UNCTAD) *E-Commerce and Development Report* showed that China's e-commerce transactions totalled US$9.3 billion in 2000, representing merely 0.87 percent of its GDP.[39]

Obstacles to the rapid expansion of e-commerce throughout the country include the following factors: low income levels, logistical difficulties, lack of a credit system and interbank settlement capability, as well as reliance on traditional payment methods. Guangzhou, Shanghai and Beijing are the three leading players in e-commerce in China because of high PC penetration, the popularity of Internet use and a developing distribution network. Consumers in these cities have also become comfortable with making online payments. Although about 20 million smart cards were sold in 2001, indications are that they have not been used on a large scale.[40] Many online customers still make their payments offline by cash on delivery, postal order or bank transfer. Ongoing reforms in the banking system will eventually enable online payments to be honoured more extensively.

Security and trust are also major hindrances to the development of e-commerce in China. Recently, in an attempt to remove these obstacles, Guangdong Province has proposed a law which will make secret codes, passwords and fingerprints as legitimate as written signatures to help formalise electronic transactions. It will be China's first law on e-commerce. More initiatives are being considered by the government. The Ministry of Justice set up a special R&D team to develop an E-Commerce Security and Creditability Solution which enabled the launch of an online notary system in 2002 to oversee online transactions.

After China's accession to WTO, an increasing number of Chinese enterprises are under pressure from customers in developed countries to adopt e-business methods. According to UNCTAD's report (2002), the massive size and potential of the market in China will be the determinant for the growth of e-commerce in the Asia-Pacific region in the medium term and of e-commerce volumes globally.[41]

Telemedicine

Many hospitals in China have acquired video-based teleconferencing systems and are delivering telemedicine services. However, such services are expensive. The future of telemedicine in China lies in low-end systems that match the capacities of telephone lines, computers and Internet-based applications and enable physicians and patients to navigate the complexity of the health-care system and to obtain health information.

E-conference

Although an e-conference infrastructure and the necessary equipment have been introduced and developed,[42] their full potential remains to be tapped in China. High costs are currently an inhibitor to e-conferencing being adopted nationwide.

A cost-effective multi-point videoconferencing system via Internet or intranet networks will probably enjoy greater demand in China as such a system will strengthen both the internal and external communication of an organisation, facilitate staff training and increase competitiveness in the international market.

E-forum

E-forum is very popular over the Chinese Internet, covering current affairs, news, economy, sports, entertainment and various other disciplines. Current affairs and news forums are influential. The Power Forum of <http://www.people.com.cn> has been visited more than 100 million times.[43]

E-community

Websites such as Chaoyang Beijing[44] and Shanghai Community Service Net[45] have implemented e-community services covering health care, entertainment, training, welfare, etc. Many communities in the cities have built broadband networks and are evolving into intelligent communities.

ICT industries and services

The growth rate of the IT industry has been maintained at two to three times China's GDP growth rate for the past ten years. The value of the communications and electronics industries increased from 1.4 percent of GDP in 1989 to 4.2 percent in 2001. The total value of the electronics industry reached RMB 1,300 billion by the end of 2001, accounting for 10 percent of the total industrial value of the country. The sales volume was RMB 890 billion and the export volume amounted to US$65 billion. By the end of 2001, the ICT industry had attracted foreign capital worth US$70 billion, and 61 countries and territories had invested in the ICT sector in China.[46]

The telecommunications industry has also made significant progress. The switching capacity of the GSM network reached 220 million lines in March 2002. China's GSM network has become the largest in the world. The number of fixed-line telephones reached 200 million, which is also ranked first in the world. Both the number of wireless calling users (70 million) and the number of mobile phone users (145 million) also rank highest in the world.[47]

The fixed assets of the communications industry had grown to over RMB 1,000 billion in 2001 compared with RMB 24.5 billion in 1989. The total length of the fibre optic network was 1.97 million kilometres.[48] During the first half of 2002, the total number of Chinese computer products sold was 4.1 million with a sales value of RMB 33.4 billion. This represented an increase of 17.2 percent and 11.3 percent, respectively, over the same period in 2001.[49]

The year 2001 was the "the year of broadband" in China. The drop in prices of ADSL equipment and subscription rates accelerated and helped to promote the wider adoption of ADSL.

During the period 1991–1999, the sales volume of the Chinese software industry increased from RMB 460 million to RMB 17.6 billion. Its growth rate exceeded the average growth rate of the software industry in developed countries.[50] According to CCID Consulting, the sales volume of the software market grew to RMB 34.6 billion in 2002, which represented an increase of 22.1 percent over 2001. Also, the sales volume of the information service market in China had grown to RMB 49.6 billion or an increase of 23.5 percent over 2001.[51]

On the services side of the industry, China had more than 96,200 customer service centres by the end of 2001. The sector was worth RMB 10,638 billion and involved 620 organisations. Nearly half (49 percent) of the call centres provided support for application software, which formed the main business of the sector.[52]

Examples of innovative and key initiatives

The government is implementing three large projects. They are the Network Project of Government, the Network Project of Enterprises and the Network Project of Families. During the Tenth Five-Year Plan period, China will invest RMB 1,700 billion to set up communication networks which are some of the biggest in the world. The networks will deploy advanced technologies, designed to be secure and dependable, and aim to support the economic and social development of the country.[53]

The e-government project

The development of e-government started in the 1990s.[54] The main e-government project was launched in April 1999.[55] In July 2002, the development of e-government entered a new stage of comprehensive planning and development.[56] There are three main stages in the development of this project:

1. Two unified platforms of an intranet and an extranet were established. Physical isolation was set up between the intranet and the extranet, as well as between the extranet and the Internet. The e-government intranet is intended for government departments above the sub-provincial level. It is physically isolated from the network intended for users below the sub-provincial level. The extranet provides professional services to the public.[57]

2. The "12 Golden Projects" involve every aspect of high-level decision-making. They cover macro-management, tax revenue, public finance, finance, audit, social stability, modernisation of agriculture, "defending and beating the false", flood prevention, and management of droughts. Four of the projects have been launched: Resources System for Official Business, Golden Customs Project, Golden Tax Project and Financial Supervision Project (including Golden Card). The projects are being improved continually and preliminary results have been obtained. China is now launching the development of eight business systems related to the other eight Golden Projects. They are the Macroscopic

Policy Administrative System, Golden Finance Project, Golden Audit Project, Golden Shield Project, Social Security Project, Golden Quality Project, Golden Water Project, and the Golden Agriculture Project.[58]

3. Information resources development includes the building of two information systems and four databases: population database, corporate sector database, natural information resources database and macroeconomic database.[59]

The government has gathered about 80 percent of useful social information resources. It is now the biggest owner of information resources, which include more than 3,000 databases. Unfortunately, most of the databases are not available online because they are not open for public use.[60]

During the Tenth Five-Year Plan period, the e-government information resources will be developed. This will involve the design of an information resources catalogue system as well as an exchange system. Four databases will also be built.[61] The *Law on the Opening of Government Information* will be issued soon. It will establish the legal basis for the sharing of government information resources.[62]

Since 2002, the e-government development has focused on four areas:
• Refining the whole structure of the e-government
• Accelerating the development of ongoing projects of the central government so as to produce some immediate benefits, which can assist in driving other projects in the programme
• Accelerating the establishment of the management system, security mechanism and a series of routine management methods
• Strengthening the competitiveness of industries and their abilities to innovate[63]

The government invested RMB 28 billion in the development of e-government in 2001. It is estimated that expenditure in 2002 would reach RMB 35 billion, with an annual increase of nearly 25 percent after that. The 2002 expenditure included RMB 25 billion for hardware, RMB 4.5 billion for software, and RMB 5.5 billion for information services.[64] This project has greatly improved the development of the IT market. It is forecast that the national e-government project market will be worth about RMB200 billion in the next five years, with software accounting for more than RMB 30 billion.[65]

The enterprise Internet project

The 2001 enterprise Internet project has two main goals:
• To organise the China Internet Exchange Meeting and encourage the participation of enterprises in the meeting, which aims to promote Internet use by enterprises.
• To assist enterprises in connecting to the Internet and developing e-commerce capabilities.
At present, some groups, such as Baoshan Iron and Steel

Corporation, Legend Group, and Haier, have succeeded in the development of online marketing/sales and procurement capabilities.[66] However, the number of enterprises using the Internet remains very low.

The family Internet project

The family Internet project has adopted the theme of "Information Construction of the Community". It was launched on 20 December 2001.[67] The project aims to develop all the elements required for bringing about higher Internet usage. The elements consist of users, telecommunications service providers, content providers and enterprises.[68]

Enabling policies

The government has issued a series of policies and measures on ICTs over the years. They include "Decisions of China Central Communist Party and the State Council on Strengthening Technology Innovation, Developing High Techology and Realising Industrialisation",[69] "Transient Regulations on the Innovation Funds of Small and Medium Enterprises of Science and Technology"[70] and "Policy Suggestions on Encouraging and Promoting the Development of the Small and Medium Enterprises".[71] These policies are all aimed at encouraging the development of high-tech industries through financing and tax incentives.

Many policies encourage the development of high-tech and new technologies, support practical technological applications and safeguard the intellectual property right of the new technologies developed, such as "Regulations on Application Promotion of Scientific and Technological Achievement",[72] "State Regulation of Science and Technology Award",[73] "Specific Rules of the State Regulation of Science and Technology Award"[74] and "Reform Scheme of the State Regulation of Science and Technology Award".[75] "Policies to Encourage the Development of the Software Industry and Integrated Circuit Industry",[76] issued by the State Council in 2000, provide favourable policies for the software industry and the integrated circuit industry not only in terms of tax incentives and financial assistance, but also in the form of government procurement programmes.

The government has proposed accelerating the penetration rate of the ICT sector in the Outline of the Tenth Five-Year Plan.[77] The important measures to be undertaken within this proposal include accelerating the implementation of a series of key projects; developing e-commerce; perfecting information networks; increasing Internet transmission speeds; promoting the convergence of telecommunications, television and computers; and developing core technologies.

The fast-track development of China's IT industry is ensured by strong policy support from the government. For

instance, the Digital Television Project has been listed as one of the 12 important projects of the Tenth Five-Year Plan. The government is aiming to make digital television widely available throughout China within 15 years.[78] It is forecasted that converting from analogue to digital television may help to create a market of more than RMB 1,000 billion.[79]

China's accession to WTO has brought about intense competition from the foreign counterparts of Chinese enterprises, especially in the telecommunications sector. In order to strengthen the competitiveness of China's telecommunications corporations, the government restructured the telecommunications industry and introduced competitive mechanisms. The huge telecom-munications corporation, China Telecom, has been restructured twice since 2000. Market-oriented operating mechanisms have been introduced into the industry. The government has also provided strong support to Chinese telecommunications corporations in their bids for the 3G mobile telecommunications world standard, TD-SCDMA, and the construction of CDMA and GPRS networks.

In October 2002, the Ministry of Science and Technology launched a RMB 200 million programme to narrow the digital divide in the western areas of China. The programme will build public information systems, conduct educational programmes on ICTs and promote the hardware and software industries. Priority will be accorded to the construction of communication infra-structure, business network development and the improvement of ICT penetration rates. Network computers running on locally developed open source software will also be actively promoted.

The local governments in the western areas are playing an active role in the programme. Chongqing has energetically promoted the application of ICTs among 1,000 enterprises drawn from ten industries. It has also prepared a plan to invest RMB 20 billion in building the Chongqing Infoport. RMB 14 billion from this investment will be spent on building the required infrastructure.[80]

Policy-making and research institutions

Ministry of Information Industry
<http://www.mii.gov.cn/mii/index.html>
This ministry was established in 1998 by merging the former Ministry of Post and Telecommunications and the Ministry of Electronics and Information. It is the main regulatory department of the IT industry.

Internet Society of China
<http://www.isc.org.cn/xhjs/index.htm>
The society was established on 25 May 2001 by Internet users, stakeholders and concerned research and educational institutions.

China Internet Network Information Centre (CNNIC)
<http://www.cnnic.net.cn>
Established on 3 June 1997, CNNIC is responsible for the registration of domain names, IP addresses and AS code distribution and management.

China Information Industry Association (CIIA)
<http://www.ciia.org.cn>
Established in March 1990, CIIA is an agent of the IT industry, comprising economic, science, technology and information units in the country.

Regulatory environment

There are four levels in the legal framework governing ICTs in China. The first level comprises the laws approved by the National People's Congress (NPC), the second level contains the administrative rules approved by the State Council, the third level is the legislative interpretations issued by the Supreme Court, and the last level is the administrative regulations formulated by the administrative sectors of industry, such as the Information Industry Ministry.

Laws and regulations governing the security of computer information system

- *The Criminal Law of the People's Republic of China*[81]
- *The Decision of Internet Security Formulated by the Standing Committee of the NPC*[82]
- *Regulation of Safety Protection of Computer Information System*[83]
- *The Interpretation of Legal Issues related to the Application of Laws concerning the Trial of the Cases of Disturbing the Order of Telecommunicationsmunication Market*[84]
- *Managerial Methods Governing the Security of Computer Information Networks and the Internet*[85]
- *Temporary Regulations for the Management of Computer Information System Secrecy*[86]
- *Regulations for the Management of Internet Secrecy of Computer Information Systems*[87]
- *Managerial Regulations for the Prevention and Treatment of Computer Virus*[88]

The *Criminal Law*, after amendments, has new articles concerning the punishment for breaching the security of computer information systems and for other computer-related crimes. Other laws and regulations are also provided with articles governing the punishment for criminal acts such as illegal access to computer information systems, privacy violation and copyright infringement. However, the existing laws and regulations do not give clear definitions of cyber crime and data protection. Therefore, they should be amended or new ones formulated in order to ensure network security and data protection.

Laws and regulations relating to the telecommunications market and WTO

China has been a member of WTO since 11 December 2001. The government's commitments concerning communication services (excluding the monopolised services of China Post) include express services, value-added telecommunications services and basic telecom-munications services. In order to fulfil these commitments to open China's telecommunications market, the government had formulated and amended some laws and regulations before China's accession to WTO:

- *Regulations of the Telecommunications Industry*[89]
- *Methods for the Management of Internet Information Services*[90]
- *Methods for the Management of Foreign-funded Telecommunications Enterprises*[91]

Intellectual property rights protection

The government has formulated laws governing patents, copyright and intellectual property. The following are related to the protection of the intellectual property of information products and computer network copyright:

- *Regulation for the Protection of Computer Software*[92]
- *Methods for the Registration of Computer Software Copyright*[93]
- *Interpretation of the Issues concerning the Applicable Laws Governing Disputes over Computer Network Copyright*[94]
- *Regulation for the Protection of IC Layout Design*[95]

National laws and regulations which have articles concerning the protection of information products and computer network copyright are:

- *Law of Copyright*[96]

Laws which include the copyright owner within the range of protection in the circulation of computer network are:

- *Regulation of the Implementation of Copyright*[97]
- *Regulation of the Implementation of International Copyright*[98]
- *Law of the People's Republic of China Against Unfair Competition*[99]
- *Law of Trademark*[100]
- *Law of Copyright*[101]

The government and its administrative units have formulated special laws and regulations governing the protection of domain names:

- *Methods of Management of China's Internet Domain Names*[102]
- *Detailed Regulations Governing the Implementation of China's Internet Domain Name Registration*[103]
- *Interpretation of the Issues of Applicable Laws of Civil Disputes over Network Domain Names*[104]
- *Methods of Solution of Disputes over Domain Names of China's Internet Network Information Centre*[105]

Laws and regulations governing Internet content

The government's management of content on the Internet is focused on news, advertising and special information. The relevant laws and regulations are as follows:

- *Methods of Management of Internet Information Services*[106]
- *Temporary Regulation of News Websites*[107]
- *Methods of Management of Internet BBS*[108]
- *Methods of Management of Internet Health Information Services*[109]
- *Temporary Regulation of Internet Medical Information Services*[110]
- *Notice of the Regulation of Broadcast of Movies and Television Shows through the Internet*[111]
- *Temporary Regulation of Internet Publications*[112]

Laws and regulations governing telecommunications and Internet management and operation

- *Methods of Management of Telecommunication Construction*[113]
- *Methods of Management of Licensing of Telecommunication Business*[114]
- *Methods of Handling of Inter-telecommunication-network Disputes*[115]
- *Temporary Regulations of the Management of the Internet Backbone Network*[116]
- *Regulation of the Management of Civil Telecommunication Interlink*[117]
- *Methods of Management of Network Accession Services Places*[118]

Laws governing the protection of e-commerce and consumer rights

Currently, there are no specific laws but some articles governing e-commerce, such as:

- *Law of Contract*[119]

Some articles are related to the legitimacy of electronic contracts and some are related to their validity:

- *Methods for the Management of Pilot Administration of Medical E-Commerce*[120]
- *Temporary Methods of the Management of Network Securities Authorisation*[121]
- *Procedures Governing the Ratification of Network Securities Company Authorisation*[122]
- *Temporary Methods of Management of Network Banking Services*[123]

There are no laws governing the legitimacy of digital certificates and digital signatures. Neither are there laws governing the protection of consumer rights in e-commerce.

Open source movement

There are more than nine million Linux users around the world and over 100,000 in China.[124]

Linux companies and products

There are more than ten large vendors of Linux-based software in China, some of which are:

Surfing Platform (China) Software Company[125]
This company was established in 1999 in Beijing and is the first supplier specialising in the production of Linux in Chinese in the country. It issued on 8 April 1999 XteamLinux 1.0. The company develops application software and solutions using the core technology of Chinese Linux operating system (OS).

Turbolinux[126]
This was the first Linux manufacturer in China. Its headquarters are located in San Francisco, California. It started operations in China in April 1999 and released the first Chinese Linux software: Turbolinux 3.0.2 Simplified Chinese. Its main business lies in Linux solutions.

China Microsoft Co. Ltd R&D Headquarters[127]
This company issued China Microsoft Linux (COSIX Linux) 1.x in September 1999. Its core product is Linux OS.

Beijing Redflag Software Technology Co. Ltd[128]
This company issued Redflag Linux 1.0 on 20 October 1999. Its core product is Linux OS and related products.

Promotion of Linux in China

Linux has been around in China for about ten years. Its adoption did not enter the mainstream until 1999 when the government defined its policy to use Linux across all ministries as a counter-measure to China's growing dependence on Microsoft Windows. Most recently, the government has reiterated its intention to promote Linux as the platform for e-government because of its open source nature and safety in deployment.

Promotion of sector administration
The Ministry of Information Industry has clearly stated in the Tenth Five-Year Plan that Linux will be pivotal in advancing China's software industry.[129]

The Linux Support Centre Project[130] was launched in April 2000 by China's Software Industry Association. The

domestic Linux manufacturers taking part in this campaign have issued their versions of the Chinese server OS and Linux application solutions in a well-coordinated way.

Linux World China[131] is the only Linux forum on special technology organised on an international scale in China. It has attracted Linux manufacturers from China and abroad. This conference is held annually.

Promotion of government procurement
In December 2001, Redflag Linux and China Microsoft Linux defeated Microsoft Windows OS[132] in supplying software to the government of Beijing. On 29 June 2002, NPC approved the *Law of Government Procurement*,[133] which clearly states that the government should give priority to domestically produced software if it is able to provide the same features as those produced by competitors. The promotion of e-government has, at the same time, provided an opportunity for the further development of Chinese Linux.

Industry executives and analysts predict that Linux will also expand into the server market as it gains increasing acceptance among enterprises, thereby eroding Unix's market share in this area.

China is now emerging as one of the world's Linux strongholds. The Evans Data Corp. 2002 Chinese Developer Survey found that two-thirds (65 percent) of Chinese developers expected to write applications for Linux in 2003, close to half (44 percent) had already done so.[134]

Research into ICTs

China's expertise in hardware R&D and its emergence as a manufacturing hub are well known. However, Chinese companies are only slowly progressing towards end-to-end product R&D. In the R&D sector, China is still at level one, where competitive wages and costs are its main strengths. It has still to progress to level two, with productivity and technological competency as its strengths.

The Party Central Committee and the State Council ratified the Outline of Development of High-Tech Research (Plan 863) in 1986. This strategic high-tech blueprint adheres to the principle of limited goals and priority focus. It has funded several key development projects, including ICT R&D projects such as 3G and applicable broadband comprehensive accession systems. Chinese enterprises such as Founder, Legend, Chunlan and TCL have established R&D centres, and built their own capacity for independent creativity. In the meantime, many scholars are very keen to explore the impact of the information highway, new technologies for the dissemination of information and new media for the masses.

Zhongxing Telecommunications Company of China is building a Shanghai R&D centre, which will employ 3,000 people. China Telecom Group has set up its R&D centre in Shanghai. The new centre will monitor development trends in the global telecommunications industry and study cutting

edge technologies and development plans for telecommunications networks, technologies and services. Based on its research, it will formulate technological development policies for the company and propose network development and technological applications.

It has become a trend for multinational companies to establish R&D centres in Beijing since the mid-1990s. In 1998, we saw the first wave of this kind of establishments. The centres which were set up include those belonging to Lucent-Bell Lab, Nokia, Microsoft and other large R&D centres. The Nokia Mobile Phone R&D Institution was founded in September 1999. In the same year, Motorola founded its research institute in Beijing; it now has 18 R&D centres throughout China, employing more than 1,000 researchers in China and other Asian regions. The thrust of these R&D centres is the localisation and development of new products. China has gradually become the main battlefield of these IT companies' R&D work.

Future trends

The government has developed a favourable environment for ICT development in terms of policy support, research subsidies and macro market control. The growth rate of the IT industry has been maintained at two to three times of GDP growth rate for the past ten years. In the outline of the Tenth Five-Year Plan, the government stated its commitment to achieve the development of the IT industry. Therefore, the ICT sector is expected to maintain its steady and continuous growth.

"Informationisation for industrialisation" is one of China's strategic decisions. In referring to information networks, President Jiang Zamin said:

> Our basic principle is proactive development, intensive management, avoiding the disadvantages and making use of the advantages, and attaining a major position in the development of the global information network.[135]

The promotion of e-government will also serve to spur the building of the information network for enterprises. The existence of a large number of traditional enterprises means that there is a huge potential market.

Although China's Internet industry has experienced twists and turns, the growth of Internet use has maintained a strong momentum. The current 59.1 million Internet users account for only 4.65 percent of the total population, so in this regard there is plenty of room for development in the coming few years and China may become the largest Internet market in the world.

The TD-SCDMA standard released by China is one of the 3G mobile telecommunications standards. China's mobile telecommunications operators are building the 3G mobile telecommunications network. It is estimated that the network will be available to users in 2003. The number of wireless Internet users is expected to increase rapidly in the coming two years.[136]

Digital television first emerged in China in 2000. However, it has been tested in only a few cities in the eastern area. A schedule to promote digital television has been made in Shanghai. It is forecasted that the market for digital television will mature by 2004 and that users in Shanghai will reach 400,000–500,000.[137]

Internet service provision has been monopolised by a couple of state-owned companies. Although there is competition among them, they also often work in coordinated ways. Therefore, the market share of these companies is fairly large. This may have a negative impact on the expansion of Internet access.

Owing to the limitation of price and the oversupply of the market, there will not be a significant rise in PC ownership. However, thanks to the promotion of e-government and e-education, the overall demand for ICT hardware will increase.

Under the guidance of the policy of stimulating domestic demand, there was improvement in China's telecommunications industry in the first half of 2002. There are now four large operators competing in China's telecommunications market: China Mobile, China Unicom, China Telecommunications and China Netcom.[138] The latter two are new operators founded in May 2002. With the accession of the country to WTO, foreign companies may now enter China's telecommunications industry. However, existing companies will maintain their leading position in the short term.

The government is sparing no efforts in maximising the positive impact of the Internet while minimising its negative impact. One of the activities of Plan 863 is China's Digital Library, which is sponsored by the government and launched in April 2000. This project may help to narrow the knowledge gap. Meanwhile, the government has passed several laws to control illegal activities and pornography over the Internet.

The structure of China's broadcasting system and market is very stable. In the coming years, the pattern of competition and share of revenue will not change significantly.

The government has always attached great importance to the role of web-based media in broadcasting and will put a firm grip on the political direction of the development of such media and news websites.

China's network security lags far behind the overall development of the network. Network security is a potentially huge market. In the meantime, the government will further support the development of and research into network security, taking economic interests and social impact into consideration.

The government's strategy of developing the western parts of the country, with the implementation of the policy of "informationisation for industrialisation" in these areas, may see the gaps narrowing between the eastern and western areas.

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China Computer Newspaper **<http://www.ciw.com.cn>**
This website provides information and services in Chinese related to China's informationisation, software, computer and the Internet.

China Education and Research Network <http://www.edu.cn>
This site provides information relevant to China's science and technology, educational policies and regulations as well as links to colleges and universities nationwide in Chinese and English.

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This website offers a variety of statistical survey reports on the Internet in Chinese and English.

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